NATURE OF FORENSIC SCIENCE AVAILABLE WITHIN THE NIGERIAN CRIMINAL JUSTICE SYSTEM AND ITS IMPLICATIONS FOR CRIME CONTROL IN SOUTH EAST NIGERIA

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Abstract
Forensic science plays a critical role in modern criminal justice systems by enhancing crime detection, investigation, and prosecution. In Nigeria, however, the integration and effectiveness of forensic science in the criminal justice system remain unevenly distributed and underexplored, particularly at the regional level. This study examines the nature and availability of forensic science within the Nigerian criminal justice system and assesses its implications for crime control in the South East region of Nigeria. The study utilized both primary and secondary data. The study employed a mixed-methods research design and used a multi-stage sampling technique to select a sample of 390. Data were collected through structured questionnaires and in-depth interviews with forensic experts, law enforcement officers, judicial personnel, correctional officers, and policymakers. Quantitative data were analyzed using SPSS version 26, applying descriptive statistics and Chi-square (χ^2) tests, while qualitative data were analyzed thematically. The study found that the criminal justice system makes use of a wide range of forensic evidence, including DNA analysis, hair analysis, and ballistic and tool marks, among others. The study found no statistically significant relationship between the availability of forensic science techniques and the effectiveness of crime control in South-East Nigeria. Thus, the presence or awareness of forensic science does not appear to have a strong or direct influence on crime reduction in the region. Findings further showed that forensic science capacity in South East Nigeria is limited in scope, infrastructure, and technical expertise, with reliance predominantly on traditional investigative methods rather than advanced forensic techniques such as DNA profiling, digital forensics, and forensic pathology. Based on the findings, this study recommends that the government should strengthen the forensic infrastructure and capacity by investing in modern laboratory facilities, equipment, and technology at both federal and state-level laboratories, with a focus on increasing accessibility in semi-urban and rural areas.

Keywords: crime control, criminal justice system, forensic science, Nigeria, South East

Introduction
Forensic science has emerged as an indispensable component of modern criminal justice systems, providing scientific techniques for the collection, preservation, analysis, and interpretation of evidence in criminal investigations and judicial proceedings. Its application has transformed crime control by improving investigative accuracy, strengthening prosecutorial outcomes, and reducing wrongful convictions (Houck & Siegel, 2015; Saferstein,

2020). Advances in forensic disciplines, including DNA profiling, fingerprint analysis, ballistics, toxicology, forensic pathology, and digital forensics, have enhanced the ability of criminal justice institutions to respond effectively to increasingly complex and technologically driven forms of crime. Consequently, forensic science is now regarded as a critical pillar of effective crime control and justice delivery globally (Saferstein, 2018; Houck & Siegel, 2015; Interpol, 2019).

In many developing countries, however, the integration of forensic science into criminal justice systems remains limited and uneven. Structural deficiencies, inadequate funding, lack of technical expertise, and weak institutional coordination often constrain the effective use of forensic evidence (Byard, 2016). These challenges are particularly evident in sub-Saharan Africa, where criminal investigations frequently rely on traditional policing methods such as confessions and eyewitness testimony, which are prone to error, manipulation, and human rights violations (Alemika, 2013). The limited deployment of forensic science in such contexts raises serious concerns about investigative credibility, judicial accuracy, and public confidence in the justice system.

Despite Nigeria's status as Africa's most populous country and one of its largest economies, forensic science development has not kept pace with the country's growing crime challenges. Criminal investigations in Nigeria have historically been characterized by a heavy reliance on confessional statements and circumstantial evidence, often obtained under questionable conditions, with minimal scientific corroboration (Nwankwo, 2020). This investigative culture has contributed to persistent problems such as poor crime detection rates, weak prosecution cases, prolonged trials, and miscarriages of justice.

Recognizing these challenges, the Nigerian government has introduced several legal and institutional reforms aimed at improving the efficiency and fairness of the criminal justice process. Notably, the Administration of Criminal Justice Act (ACJA) 2015 seeks to promote professionalism in criminal investigations, protect suspects' rights, and improve the handling of evidence. While the Act implicitly supports the use of scientific evidence, it does not by itself guarantee the availability or effective application of forensic science. The operationalization of forensic science remains dependent on infrastructural capacity, trained personnel, inter-agency collaboration, and judicial competence in evaluating scientific evidence (Adebayo, 2021).

Empirical evidence suggests that forensic science infrastructure in Nigeria is limited in scope and unevenly distributed. Existing forensic facilities are few, under-resourced, and often concentrated in major urban centers, leaving many regions without meaningful access to forensic services (Otu & Okeke, 2019). Even where forensic capabilities exist, their utilization is constrained by shortages of skilled forensic practitioners, inadequate equipment, weak quality assurance mechanisms, and challenges in maintaining the chain of custody (Houck,

2017; Saferstein, 2018; UNODC, 2011). As a result, forensic evidence is infrequently generated, inconsistently applied, and sometimes poorly understood within the criminal justice process.
South-eastern Nigeria has continued to experience diverse and evolving crime patterns, including violent offences such as armed robbery, kidnapping, and cult-related violence, as well as emerging forms of crime such as cybercrime (Nigeria Police Force, 2025; Suleiman, 2025). Nationwide data show that kidnapping and armed robbery remain major threats, with Nigerian police reporting hundreds of cases in 2024, including incidents of armed theft and

cultism, while cybercrime incidents continue to be recorded, reflecting broader trends in sophisticated criminal activity that extend across all geopolitical zones of the country (Nigeria Police Force, 2025). These patterns require more sophisticated investigative responses beyond traditional policing methods to effectively address both analogue and digital crimes (Suleiman, 2025).

However, despite growing recognition of the importance of forensic science, Nigerian law enforcement agencies still face significant gaps in forensic support, infrastructure, and technical capacity (Maxwell et al., 2025; Ofomata et al., 2025). Research and reviews of the criminal justice system highlight that forensic evidence remains underutilized in criminal investigations, with law enforcement agencies often relying heavily on testimonial and circumstantial evidence due to limited forensic laboratories, inadequate technical training, and procedural constraints (Maxwell et al., 2025). Collectively, these challenges indicate that, while there have been increasing calls for enhanced forensic integration, law enforcement in Nigeria, including the South-east, continues to operate with minimal forensic support relative to the sophistication of contemporary crime (Ofomata et al., 2025).

The limited availability and utilization of forensic science in South East Nigeria have significant implications for crime control. The absence of reliable scientific evidence undermines the capacity of law enforcement agencies to identify offenders, link suspects to crime scenes, and dismantle organized criminal networks. At the prosecutorial level, weak forensic support contributes to poorly substantiated cases, high dismissal rates, and prolonged judicial processes. Furthermore, courts often face difficulties in assessing forensic evidence due to limited exposure, lack of expert witnesses, and the absence of standardized forensic protocols (Adebayo, 2021).

Beyond institutional efficiency, the underdevelopment of forensic science has broader social implications. Public confidence in the criminal justice system is closely linked to perceptions of fairness, accuracy, and accountability. When investigations rely on coerced confessions or unreliable testimony, trust in law enforcement and judicial institutions is eroded. Conversely, the transparent and professional use of forensic science has been shown to enhance legitimacy, deter crime, and promote compliance with the law (Saferstein, 2020).

Despite the growing recognition of these issues, there remains a paucity of region-specific empirical research on the nature and availability of forensic science within Nigeria's criminal justice system. Much of the existing literature adopts a national or theoretical focus, with limited attention to regional disparities and localized crime control challenges. This gap is particularly evident in studies focusing on South East Nigeria, where forensic science capacity and its practical implications for crime control have not been sufficiently interrogated. Against this backdrop, this study examines the nature of forensic science available within the Nigerian criminal justice system and analyzes its implications for crime control in South East Nigeria.

Statement of the Problem

Despite its critical role in modern criminal investigations, forensic science remains underdeveloped and inadequately integrated into the Nigerian criminal justice system, significantly undermining the capacity of law enforcement agencies to detect, prevent, and prosecute crime effectively. In many parts of Nigeria, forensic laboratories are scarce, outdated, or absent, and there is a notable shortage of trained forensic experts, resulting in an overreliance on rudimentary investigative methods and external analysis for critical evidence processing. These institutional and infrastructural deficiencies compromise the quality and admissibility of

scientific evidence, delaying case resolution and weakening the evidentiary basis required for successful prosecution in courts of law.

In the South-East region of Nigeria, where crime rates related to complex offences such as murder, armed robbery, kidnapping, and cybercrime are on the rise, the limited availability and utilization of forensic science exacerbate existing challenges in crime control and justice delivery. The marginal presence of forensic capabilities impedes timely investigation, contributes to low conviction rates, and fosters public distrust in the criminal justice process. Consequently, there is a compelling need to investigate the nature and extent of forensic science available within this region's criminal justice system and to assess its implications for effective crime control and justice administration.

Research Objectives

These are the specific objectives for this study

1. To examine the types and levels of forensic science capabilities available within the Nigerian criminal justice system in South-East Nigeria.
2. To assess the influence of the availability and utilization of forensic science on crime control outcomes in South-East Nigeria.

LITERATURE REVIEW

Saferstein (2018) defines forensic science as the application of scientific principles and techniques to the investigation of crimes and the resolution of legal issues, particularly through the analysis of physical evidence. Houck and Siegel (2015) describe forensic science as a multidisciplinary field that applies chemistry, biology, physics, and other natural sciences to matters of law, especially in criminal investigations. Jackson and Jackson (2011) posit that forensic science is the use of scientific knowledge and methodology for the purpose of establishing facts and providing expert opinion in legal proceedings. Robertson, Vignaux, and Berger (2016) conceptualize forensic science as a system of scientific reasoning applied to the evaluation and interpretation of evidence for legal decision-making. Tilstone, Savage, and Clark (2006) define forensic science as the examination, evaluation, and interpretation of physical evidence using scientific techniques in order to assist the administration of justice. Houck & Siegel (2015) assert that within the context of the criminal justice system, forensic science serves as a critical interface between science and law, providing objective and reliable evidence that supports investigative decision-making and judicial outcomes.

Forensic science encompasses a wide range of specialized disciplines, including but not limited to fingerprint analysis, DNA profiling, forensic pathology, ballistics, toxicology, questioned document examination, and digital forensics. These disciplines collectively enhance the capacity of law enforcement agencies to reconstruct crime scenes, identify suspects, link offenders to criminal acts, and exonerate the innocent (Robertson et al., 2016). The effectiveness of forensic science, however, is largely dependent on the availability of adequate infrastructure, skilled personnel, standardized procedures, and legal frameworks that ensure the admissibility and integrity of scientific evidence in court.

Within the Nigerian criminal justice system, forensic science can be viewed as an emerging yet underutilized investigative resource, constrained by limited technological capacity, insufficient forensic laboratories, and inadequate professional training (Okoye & Onyekachi, 2019). As a result, criminal investigations often rely heavily on confessional statements and eyewitness accounts, which are susceptible to error, coercion, and miscarriage of justice. This limited

integration of forensic science weakens crime detection efficiency and undermines public confidence in the justice system.

Criminal Justice System

According to Cole and Smith (2019), the criminal justice system is *the collection of public agencies and institutions responsible for enforcing criminal law, adjudicating criminal cases, and correcting criminal behavior through punishment and rehabilitation*. **Siegel (2020)** conceptualizes the criminal justice system as *an interconnected network of government agencies that work together to control crime, maintain social order, and ensure the fair administration of justice.* **Peak and Giacomazzi (2016)** describe the criminal justice system as *a formal mechanism through which society responds to crime by detecting offenders, determining guilt or innocence, and imposing sanctions in accordance with the law*. **Packer (1968)** opined that the criminal justice system is *the institutional process through which criminal sanctions are applied, balancing the competing demands of crime control and due process*. **Alemika (2013)** defines the criminal justice system in the Nigerian context as *the set of legal institutions and procedures established to prevent and control crime, enforce laws, and administer justice in accordance with constitutional and statutory provisions*. Cole & Smith (2019) understand the criminal justice system as a network of formal institutions, legal norms, and procedural mechanisms established by the state for the purpose of preventing crime, enforcing the law, adjudicating criminal cases, and administering punishment or correction. According to Siegel (2020), it represents the institutional response to crime and deviance and is designed to maintain social order, uphold the rule of law, and protect individual and collective security within society.

Scholars commonly conceptualize the criminal justice system as comprising three interrelated subsystems: law enforcement, adjudication, and corrections. The law enforcement subsystem is responsible for crime detection, investigation, and arrest; the adjudicatory subsystem, which includes courts and prosecution services, determines guilt or innocence based on legally admissible evidence; while the corrections subsystem administers sanctions, rehabilitation, and reintegration of offenders (Peak & Giacomazzi, 2016). The effectiveness of the system depends on coordination and functional integration among these subsystems.

Within this framework, the criminal justice system is not merely reactive but also preventive, relying on investigative tools, evidentiary standards, and institutional capacity to deter criminal behavior and ensure accountability. Forensic science occupies a critical position in this process by strengthening the evidentiary foundation upon which criminal investigations and prosecutions are conducted. The absence or inadequacy of scientific evidence within the criminal justice system can result in wrongful convictions, acquittals of guilty offenders, case backlogs, and diminished public confidence in justice institutions (Packer, 1968; Cole, 2001). In Nigeria, the criminal justice system is legally anchored in constitutional provisions, statutory laws, and procedural codes, including the Administration of Criminal Justice Act (ACJA) 2015. Conceptually, however, its operation has been characterized by structural inefficiencies, limited technological capacity, and overreliance on traditional investigative practices such as confessional statements and eyewitness testimony (Alemika, 2013). These limitations have constrained the system's ability to effectively integrate forensic science into criminal investigations and adjudication.

For crime control in South-East Nigeria, the criminal justice system can therefore be understood as an institutional framework whose effectiveness is directly linked to the

availability, accessibility, and utilization of forensic science. A system that is supported by robust forensic capabilities is more likely to achieve accurate investigations, fair trials, and credible crime control outcomes.

Crime Control

Packer (1968) defines crime control as *a model of criminal justice that emphasizes the repression of criminal conduct through efficient law enforcement, swift adjudication, and the certainty of punishment.* **Siegel (2020)** viewed crime control as *the strategies and institutional processes employed by the state to prevent crime, detect offenders, and reduce criminal behavior through enforcement and legal sanctions.* **Walker (1992)** defines crime control as *the collective efforts of criminal justice agencies aimed at reducing the incidence of crime and maintaining public order through policing, prosecution, and correctional interventions.* **Garland (2001)** describes crime control as *a set of governmental responses designed to manage crime risks by combining punishment, surveillance, and preventive strategies.* **Alemika and Chukwuma (2011)** define crime control in the Nigerian context as *the application of legal, institutional, and community-based measures to prevent, detect, and respond to crime in order to ensure public safety and social stability.*

Crime control is conceptually understood as the deliberate set of policies, institutional practices, and enforcement strategies adopted by the state to prevent criminal behavior, detect and apprehend offenders, and reduce the incidence and impact of crime within society. It represents a central objective of the criminal justice system and encompasses preventive, investigative, prosecutorial, and correctional measures aimed at maintaining public order and safeguarding societal security (Siegel, 2020; Walker, 1992).

Scholarly perspectives emphasize that crime control operates through both formal and informal mechanisms. Formal mechanisms include policing, criminal investigation, adjudication, and punishment, while informal mechanisms involve community participation, situational prevention, and social regulation (Garland, 2001). Effective crime control, therefore, depends not only on the existence of legal frameworks but also on the capacity of justice institutions to enforce laws efficiently, fairly, and consistently. Within modern criminal justice systems, crime control is increasingly linked to evidence-based practices and scientific methods that enhance accuracy, efficiency, and accountability. Forensic science plays a critical role in this regard by improving crime detection, strengthening the probative value of evidence, and supporting the successful prosecution of offenders. The use of reliable forensic evidence reduces investigative errors, limits wrongful convictions, and increases the certainty of punishment, an essential condition for deterrence (Packer, 1968; Cole, 2001).

In Nigeria, crime control is legally grounded in statutory provisions and implemented through agencies such as the Nigeria Police Force, the courts, and correctional institutions. However, scholars have noted that structural constraints, limited technological capacity, and weak investigative processes undermine effective crime control, particularly in regions experiencing complex and violent crimes (Alemika & Chukwuma, 2011). The limited integration of forensic science within criminal investigations has further constrained the ability of the criminal justice system to respond decisively to crime.

In South-East Nigeria, crime control can therefore be seen as an outcome of the interaction between institutional capacity, legal processes, and the availability and utilization of forensic science. Where forensic capabilities are limited or underutilized, crime control efforts tend to

rely on less reliable forms of evidence, leading to low detection rates, weak prosecutions, and reduced public confidence in the justice system. Consequently, understanding crime control within this conceptual framework provides a critical basis for assessing the implications of forensic science availability for effective crime prevention and justice delivery in the region.

Overview of Forensic Science in Nigeria

Forensic science in Nigeria represents the intersection of science, law, and criminal justice, providing objective methods for the detection, investigation, and prosecution of crime. Despite its crucial role in modern criminal justice systems, forensic science in Nigeria has faced historical, institutional, and infrastructural challenges that have shaped its current scope and effectiveness (Okoye & Onyekachi, 2019).

The development of forensic science in Nigeria has been gradual and largely influenced by British colonial legal and policing frameworks. Early criminal investigations primarily relied on eyewitness testimony, confessional statements, and rudimentary evidence collection techniques. Fingerprinting was introduced in the mid-20th century as one of the first systematic scientific methods for criminal identification (Omoniyi, 2018). The late 20th and early 21st centuries witnessed the incremental adoption of more advanced forensic techniques, including ballistics, toxicology, DNA profiling, and digital forensics, often initiated in response to complex crimes such as homicide, armed robbery, and financial crimes. However, growth has been uneven, with most forensic capabilities concentrated in major urban centers, while semi-urban and rural areas remain largely underserved (Alemika, 2013; Okoye & Onyekachi, 2019). The practice of forensic science in Nigeria is governed by statutory laws, constitutional provisions, and regulatory guidelines that define the collection, analysis, and admissibility of scientific evidence. Key legal instruments include the **Administration of Criminal Justice Act (ACJA) 2015**, the **Evidence Act 2011**, and sector-specific laws regulating cybercrime and financial offenses (Alemika, 2013). These statutes provide a legal framework for evidence handling, expert testimony, and procedural standards for admissibility in courts.

Institutionally, forensic practice is embedded within the criminal justice system through agencies such as the **Nigeria Police Force**, the **Economic and Financial Crimes Commission (EFCC)**, and specialized state forensic laboratories. These institutions are responsible for the operationalization of forensic investigations, ensuring adherence to legal standards, and supporting prosecution through expert evidence (Okoye & Onyekachi, 2019). Despite these frameworks, weak enforcement, limited accreditation, and a lack of standardized procedures hinder uniform forensic application across Nigeria.

The structure of forensic service provision in Nigeria is hierarchical and centralized, with services concentrated in federal and state capitals. The **Nigeria Police Force's Criminal Investigation Department (CID)** maintains the largest forensic units, including fingerprint, ballistics, toxicology, and crime scene investigation divisions (Omoniyi, 2018). Other specialized agencies, such as the EFCC, maintain digital forensic laboratories to support investigations into cybercrime and economic offenses. Academic and research institutions also contribute to forensic training and limited laboratory services, although their role in active criminal investigations is minimal (Okoye & Onyekachi, 2019).

Overall, forensic service provision in Nigeria is characterized by:

- **Centralization:** Advanced laboratories and expertise are concentrated in a few urban centers.

- **Fragmentation:** Different agencies operate independently with limited inter-agency coordination.
- **Resource Limitations:** Shortages of trained personnel, modern equipment, and sustainable funding affect service delivery.

These structural and operational limitations directly influence the effectiveness of forensic science in supporting crime detection, investigation, and control, particularly in regions like South-East Nigeria, where criminal justice resources are unevenly distributed.

Nature and Scope of Forensic Science Available in the Nigerian Criminal Justice System

Forensic science in Nigeria represents a critical component of the criminal justice system, serving as a scientific basis for crime detection, investigation, and prosecution. Despite its recognized importance, the availability, scope, and utilization of forensic science in Nigeria remain uneven, influenced by infrastructural, human, and institutional limitations (Okoye & Onyekachi, 2019). The nature and scope of forensic science can be analyzed through its techniques, infrastructure, human resource capacity, and accessibility.

Types of Forensic Techniques Available

Nigeria has gradually developed a range of forensic techniques, each designed to strengthen investigative and judicial processes:

1. **Fingerprint Analysis: This** is one of the earliest forensic methods used in Nigeria. Fingerprinting is applied for criminal identification and linking suspects to crime scenes. Although widely utilized, it is largely centralized in urban police commands (Omoniyi, 2018).
2. **DNA Profiling**: DNA analysis provides highly accurate identification in violent crimes such as murder and sexual assault. However, its application is limited due to the small number of accredited laboratories and challenges in sample processing (Okoye & Onyekachi, 2019).
3. **Ballistics and Firearm Analysis**: This is used to examine firearms, bullets, and cartridge cases. Ballistics analysis is mainly conducted within specialized police units. The limited number of facilities restricts its availability outside major urban centers (Alemika, 2013).
4. **Digital Forensics**: With the rise of cybercrime, digital forensic capabilities have become increasingly relevant. Agencies like the EFCC maintain units for the extraction and analysis of digital evidence, though expertise and resources are concentrated in major cities (Omoniyi, 2018).
5. **Forensic Toxicology**: Toxicological analysis investigates poisons, drugs, and chemical substances linked to crimes. This service exists primarily in select laboratories and is often constrained by equipment and personnel shortages (Okoye & Onyekachi, 2019).

Bakhtiar (2022) also affirms that there is a long number of established disciplines within the field of forensics: Glass chip and fragment analysis, fiber analysis, hair analysis, analysis of soil, tool and ballistic markings, Footwear, tire tracks, and fingerprints Forensic psychology, forensic anthropology, forensic archeology, forensic pathology, forensic dentistry, blood spatter analysis, DNA analysis, forensic psychology, psychiatry, and the examination of dubious documents. The infrastructure for forensic science in Nigeria is **centralized, limited, and unevenly distributed**. Federal and state capitals host the majority of forensic laboratories, leaving rural and semi-urban areas with minimal access (Alemika, 2013). Laboratories are often underfunded and inadequately equipped, resulting in delays in evidence processing and limiting the effectiveness of scientific investigations. Some laboratories lack modern

instruments for DNA sequencing, digital forensics, and toxicology, restricting the capacity to handle complex and high-volume cases (Okoye & Onyekachi, 2019).

A significant challenge in the Nigerian forensic landscape is the **shortage of trained personnel**. Forensic science requires specialized knowledge in biology, chemistry, physics, and information technology. However, the limited number of forensic experts, combined with inadequate professional development programs, hinders the full integration of forensic services into criminal investigations (Omoniyi, 2018). Furthermore, the absence of standardized certification and accreditation for practitioners compromises consistency and quality in forensic analysis.

Access to forensic services in Nigeria is generally **restricted to urban centers**, creating disparities in the availability of scientific evidence for criminal investigations across different regions, including South-East Nigeria (Alemika, 2013). Utilization of forensic science is further constrained by institutional bottlenecks, slow turnaround times, and a lack of awareness among law enforcement personnel regarding available techniques. As a result, many investigations continue to rely heavily on traditional methods, such as confessional statements and eyewitness testimony, which are prone to error (Okoye & Onyekachi, 2019).

Availability and Utilization of Forensic Science on Crime Control Outcomes

The availability and effective utilization of forensic science significantly shape the ability of criminal justice systems to detect, investigate, and prevent crime. In the context of South-East Nigeria, where forensic resources are limited and unevenly distributed, understanding this influence is critical for enhancing crime control outcomes (Okoye & Onyekachi, 2019).

Availability refers to the presence of forensic techniques, laboratories, equipment, and trained personnel necessary for scientific criminal investigation (Omoniyi, 2018). As of 2019, only four forensic laboratories in Nigeria are currently owned by the government. The first police forensic laboratory was established in 1986 at the Force Criminal Intelligence and Investigation Department (FCIID) in Alagbon, Lagos; however, it was later reported to have been abandoned due to inadequate and outdated facilities (Adebola, cited in Olaniyi, 2022). To complement this older facility, a second police forensic laboratory was commissioned in 2016 at the Nigeria Police Headquarters in Abuja, designed to support investigations through technologies such as iris and facial recognition and a digital resource center (Punch Newspapers, 2016). The National Drug Law Enforcement Agency (NDLEA) established its first forensic laboratory in Lagos in December 1989 to combat substance abuse and illicit drug trafficking (NDLEA, 1989/2025). Separately, the Lagos State Government independently established the country's first DNA forensic laboratory in 2017. Recently, Nigeria has opened new forensic facilities, with the NDLEA launching two new laboratories in Abuja and Enugu (NDLEA, 2025). Despite these developments, these facilities are not being utilized to their full potential. Moreover, although the 1999 Constitution of the Federal Republic of Nigeria provides for forensic evidence, the executive branch has yet to enact specific legislation governing the practice and regulation of forensic science in the country.

In Nigeria, forensic capabilities such as fingerprint analysis, DNA profiling, ballistics, and digital forensics are predominantly concentrated in urban centers, leaving large portions of South-East Nigeria with restricted access (Alemika, 2013). Limited availability constrains the use of forensic evidence in investigations, contributing to low crime clearance rates and reliance on traditional methods such as eyewitness testimony and confessional statements, which are prone to error (Okoye & Onyekachi, 2019).

Utilization refers to the degree to which available forensic resources are applied in criminal investigations, prosecutions, and preventive strategies. Even where forensic tools exist, their use is often hampered by procedural inefficiencies, lack of inter-agency coordination, inadequate training, and legal barriers (Omoniyi, 2018). Underutilization diminishes the potential of forensic evidence to strengthen investigative accuracy, support successful prosecution, and deter repeat offenses (Siegel, 2020).

The interplay between availability and utilization directly impacts **crime detection, clearance, and prevention**. Jurisdictions with higher access to functional forensic laboratories and trained personnel report faster and more accurate case resolution, reduced impunity, and enhanced public trust in law enforcement (Cole, 2001; Okoye & Onyekachi, 2019). In South-East Nigeria, studies suggest that limited availability and inconsistent utilization of forensic science correlate with low crime clearance rates, delayed prosecutions, and diminished public confidence, which collectively undermine effective crime control (Alemika, 2013).
Furthermore, forensic science supports **strategic crime prevention** by providing data for pattern analysis, offender profiling, and intelligence-led policing (Siegel, 2020). When effectively applied, it enables law enforcement to anticipate criminal activity, allocate resources efficiently, and implement targeted interventions, thereby reducing both the incidence and recurrence of crime.

Challenges Affecting the Use of Forensic Science in Nigeria
The use of forensic science in Nigeria is critical for enhancing the efficiency, accuracy, and credibility of criminal investigations and prosecutions. However, several challenges impede its optimal deployment within the Nigerian criminal justice system, thereby limiting its contribution to crime control in regions such as South-East Nigeria (Okoye & Onyekachi, 2019; Alemika, 2013). These challenges are broadly technological, legal, institutional, and human resource-related.

One of the primary barriers to the effective use of forensic science in Nigeria is **technological inadequacy**. Many forensic laboratories lack modern analytical equipment, including DNA sequencers, digital forensics software, and advanced toxicology instruments (Omoniyi, 2018). Equipment shortages, frequent malfunctions, and obsolete technology delay evidence processing and reduce investigative reliability. Additionally, forensic infrastructure is largely **centralized in federal and state capitals**, leaving semi-urban and rural regions underserved. These infrastructural limitations impede timely access to forensic services and contribute to backlogs in case investigations (Alemika, 2013; Okoye & Onyekachi, 2019).

The integration of forensic science into the Nigerian legal system is further constrained by **legal, ethical, and procedural issues**. The admissibility of scientific evidence often faces scrutiny due to inconsistent application of statutory provisions, lack of standardized protocols, and insufficient understanding of forensic methods among judges, prosecutors, and law enforcement officers (Alemika & Chukwuma, 2011). Ethical concerns, such as the handling of biological samples and digital data, pose additional challenges, especially in cases involving privacy and consent. These legal and procedural gaps undermine the credibility and effectiveness of forensic evidence in criminal trials (Okoye & Onyekachi, 2019).

Forensic services in Nigeria are fragmented across multiple agencies, including the Nigeria Police Force, the Economic and Financial Crimes Commission (EFCC), and specialized state laboratories. This **lack of institutional coordination** often results in duplication of efforts,

inconsistent procedures, and inefficient utilization of limited resources (Omoniyi, 2018). Inadequate funding exacerbates these challenges, restricting the acquisition of modern equipment, maintenance of laboratory infrastructure, and expansion of services to underserved regions. Consequently, forensic science often remains underutilized despite its recognized importance for crime control (Alemika, 2013).

The effectiveness of forensic science depends heavily on the availability of skilled personnel. In Nigeria, there is a **shortage of trained forensic experts**, compounded by limited professional development opportunities and inadequate accreditation systems (Okoye & Onyekachi, 2019). Many investigators and law enforcement officers lack sufficient understanding of scientific methods, leading to improper collection, preservation, and interpretation of evidence. This human resource deficit reduces the reliability of forensic analysis and limits its integration into routine criminal investigations, especially in South-East Nigeria, where technical capacity is particularly constrained (Omoniyi, 2018).

Theoretical Framework: Deterrence Theory

This study is anchored in the **Deterrence Theory**, which postulates that the certainty, swiftness, and severity of punishment influence individuals' decisions to engage in criminal behavior (Gibbs, 1975; Paternoster, 2010). According to this theory, the perception that criminal acts are likely to be detected and punished discourages potential offenders from committing a crime. In the context of criminal investigations, **forensic science enhances the certainty of detection** by providing objective, scientifically validated evidence that can link offenders to criminal acts (Cole, 2001).

Deterrence theory is particularly relevant to the Nigerian criminal justice system, where crime control is often challenged by reliance on eyewitness testimony, confessional statements, and low conviction rates (Alemika & Chukwuma, 2011). The integration of forensic science, such as DNA profiling, fingerprint analysis, ballistics, and digital forensics, strengthens evidentiary credibility and increases the likelihood of successful prosecution. Consequently, potential offenders are more likely to perceive a higher risk of detection and punishment, which can contribute to the reduction of criminal behavior in society (Packer, 1968; Siegel, 2020).

Applying deterrence theory to South-East Nigeria, the study posits that the **availability and effective utilization of forensic science within the criminal justice system are key mechanisms for achieving crime control**. Regions with limited forensic infrastructure may experience lower conviction rates and higher impunity, thereby weakening deterrent effects. Conversely, improving forensic capacity can enhance investigative efficiency, strengthen prosecution outcomes, and reinforce the preventive dimension of the criminal justice system.

Methodology

This study adopts a mixed-methods research design, which involves the integration of both quantitative and qualitative approaches. The area of the study is the South East, Nigeria which, comprises Abia, Anambra, Ebonyi, Enugu, and Imo States, is justified for this study due to its exposure to complex crimes requiring advanced forensic investigation, yet characterized by limited forensic integration, reliance on traditional policing methods, and weak technical capacity, making it critical for assessing forensic science and crime control within Nigeria's criminal justice system. The population of the study was 16,145 individuals, and the sampling size was 390 respondents, which included the Police officers, the Legal Practitioners, and the Correctional Officers. The study also employed a multi-stage sampling technique. The data was collected using a

questionnaire schedule for quantitative data, while an In-depth Interview (IDI) Guide for qualitative data was used from the forensic experts, law enforcement officers, judicial personnel, correctional officers, and policymakers. Quantitative data were analyzed using SPSS version 26, applying descriptive statistics and Chi-square (χ^2) tests, while qualitative data were analyzed thematically

Result and Findings

Table 1: Respondents' views on the existence of forensic science in criminal investigations in Nigeria

Responses	Frequency	Percent
Yes	302	78.9
No	81	21.1
Total	383	100.0

Field Survey, 2025

Table 1 shows respondents' awareness of the existence of forensic science in criminal investigations in Nigeria. The majority of respondents (78.9%) indicated that they were aware of the existence of forensic science in criminal investigations, while 21.1% stated that they were not aware. This high level of awareness suggests that most respondents, likely due to their occupational exposure or educational background, are familiar with the role of forensic science in the Nigerian criminal justice system. However, the 21.1% who were unaware highlight that a segment of the population may still lack adequate information about modern investigative techniques, indicating a need for greater sensitization and public education on the relevance and application of forensic science in crime detection and prosecution. This finding aligns with the opinion of an IDI participant:

> Yes, I am aware of the existence of forensic science in criminal investigations in Nigeria, but in my experience as a lawyer, it is not effectively utilized. While forensic techniques such as fingerprint analysis, DNA testing, and ballistic examination are known to be essential tools for uncovering the truth and strengthening evidence in court, their practical application within our criminal justice system remains very limited. Most investigations still rely heavily on confessional statements and eyewitness testimonies, which are often unreliable or coerced. In many cases, I have handled forensic evidence that could have clarified doubts or facts beyond a reasonable doubt, but was either unavailable or poorly managed due to inadequate facilities, lack of trained personnel, or bureaucratic bottlenecks. The few times forensic reports are presented in court, they are sometimes delayed or questioned for credibility because of the absence of standardized forensic laboratories and proper chain-of-custody procedures (Female, 36 years, Lawyer, Married, Anambra, 2025).

According to another IDI participant:

> Forensic science is part of criminal investigations in Nigeria, but the truth is that it is not commonly or effectively used. In most cases, investigations rely more on confessions, witness statements, and traditional methods rather than scientific

evidence. This is not because forensic science is not useful, but because the facilities, equipment, and training required to use it properly are often lacking. There are only a few functional forensic laboratories in the country, and even those are not always accessible or adequately equipped. Sometimes, when forensic evidence is collected, the process takes too long, and the results arrive after the case has already moved forward. There are also issues with preserving crime scenes and maintaining the integrity of evidence, which affects the reliability of the results. Many officers understand the importance of forensic science and would like to use it more, but the system does not provide the necessary support. Until proper investment is made in modern tools, capacity building, and laboratory infrastructure, forensic science will continue to be underutilized in criminal investigations across Nigeria (Male, 49 years, Police Officer, Married, Enugu, 2025).

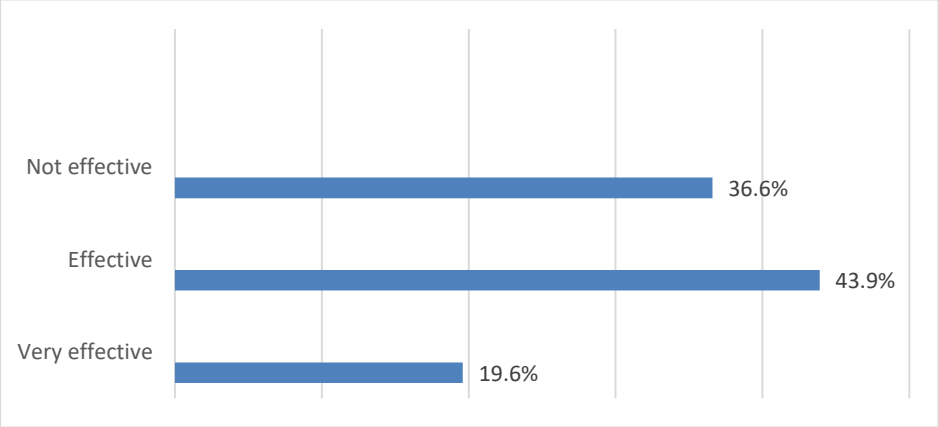
Table 2: **Respondents' views on the most commonly used branch of forensic science in Nigeria's criminal justice system**

Responses	Frequency	Percent
Forensic biology (DNA analysis)	22	5.7
Forensic chemistry (toxicology)	18	4.7
Forensic pathology (autopsy)	25	6.5
Digital forensics (cybercrime investigation)	19	5.0
Fingerprint	21	5.5
Hair analysis	21	5.5
Fiber analysis	18	4.7
Analysis of glass fragments and glass chips	21	5.5
Soil analysis	18	4.7
Ballistic and tool marks	25	6.5
Footwear analysis	32	8.4
Tire tracks	16	4.2
Blood spatter analysis	25	6.5
Forensic anthropology	21	5.5
Forensic archeology	31	8.1
Odontology	24	6.3
Analysis of questionable documents	26	6.8
Total	383	100.0

Field Survey, 2025

Table 2 shows respondents' views on the most commonly used branch of forensic science in Nigeria's criminal justice system. The findings showed that footwear analysis (8.4%) and forensic archaeology (8.1%) were perceived as the most commonly used branches, followed by analysis of questionable documents (6.8%), forensic pathology (autopsy), ballistic and tool marks, and blood spatter analysis, each accounting for 6.5%. Odontology recorded 6.3%, while forensic biology (DNA analysis) constituted 5.7%. Fingerprint analysis, hair analysis, analysis of glass fragments and glass chips, and forensic anthropology each accounted for 5.5%. Digital forensics (cybercrime investigation) represented 5.0%, whereas forensic chemistry

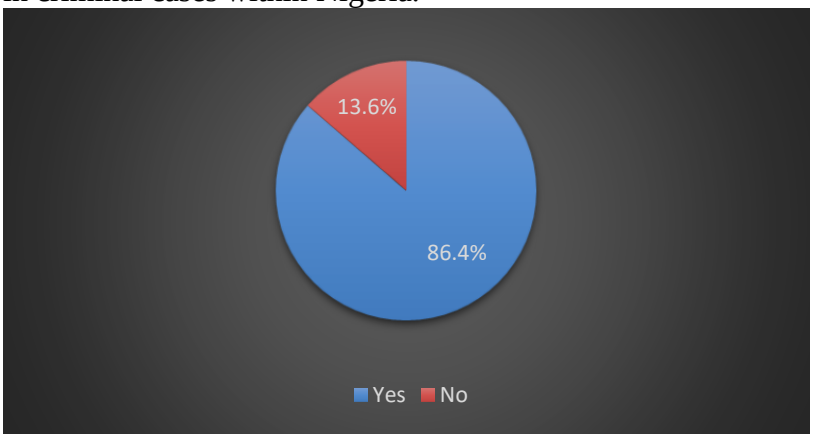
(toxicology), fiber analysis, and soil analysis each accounted for 4.7%. Tire-track analysis recorded the lowest proportion (4.2%). Overall, the results indicate that no single branch of forensic science clearly dominates in Nigeria's criminal justice system. This broad distribution suggests that the application of forensic techniques remains limited and fragmented, underscoring the need for improved specialization, funding, and infrastructural development to enhance forensic practice and strengthen criminal investigations in the country.



Field Survey, 2025

Figure 1: Respondents' views on the effectiveness of forensic evidence in securing convictions in Nigerian courts

Figure 1 shows respondents' opinions on the effectiveness of forensic evidence in securing convictions in Nigerian courts. The data indicate that 43.9% of respondents believed forensic evidence is effective, while 19.6% rated it as very effective. However, a considerable proportion (36.6%) felt that forensic evidence is not effective in securing convictions. This suggests that although a majority (63.5%) recognize the usefulness of forensic evidence in the judicial process, a significant number remain skeptical about its impact. The mixed perceptions may reflect challenges such as inadequate forensic infrastructure, limited expert availability, poor evidence handling, and judicial hesitation in accepting forensic results as decisive proof in criminal cases within Nigeria.



Field Survey, 2025

Figure 2: Respondents' views on whether the crime rate is increasing in Southeast Nigeria

The results showed that 86.4% of respondents believed that the crime rate is increasing, while 13.6% disagreed. This overwhelming perception of rising crime suggests growing concern about security challenges in the region. The findings may reflect the increasing reports of violent crimes, kidnapping, cult activities, and communal conflicts that have affected parts of

Southeast Nigeria in recent years. It also indicates a general public awareness of the deteriorating security situation and the need for stronger law enforcement and community-based crime prevention strategies.

Discussion of Findings

The findings of this study showed that the Nigerian criminal justice system makes use of a **broad range of forensic evidence**, including DNA analysis, hair analysis, and ballistic and tool mark examinations. This demonstrates a formal recognition of forensic science as an important component of criminal investigations and aligns with global trends toward the incorporation of scientific methods to enhance investigative accuracy and judicial fairness (Bakhtiar, 2022; National Institute of Standards and Technology [NIST], 2024; Bakhtiar et al., 2025; Jhalani et al., 2025). The growing acceptance of diverse forensic techniques in legal proceedings underscores their perceived value in establishing evidentiary links between suspects and criminal acts.

The findings show a relatively high level of awareness of forensic science among key actors in the Nigerian criminal justice system, indicating that scientific investigation has gained conceptual recognition within criminal justice discourse. This awareness reflects professional exposure, media influence, and the global diffusion of forensic standards, positioning forensic science as an acknowledged component of modern justice administration. However, awareness has not translated into effective practice. Persistent informational gaps remain, particularly among groups with limited engagement with formal justice institutions.

More importantly, qualitative evidence reveals widespread dissatisfaction with implementation. Although forensic science is widely acknowledged, investigations continue to rely predominantly on confessional statements and eyewitness testimony, methods vulnerable to coercion and error. This disconnection between recognition and application supports earlier studies that describe forensic science in Nigeria as a normative ideal rather than an institutionalized practice (Alemika, 2013; Okoye & Onyekachi, 2019), undermining evidentiary reliability and increasing the risks of delayed justice and wrongful prosecution.

The application of forensic science in Nigeria is characterized by fragmentation rather than specialization. Multiple forensic techniques are used inconsistently, often shaped by case-specific factors, investigator discretion, and resource availability. While traditional and trace-evidence methods appear more visible, highly probative techniques such as DNA analysis and digital forensics remain underutilized.

This pattern reflects weak strategic prioritization and institutional coordination. Unlike advanced criminal justice systems where forensic biology, fingerprinting, and digital forensics form the investigative core, Nigeria operates a piecemeal forensic system constrained by limited infrastructure, high costs, and shortages of technical expertise. The absence of dominant forensic disciplines further indicates minimal investment in specialization and long-term forensic development, corroborating Bakhtiar's (2022) assertion that forensic capacity in developing systems remains uneven despite theoretical breadth.

Perceptions of the effectiveness of forensic evidence are divided, revealing a broader legitimacy challenge within the judicial process. While forensic evidence is recognized for its potential to strengthen prosecutions, skepticism persists regarding its actual influence on court outcomes. This skepticism is rooted in systemic deficiencies, including delays in forensic reporting, weak chain-of-custody practices, and inconsistent judicial acceptance of scientific

evidence. Qualitative accounts highlight frequent challenges to the credibility and timeliness of forensic reports, diminishing their probative value. Consistent with Cole (2001), the findings demonstrate that forensic authority depends not only on scientific validity but also on institutional trust, procedural integrity, and professional competence, conditions that remain fragile in Nigeria.

The widespread perception of rising crime in South-East Nigeria underscores growing insecurity and intensifies the need for evidence-based policing. Persistent reliance on confessions and eyewitness accounts amid escalating crime reveals a misalignment between contemporary security challenges and investigative capacity.

In this context, forensic science assumes strategic importance as a tool for deterrence, accurate offender identification, and intelligence-led policing. As Siegel (2020) notes, scientific evidence enhances investigative precision and proactive crime control. The findings thus expose a critical paradox: increasing crime alongside the underutilization of scientific investigative resources. Despite possessing a broad range of forensic techniques in theory, Nigeria's forensic capacity remains constrained by structural limitations. Forensic infrastructure is centralized, underfunded, and unevenly distributed, restricting access, particularly in rural and semi-urban areas. Shortages of trained personnel, coupled with weak accreditation and regulatory frameworks, further compromise forensic quality and credibility. Although incremental investments have been made, forensic resources remain inadequate relative to crime levels and population demands. Even where facilities exist, utilization is hindered by limited training, bureaucratic inefficiencies, and weak inter-agency coordination. This underutilization reduces the potential of forensic science to improve crime detection, clearance rates, and deterrence. Consistent with Siegel (2020), the findings suggest that effective forensic utilization could significantly enhance crime control outcomes. However, in South-East Nigeria, limited availability and inconsistent use continue to contribute to delayed justice, diminished public confidence, and persistent insecurity.

Overall, forensic science in Nigeria is recognized but weakly institutionalized, available in principle but inaccessible in practice, and valued yet insufficiently trusted. Addressing these contradictions requires sustained investment in forensic infrastructure, comprehensive capacity building, standardized accreditation, and robust forensic legislation. Without such reforms, forensic science will remain peripheral to criminal investigations despite rising crime and growing societal expectations for scientific justice.

Conclusion

This study examined the nature, availability, and utilization of forensic science within the Nigerian criminal justice system, with particular focus on crime control in South-East Nigeria. Forensic science is formally recognized in Nigeria, and a broad range of techniques, including DNA analysis, fingerprinting, ballistics, toxicology, and digital forensics, exists in principle, reflecting alignment with global standards for scientific justice. However, a pronounced gap persists between recognition and effective implementation. Forensic science remains weakly institutionalized and inconsistently applied, with investigations still relying heavily on confessional statements and eyewitness testimony. This reliance undermines evidentiary reliability, heightens the risk of rights violations, and contributes to delayed justice and wrongful convictions. Forensic practice is further constrained by fragmented institutional structures, inadequate and centralized infrastructure, shortages of trained personnel, weak accreditation and quality assurance mechanisms, and limited inter-agency coordination,

particularly affecting access in South-East Nigeria. In the context of rising and increasingly sophisticated crime, the underdevelopment of forensic science constitutes a critical weakness in Nigeria's crime control strategy. Overall, forensic science is recognized but not fully operationalized, technically available but practically inaccessible, and insufficiently trusted. Addressing these challenges requires sustained investment, capacity building, standardized regulation, and stronger coordination to enhance justice delivery, crime control, and public confidence

Recommendations

- The government should prioritize sustained investment in modern forensic laboratories and equipment, with a deliberate focus on decentralization beyond major urban centers. Establishing well-equipped regional forensic laboratories, particularly in South-East Nigeria, will improve access, reduce case backlogs, and enable timely scientific support for criminal investigations.
- Comprehensive training and continuous professional development should be provided for forensic practitioners, investigators, prosecutors, and judges. This should be complemented by standardized accreditation and certification systems for forensic laboratories and personnel to ensure quality, credibility, and consistent application of forensic evidence.
- Nigeria should enact comprehensive forensic science legislation to regulate forensic practice, standardize evidence-handling procedures, strengthen chain-of-custody requirements, and clarify admissibility standards.
- Stronger institutional collaboration among law enforcement agencies, forensic service providers, and the judiciary is essential.

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