

The Value of Forensic DNA Investigative Leads in South Africa



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Submission: July 19, 2023; **Published:** July 26, 2023

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Abstract

This article highlights the significance of South Africa's National Forensic DNA Database in identifying and processing forensic DNA investigative leads since its inception in 2015. These leads, along with other evidence, are utilised by investigators to effectively solve cases. The capacity to link perpetrators to crime scenes, victims, and other forensic evidence is one of the most significant advantages of forensic DNA analysis in South Africa. By comparing DNA samples recovered from crime scenes with those in national databases, investigators can link suspects to previous offences, thereby revealing patterns of criminal behaviour that might have otherwise gone undetected.

Keywords: DNA, DNA database, Forensic DNA investigative leads

Introduction

With the implementation of the Criminal Law (Forensic Procedures) Amendment Act, Act 37 of 2013 (commonly known as the "DNA Act") [1] in January 2015, the National Forensic DNA Database of South Africa (NFDD) was formally established. In South Africa, a country with a high crime rate and difficulties with law enforcement, implementing the National Forensic DNA Database (NFDD) has positively impacted the resolution of crimes such as serial sexual offence cases [2]. Generating forensic DNA leads significantly improves the investigative process, resulting in the apprehension of repeat offenders and the resolution of dormant cases, thereby providing victims' families with closure. This manuscript provides an overview of the identification and processing of forensic investigations to support the utility of forensic DNA investigative leads as an investigative tool in South Africa.

Exhibit of Collection and Analysis Material

The DNA Act allows officers who have completed the required training to collect buccal samples from specific categories of individuals, including convicted individuals, detained individuals, and those under investigation. The samples are then transported to the Forensic Science Laboratory (FSL) for DNA analysis. The DNA Act mandates that buccal samples be submitted to the

laboratory. The forensic DNA profiles derived from these samples must be transmitted within thirty days of collection to the NFDD [1]. For DNA analysis, the FSL receives exhibit materials from the investigating officer or crime scene examiners, such as sexual assault evidence collection kits. Using an automated electronic procedure, the DNA testing laboratories transmit the Forensic DNA profiles derived from these exhibit materials or buccal samples to configured Indexes in the NFDD.

Leads in Forensic Investigation

The Forensic Database Management (FDM) Section of Quality Management manages the NFDD independently from the FSL, which oversees DNA analysis. The quality management system of FDM has been certified as compliant with ISO9001:2015. FDM uses a locally developed system software solution developed by the, State Information Technology Agency, to conduct exhaustive comparative searches of forensic DNA profiles. Before submitting a report for independent technical review, a forensic examiner verifies the candidate forensic DNA investigative lead (FIL), the result of the comparison search, to ensure conformance with quality assurance and quality control standards. The reviewed FIL report is electronically documented in the forensic system and then transmitted electronically to the linked cases on the investigating officer's system.

Research into Forensic Investigative Leads (FILs)

Cases closed by the investigating officer on the investigation system are automatically reopened. The investigating officer must acknowledge the FIL for all cases that are linked. The report must be printed, and copies submitted in each linked case. Case dockets must be retrieved from the archives, and the report must be filed. The investigation will continue until the linked cases' contents and evidence have been exhaustively investigated [3].

Control and Command

One of the most significant benefits of forensic DNA analysis in South Africa is the ability to link perpetrators to crime scenes, victims, and other forensic evidence. By comparing DNA samples recovered from crime scenes with those in national databases, investigators can link suspects to prior offences, thereby disclosing patterns of criminal behaviour that would have otherwise remained undetected [3].

Metrics of the NFDD

Since the beginning of the DNA Act, 786 246 forensic DNA profiles have been deleted, and as of June 30, 2023, 1,219,913 forensic DNA profiles have been uploaded to the NFDD in the following Indexes [4] (Table 1):

Table 1: Metrics of the NFDD.

Index	Number of DNA Profile
Crime Scene Index	571059
Arrestee Index	448258
Convicted Offenders Index	85086
Missing Persons	25146
Investigative Index	12320
Elimination Index	78044

The NFDD comparison search returns two types of FILs i.e., person-to-crime and crime-to-crime DNA matches. DNA person-to-crime FILs link a person of interest with a database profile to one or more cases (crime sites) [3]. In contrast, DNA crime-

to-crime FILs entail linking forensic DNA profiles discovered on multiple linked cases (crime scenes) when no DNA profile of a specific individual is present in the database. Since the inception of the DNA Act, 20,141 DNA person-to-crime and 9,155 DNA crime-to-crime FILs have been established, respectively. Through the database, 4,313 serial sexual offenders have been identified to date [4].


The commanders and investigating officers must conduct FIL investigations by the established standard operating procedure. The development FILs in accordance to a management information tool enables commanders to determine the status of investigations for new and historic FILs and the collection of buccal swabs from persons arrested and charged with certain offences specified in the DNA Act [3]. The investigation of FILs is monitored as part of the SAPS Annual Performance Plan, where commanders must report quarterly and annually on their performance investigating FILs [5].

Conclusion

The establishment of the National Forensic DNA Database of South Africa has demonstrated that it is a valuable investigative instrument by generating forensic DNA investigative leads that aid in the investigation of certain crimes and positively impact the reduction of crime and conviction rates.

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DOI: [10.19080/JFSCI.2023.17.555969](https://doi.org/10.19080/JFSCI.2023.17.555969)

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