



## The Processing of Forensic Investigative Leads in Criminal Investigations Conducted by the South African Police Service

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<http://dx.doi.org/10.47814/ijssrr.v7i4.1984>

### **Abstract**

The adverse impact of crime undermines not only a nation's peace and stability, but also the safety and security of its communities. Furthermore, crime affects a nation's economy, its citizens' standard of living, and its standing with prospective foreign investors and tourists. Forensic investigative leads (FILs) are crucial in the investigation and resolution of crime. The South African Police Service (SAPS) allocates significant resources to analyse exhibit materials and forensic databases containing vital forensic biometric information. By conducting comparative searches in these databases, FILs are generated and communicated to detectives to facilitate investigation, detection and conviction. This article does an in-depth analysis of local and international literature, examines data from the CAS/ICDMS system and reports on qualitative interviews conducted with SAPS detectives, forensic examiners, and international forensic experts. It delineates the consequences of the underutilisation and an inadequate understanding of FILs on detection rates within the criminal justice system. The research not only identifies barriers to reporting and utilising FILs, but also recommends ways to enhance the regulatory framework, information technology systems, and detective training programmes within the SAPS. Emphasising adherence to ISO standards to maintain FIL reliability during forensic examinations, the study underscores the resource constraints faced by detectives, which affect FIL utilisation and impede the desired outcomes in detection and conviction rates. The article proposes that the SAPS can overcome these challenges by prioritising resource allocation to detective forensic investigative units to enable them to follow up and investigate FILs.

**Keywords:** *Deoxyribonucleic Acid (DNA); DNA Forensic Investigative Leads; Fingerprints; Integrated Ballistic Identification System; Forensic Investigative Leads (FILs)*

### **Introduction**

By international standards, crime levels in South Africa are unacceptably high and crime is exceptionally violent. Furthermore, South Africa has one of the highest homicide rates in the world (Dlamini, 2023:39). Seeing that forensic technology constantly improves, forensic products provide detectives with investigative aids to solve crime. Eck and Rossmo (2019:603) argue that the police have

increasingly sophisticated technology at their disposal, including DNA analysis, automated fingerprint identification, multiple linked computer databases, and closed-circuit television recordings. So it would be reasonable to expect high crime solution rates.

Since 2009 the South African government has invested much money and resources in forensic databases to facilitate crime investigation. Comparative searches conducted on forensic databases yield forensic investigative leads (FILs), which can improve the detection rate of criminals. The success of investigations and the prosecution of criminals depend on various role players in the criminal justice system's value chain. The underutilisation of FILs and many investigators' and their commanders' poor understanding of the value of FILs contribute to the substandard detection rate, which affects the Criminal Justice System (CJS) (AGSA, 2023:19).

Consequently, these researchers decided to explore the ways in which FILs are identified and processed in crime investigation and examine the impact they have. It is believed that the outcome of this study will assist the SAPS to not only address hindrances in their optimal reporting and use of FILs during investigations, but also improve the regulatory framework, including practical guidelines and procedures, and enhance their information technology systems and detective training programmes.

In-depth interviews were conducted with detectives at ten police stations in the Gauteng Province, forensic examiners, and international forensic experts. The study was supported by secondary data such as the literature, and data extracted from the CAS/ICDMS system to validate and contextualise some of the responses.

## **Theoretical Framework**

Latent fingerprints and DNA evidence are collected from crime scenes and submitted for forensic analysis. The biometrics derived from such evidence are then uploaded on the appropriate databases to enable comparative searches and identify forensic investigative leads (FILs), which are communicated to investigators. In addition, Integrated Ballistic Investigative System forensic investigative leads (IBIS FILs) indirectly link crime scenes. FILs are the verified outcome of a comparative search conducted on a forensic database (Smith, 2022:4; SAPS, 2023:181). The SAPS has established the following forensic databases for comparative searches, namely the Automated Fingerprint Identification Database (AFIS), Integrated Ballistic Identification System (IBIS), and the National Forensic DNA Database (NFDD), to generate FILs (SAPS, 2023:178). Figure 1 below illustrates the different types of FILs.

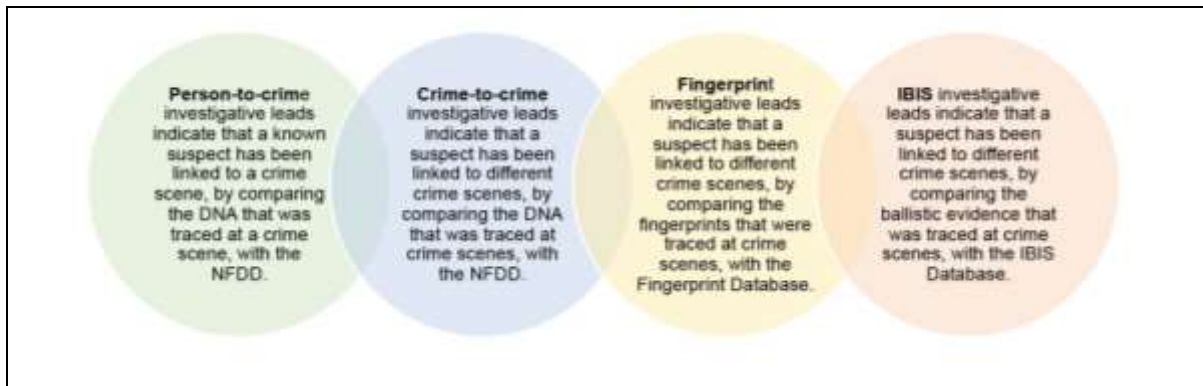


Figure 1: Forensic investigative leads (FILs)  
(Source: SAPS, 2023:178)

A comparative search on the NFDD yields two FIL types: (i) a DNA person-to-crime forensic DNA investigative lead, which may link a person on the database to the DNA of crime scene samples, or (ii) a DNA crime-to-crime forensic investigative lead, which may link samples from two or more crime scenes (i.e., different stations and CAS numbers) while the forensic DNA profile from the crime scene samples does not match any person on the database.

Figure 2 below represents a summary workflow process illustrating how FILs are communicated to investigators. A verified FIL is communicated to an investigator by uploading the report on the forensic system and communicating it electronically to the CAS/ICDMS system. Thus the AFIS and NFDD can provide FILs to identify persons of interest. Fingerprints and DNA in body fluids and tissues are termed individualisation characteristics, in other words, features that are unique to a particular person or thing.

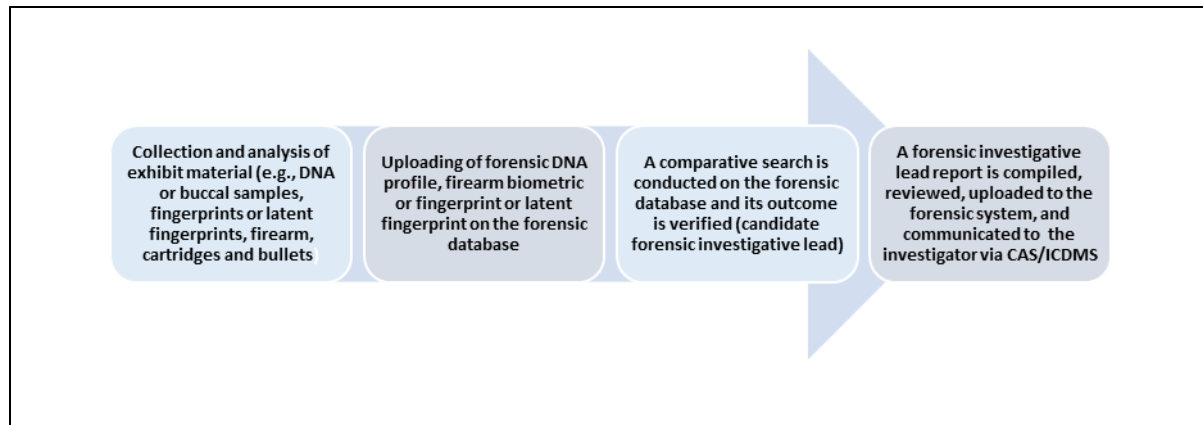


Figure 2: Summary workflow of how forensic investigation leads are communicated to an investigator through the CAS/ICDMS System  
(Source: Researcher)

FILs improve detectives' detection rate and benefit the CJS (AGSA, 2023:19; Budowle, Arnette & Sajantila, 2023:1597; Smith, Singh & Sefalafala, 2018:34; Wickenheiser, 2022:100226). In forensic services, forensic investigative leads are identified and communicated to detectives via the forensic and CAS/ICDMS systems.

### **Research Methodology**

The study explores the South African Police Service's identification and processing of forensic investigative leads to investigate crime. A qualitative-research approach and a case study design, which is both descriptive and exploratory, was adopted. Considering the primary and secondary data, the qualitative research methodology enables an in-depth appreciation of participants' lived experiences and the processing and investigation of forensic investigative leads.

O'Reilly and Kiyimba (2015:14) explain that researchers need to observe their participants' worlds from their participant's point of view to understand how their participants make sense of the world. According to Creswell and Creswell (2018:10-11), pragmatism is about practical applications and problem-solving. The pragmatic worldview arises from real-world actions, situations, and consequences rather than antecedent conditions. This research emphasises work practice and finding solutions to problems. Therefore, the researcher focused on the research problem and adopted the applicable approaches to understand the problem. The pragmatist's philosophical orientation is influenced by a desire to contribute meaningful and practical knowledge anchored in the participant's experience and, in this case, the detective environment on which the case study is based.

The researcher conducted qualitative interviews and consulted secondary sources, including the literature, documentary sources, and electronic data on the CAS/ICDMS system, the system on which investigators record the status of an FILs investigation. Moreover, the researcher conducted semi-structured one-on-one interviews with participants to clarify their responses. Since this informal type of interview resembles a conversation, interviewees are relaxed and participate spontaneously (Gray, 2014:382). The pragmatic worldview was most relevant to this study because it permits the use of methodologies, processes, and strategies to resolve the research problem and get varied responses to the research questions from the participants' perspective.

The ideal population in this research includes all SAPS detectives, all members of the SAPS forensic services who identify and report FILs, and all international forensic experts in the field. According to Polit and Beck (2012:273), Mouton (2014:135) and Babbie (2017:199), a target population is a subset of the population (e.g., entities, objects, or substances) from which the researcher makes scientifically valid inferences considering the heterogeneity of attributes and traits. The researcher used a target population since it was unfeasible to involve all population members in this research project. In light of the views of Polit and Beck (2012:273) and Mouton (2014:135), the researcher chose the Gauteng Province as a study location since it is the province with the highest crime rate and where countless FILs are processed and reported.

According to Fritsch, Trulson and Blackburn (2013:54), qualitative research lends itself to non-probability sampling methods. This qualitative study explored the identification and processing of FILs in the SAPS to investigate crime. The sample consisted of 30 purposefully selected detectives (Sample A) (n=30) from ten police stations in the Gauteng Province, four forensic examiners (Sample B) (n=4), and four international forensic experts (Sample C) (n=4). Seeing that FILs are an international phenomenon in the fight against crime, a comparison of an international and a South African perspective on the FIL phenomenon was necessary. The researchers adopted the sampling method because a sample is a selection of elements used to make statements about an entire population.

The case study design enabled the researcher to make recommendations based on primary data collected through in-depth interviews and insights from various experiences and participants' subject-matter expertise. The research was further enriched by secondary qualitative data collection techniques such as literature and documentary evaluations, FIL data extracted from the CAS/ICDMS system, and personal experiences. A thematic content analysis was done of the qualitative data (Akinyode & Khan, 2018:166).

## ***Findings and Discussion***

This article delves into participant interviews and secondary sources, including data extracted from the CAS system, to gain key insights. These sources proved invaluable in validating the participants' responses. The subsequent discussion will expound on six themes: Theme A concerns participants' knowledge and experience regarding forensic investigative leads (FILs); Theme B explores the process of investigating FILs; Theme C pertains to challenges experienced in this regard; Theme D relates to withdrawal, undetected cases, and the underutilisation of FILs; Theme E scrutinises the reliability of identified FILs; and, finally, Theme F involves the perceived value of FILs in criminal investigations.

### **Theme A: Participants' Knowledge and Experience Regarding FILs**

The detective participants (Sample A) have completed either the Resolving of Crime curriculum, which replaced the detective course, or the earlier detective learning programme. Thus it can be concluded that they have been trained in detective investigations. Less than a third of Sample A completed an ICDMS/CAS systems course, an integral part of their work. It can be concluded that

detectives rely on on-the-job training to operate the systems in their work environment. Because 36.6% [11/30] of Sample A participants attended a training workshop on FILs, they rely on on-the-job training by their commanders or peers to process and investigate FILs. The remainder of Sample A participants depend on self-development, including perusing the standard operating procedure (SOP), to process and investigate FILs. Considering that commanders must ensure that staff members are familiar with SOPs, it is surprising that few participants had the opportunity to discuss the SOP for FILs with their supervisors.

When they were asked to assess their knowledge of FILs, the detective participants in Sample A rated themselves as knowledgeable. No less than 70% (21/30) indicated they had some knowledge and 30% (9/30) indicated they were very knowledgeable about FILs. Only 33.3% [10/30] of Sample A were conversant with the SOP for managing FILs. It was evident from the responses from Sample A that most of the investigators were familiar with the concept of a FIL. But the fact that only one-third of the participants had read and understood the SOP for FILs is cause for concern. This could explain the observed shortcomings such as incomplete detail entry in the SAPS6 (investigation) diary, incomplete system updates during the FIL investigation, and incomplete dockets mandated by the SOP on managing FILs. Non-adherence to the SOP is congruent with the literature regarding poor command and control in mentoring and ensuring compliance with SOPs, poor management of 24-hour docket inspections, and detectives' failure to follow docket inspection instructions (Govender, 2011:128; Kempen, 2016:11; Mofokeng, 2012:70; Schwartz, [sa]:12).

As seasoned forensic experts, the forensic-examiner participants (Sample B) and the international forensic experts (Sample C) are well-versed in identifying and processing FILs. Samples B and C's in-depth knowledge of FILs can be ascribed to years of experience in the forensic field, direct involvement in examining forensic exhibit material, reporting on FILs to a detective, and, when required, giving evidence of it in court. This study obtained valuable insights from seasoned professionals seeing that the majority ([81.6% [31/38]) of Sample A, Sample B and Sample C participants have more than ten years' experience as detectives. It was evident from the study that the forensic participants (Samples A and B) have significant expertise in FILs. Because of their postgraduate qualifications and considerable forensic experience, Sample C provided valuable and quality responses that contributed a great deal to this study. The substantial knowledge of these renowned international forensic experts (Sample C) emphasises the need for lifelong learning and adaptation in the dynamic field of forensic science. Sample C's emphasis on thorough training, involvement in developing technology, and the incorporation of real-world experiences highlights the necessity of a comprehensive training approach in this critical field. Sample C viewpoints serve as useful signposts for a generation of more competent forensic examiners and detectives as we work to close the gap between theory and practice.

### **Theme B: The Process of Investigating FILs**

The detective participants (Sample A) gave similar responses when asked to explain the process of investigating FILs. These detective participants have a good comprehension of the steps to process and investigate FILs. The following is a typical response:

*FILs are reported and received on the CAS/ICDMS system and automatically open cases. The FIL cases are assigned to a detective to investigate the FILs. The docket is inspected to check that it is complete and contains, for example, the A1 statement. Other evidence is also pursued. The complainant is approached when a person is linked to the cases through the FIL and provides a statement that they know the linked person. If the person is unknown or there are compelling reasons that the person of interest had violated them, the person of interest will be traced and arrested. The function 5.16 or FLM function on CAS or ICDMS is completed as the investigation progresses, and the SAPS6 inventory diary is completed (Sample A participant no 30).*

Another Sample B participant indicated the following:

*FILs are identified by performing comparison searching on the forensic databases. The candidates' FILs are verified and reviewed before they are informed to the detectives. The FILs are reported electronically to the CAS/ICDMS system. The necessity of carefully evaluating related cases, retrieving pertinent dockets from archives, and indexing FIL statements in the ICDMS system, all of which are detailed in the FILs, is paramount. Printing and filing FIL statements per connected dockets, finishing the SAPS 5 investigation diary in preparation for receiving the FIL report, and assessing the evidence for potential arrest leads are the next steps, and obtaining witness statements before preparing the case docket for submission to the SPP.*

*Moreover, the response revealed that the SAPS's use of familial searching FILs and FIGG has yet to be implemented. According to the Criminal Law (Forensic Procedures) Amendment Act (No. 37 of 2013), the Minister of Police has yet to finalise a policy on implementing familial searching FILs and FIGG. Additional forensic technology and software solutions are required to facilitate this procedure. It will impose additional strain on DNA analysis, necessitating the implementation of additional test methods; this needed to be accounted for in the current down management strategy of the DNA backlog. Introducing FILs and FIGG requires careful evaluation and may necessitate legislative changes to assure cost-effectiveness and a significant impact on enhancing criminal investigation. Familial searching and FIGG FILs have proven to be beneficial elsewhere in other countries in solving cold casework, serial murder and sexual offence casework, and the identification of human remains. The FIL processes follow a systematic process approved by the forensic and detectives' management. Obtaining and classifying related dockets, filing FIL statements digitally through ICDMS, and printing and filing the statements all go into maintaining precise record keeping. It is valuable to keep meticulous records of actions, such as finishing investigative diaries and assessing potential leads for suspect capture SPP (Sample B participant no1).*

According to the forensic examiners (Sample B), the practice of identifying and reporting FILs from the forensic system to the CAS/ICDMS system is well entrenched. One of the forensic examiners referred to forensic investigative genetic genealogy and familial searches, which, according to the literature, are applied by other law enforcement agencies, but not yet by the SAPS. A Sample C participant commented the following:

*Through the delivery of reports, forensic laboratories provide the investigating units with new forensic investigation leads. The investigative units then manage the ongoing inquiry per the unique protocols established by each jurisdiction. Cold cases and FILs are pursued by specialised units designated for that purpose in several states. At the Federal level, certain major crimes and crimes against the State are coordinated, including cooperating across country borders and at the international level. The Federal government will also facilitate the introduction of cutting-edge technologies and skills to investigate FILs (Sample C participant no. 1).*

*Forensic laboratories and investigators create crucial partnerships in pursuing follow-up and inquiry based on FILs. For example, when a forensic laboratory discovers promising leads through DNA analysis, it swiftly notifies the investigation units of its findings and provides them with thorough reports. These studies offer essential genetic data that facilitates the identification of prospective suspects or ties to unsolved cases. Then, investigative units take over, using their knowledge and jurisdictional protocols to launch extensive investigations. Forensic investigative leads (FILs) and cold cases are handled by specialised teams in some jurisdictions. The cases which link a suspect through one or two cases by fingerprints are investigated at the police station level.*

*Using forensic investigative genetic genealogy (FIGG) improves this collaboration even more. Private DTC vendors get genetic material from crime scenes and utilise cutting-edge genealogical methods to find potential familial ties. Despite requiring many resources, this method has produced remarkable outcomes. A multidisciplinary approach is made possible by working with seasoned genealogists and cooperating with law enforcement, closing the loop and increasing the likelihood of effectively resolving complex cases (Sample C participant no. 2).*

*Successfully pursuing forensic DNA investigation leads requires seamless cooperation between forensic laboratories and investigating units. After using DNA, fingerprint, or IBIS FIL evidence to identify prospective leads, forensic laboratories immediately provide investigating units with thorough reports outlining their findings. Investigative units use these reports as the basis for their initial enquiries. These units manoeuvre via jurisdiction-specific procedures to carefully investigate the leads. The expertise is centralised in jurisdictions with specialised divisions for cold cases and forensic investigative leads to enable a thorough approach. A comprehensive approach is fostered by the involvement of knowledgeable genealogists and smooth cooperation with prosecution authorities, increasing the possibility of successful resolutions. The unit prioritises which FILs should be prioritised. No national system monitors the number of FILs reported and responded to. Each County has developed protocols for managing the FILs (Sample C participant no. 3).*

*Forensic laboratories are crucial for reporting and doing follow-up examinations when FILs are reported to investigators. Investigators are provided with the FIL reports and crucial information about prospective leads. Then, investigative units use their specialised knowledge and legal frameworks to launch extensive investigations. The concentration of expertise works exceptionally well in areas with specialised divisions that focus on cold cases and forensic investigative leads. The use of familial searching and forensic investigative genetic genealogy (FIGG) to identify suspects and unidentified human remains demonstrates the power of the collaboration between forensic labs and investigative units. This cutting-edge procedure entails exchanging genetic information with private vendors who use sophisticated genealogy techniques to find familial connections. Although resource-intensive, this strategy has produced remarkable results. The collaboration goes even further, involving expert genealogists and close communication with law enforcement, and it results in a holistic strategy that improves the chances of successfully resolving complex cases. There is no central database to manage the outcome of each FIL since the police services have decentralised authorities. Each State monitors this differently according to its protocols and legislation (Sample C participant no. 4).*

The Standard Operating Procedure (SOP) for managing FILs offers additional details. The SAPS 5 (investigation diary) must be completed for each step of the FIL processing and investigation (SAPS, 2022:4). Additionally, the literature study reveals that the docket content must be electronically scanned and saved on the ICDMS system so that the content, including witness statements, can be printed when a misfiled docket has to be reconstructed (SAPS, 2022:4). Different international jurisdictions process the follow-up and investigation of FILs. Because the SAPS is a national entity, all provinces and police stations must adhere to central policies and prescripts. Other countries have devolved law enforcement authority to federal states and counties, allowing them more independence regarding prescripts and investigative protocols. Even though each country and regional law enforcement functions according to its own legal and procedural framework, cooperation between forensic laboratories and investigative units is a common thread. It is crucial for resolving cases successfully.

So different nations have adopted different approaches to the process according to their legal frameworks and law enforcement procedures. Some countries have specialised divisions that deal with forensic leads and cold cases, which increases knowledge and attention in this critical field. Cutting-edge

tools such as forensic investigative genetic genealogy, not only signal a change in the way investigations are conducted, but also add new perspectives to the resolution of challenging cases. Owing to this method's resource-intensive nature, a balance must be struck between the pursuit of justice and the effective use of resources. Additionally, knowledgeable detectives and genealogists, tight coordination with the prosecuting authorities, and adherence to ethical principles are consistent across all jurisdictions. International exchange of information, best practices, and lessons encourages innovation and improvement in the handling of forensic investigation leads.

The investigative process is summarised in figure 3 below based on the literature and the responses of the detective participants (Sample A).

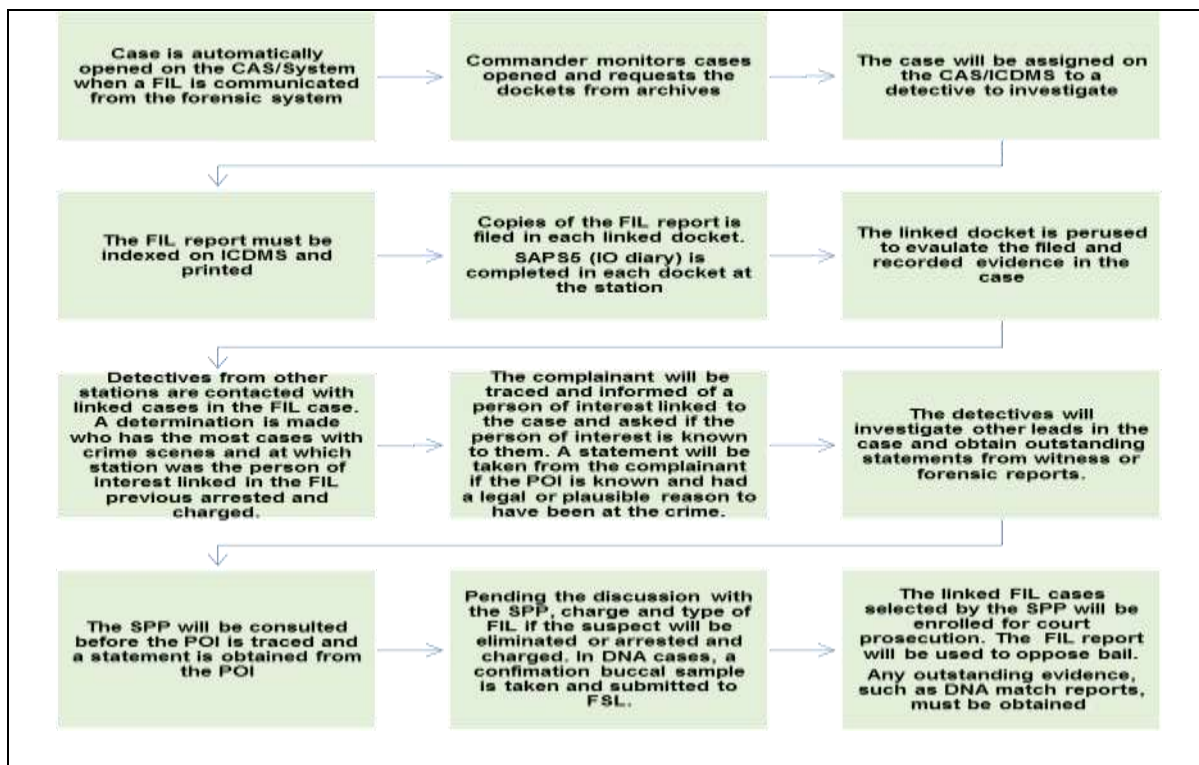


Figure 3: A summary of the investigative process for FIL cases.

(Source: The literature and participant responses)

The detective participants' (Sample A) responses revealed that the procedures they follow are remarkably similar and show only minor variations. According to them, commanders occasionally assume the responsibilities of an investigator designated to the FILs investigation and in charge of the case docket.

### Theme C: Challenges

The detective participants (Sample A) were of the view that the following are challenges to the investigation of FIL-linked cases with unknown persons of interest:

- Communication with stations is delayed in approximately 66.7% (20/30) of forensic reports, including FILs and DNA match reports. Delayed communication hampers ongoing investigations and can affect court proceedings because of delays in enrolment or withdrawal.
- Approximately 63.3% (19/30) of linked case dockets lack essential information about the perpetrator. No identikit or description in a case docket means an unidentified perpetrator.



The detective participants (Sample A) indicated that investigations not only require a great deal of effort but are also time-consuming. They also complained that it was difficult to conduct thorough investigations because they handled a large number of cases simultaneously. This is consistent with the findings in the literature. Limited resources make their work even more challenging (Dikotla & Legodi, 2022:27; Kempen, 2016:11; Machisa, Jina, Labuschagne, Vetten, Loots & Jewkes, 2023:609; Mofokeng, 2012:70; Motsepe, 2019:125; Schwartz, [sa]:12). They indicated other challenges that impede their ability to investigate FILs such as inadequate detective numbers (96.7% [22/30]); the unavailability of computer workstations (83.4% [22/30]); the slowness of the Integrated Case Administration Management System (ICDMS) (80% [24/30]), and a shortage of vehicles (63.3% [19/30]).

Moreover, the backlog of delayed forensic reports not only affects the detection rate and retards court procedures, but also makes it difficult to manage their case dockets and handle incoming cases efficiently. Furthermore, the investigations in many case dockets containing FILs are incomplete, including those about the chain of custody, witness accounts, and complainant statements. Investigations must be completed before they can be submitted to the State Public Prosecutor and before linked cases can be considered for court enrolment.

The forensic examiners (Sample B) indicated that a shortage of forensic examiners and system integration are their biggest challenges. On top of that, inconsistent water and energy supplies delay the processing of forensic findings and FILs, which limits their ability to meet the needs of detectives. Supplier concerns such as delays in instrument servicing and the supply of reagents and consumables, exasperate detectives' already severe service problems.

The international forensic-expert participants (Sample C) mentioned that the following challenges affect FILs in their countries:

*It is a requirement in their country that law enforcement obtain a confirmation buccal sample in DNA FILs before a match report is released by the DNA testing laboratory. It is challenging to monitor the follow-up and investigation of FILs in their countries since no one is assigned this duty, and there is no central system to account for the monitoring and the follow-up of FILs (Sample C participant No. 1).*

*In less than 7% of the FILs, the detectives submit a confirmation sample, resulting in the DNA match report to be used in the court procedures (Sample C participant No. 2).*

*Alternative hypotheses are not explored and presented to the court, negatively affecting impartiality (Sample C participant No. 3).*

*Forensic laboratories need help with various internal and external factors, such as unfunded legislative mandates, resource shortages, the time needed to train new employees to proficiency, increased case submissions caused by successful outcomes, and older cases that may not be a submitting agency's top priority. For example, several laboratories saw a significant increase in forensic exhibit submissions after new regulations on sexual assault kits were passed. The development of forensic technology is another factor affecting backlogs. The first screening procedure can be sped up by switching to Y-screening, but more instances advance to complete DNA analysis due to the greater possibility of identifying male DNA. Information suggesting that a case no longer must be processed might not reach the laboratory due to complaint withdrawal or plea deals. Forensic laboratories must improve communication with their clientele, which includes detectives, to prioritise cases and drop them from analysis when the client no longer requires the forensic findings (Sample C participant no 4).*

Regulation 11 in section 15AD of the South African Police Service Act (Act No 68 of 1995), 2020 (GNR 396 of 2020), requires that confirmation buccal samples must be submitted to the Forensic Science Laboratory for DNA analysis after a person of interest has been identified through DNA FILs. Subsequently, the Forensic Science Laboratory (FSL) will communicate whether a DNA profile has been obtained and issue a match report. A DNA FIL report focuses an investigation and is used as supporting evidence to affect arrest and oppose bail (SAPS, 2022:15). According to the literature, backlogs in forensic services affect service delivery to clients, particularly detectives and the courts. Client engagement needs to be optimised. Severe problems with internal control systems, the availability of resources, and internal inefficiencies have a considerable impact on service delivery. Regular interruptions in water and electricity supply, combined with inadequate supplier services, make it difficult to meet service delivery standards. Moreover, a resolution of the current procurement issues would ensure an uninterrupted supply of critical reagents and consumables. The information technology services and system integration, which are the causes of poor service delivery, need to be fixed.

#### **Theme D: Withdrawn, Undetected and Underutilised FILs**

Most detective participants (Sample A) cited ignorance of conducting comprehensive FIL-related investigations (70% [21/30]), poor command and control, and insufficient resources (43.3% [13/30]) as the main causes of underutilised, withdrawn, undetected or closed FIL cases. Delays in forensic results and FILs (23.3% [7/30]) are also cited as reasons for the underutilisation of FILs in investigations. Furthermore, the empirical evidence below collected from detective participants (Sample A), forensic examiner participants (Sample B), and international forensic experts (Sample C), summarises the reasons for the underutilisation of FILs:

*Detectives must thoroughly assess the linked cases and existing data to find any shortcomings before presenting the case to the SPP. Essential evidence, such as expert testimony, surveillance footage, or witness statements, must be presented outside the docket to strengthen the case (Sample A participant no. 1).*

*The main factor leading to the closure of FIL cases with the designation "undetected" is the failure to find the suspect or the complaint despite numerous and varied attempts. In many instances, the said persons migrate often and do not reside for long in a particular place. Where undocumented persons are involved, it is often very challenging and impossible to trace them (Sample A participant no. 8).*

*Due to the considerable caseload and scarcity of resources at the Station, juggling the needs of FIL follow-ups and investigations becomes difficult. The issue worsens with only one working car for investigations and court appearances and a team of ten detectives (Sample A participant no. 11).*

*A multifaceted strategy that includes cooperation between law enforcement agencies, the use of technology, and extensive investigative methods is frequently needed for successful apprehending. This strategy is also time-consuming and labour-intensive. Some detectives are ill-informed about the many methods that can be used to try to find the suspect (Sample A participant no. 17).*

*Our commander is a novice detective with little advice on conducting FIL investigations. Additionally, more pertinent remarks on the SAPS5 form must be added during docket inspections (Sample A participant no. 22).*

*In our province, unless a buccal confirmation sample is acquired and the DNA match report verifying the FIL is obtained, the state prosecutor will not enrol the case for court; therefore, we do not instantly arrest the person whose DNA links them to a crime suspect of interest (Sample A participant no. 24).*

*Finding the suspect or complaint becomes more difficult as a case ages. Unexpected consequences of forensic backlogs include the possibility that FILs that have the potential to be identified soon after an occurrence may not be discovered for months or even years after the backlog is cleared (Sample A participant no. 24).*

*Because traditional investigative techniques have been the standard for a long time, people may be resistant to change and continue to rely on them. Investigators may be overwhelmed by the technical aspects and opt for more straightforward methods of investigation. (Sample B participant no. 1).*

*FIL investigations usually need a great deal of time and careful analysis. Investigators may be pressured to close cases quickly, which leads them to favour less thorough but speedier investigating techniques. Detectives' trust in their ability to use these techniques effectively might be damaged by inadequate forensic science instruction during their detective training courses and professional development. It is difficult to narrowly follow up on the FIL (such as DNA Crime-to-crime FILs) if there is little or no initial information about the suspect. To avoid detection, suspects may give fake identities, addresses, or phone numbers when they are first apprehended in a case where a buccal sample or fingerprint is acquired. This false information provided when first arrested makes tracking a suspect's location more challenging when they are later connected to further crimes through FILs. To avoid capture, suspects could leave the region or even the country, making it challenging for law enforcement to find them (Sample B participant no. 2).*

*We are actively conducting regular workshops focused on enhancing the use of FILs in investigations amongst the detectives. These workshops encourage detectives to enhance their approach to following up on and investigating FILs. Our observation has revealed a prevalent need for more understanding among detectives about the potential of FILs in aiding crime detection. Additionally, many detectives find that FILs contribute to their already substantial workload and need help to give quality investigation time to all their dockets. (Sample B participant no. 3).*

*In many cases, we have noticed that the initial detectives failed to perform fundamental investigative steps, such as collecting witness statements. Frequently, detectives tend to swiftly close cases on the CAS/ICDMS systems as "undetected" on the same day they receive the FIL. Even commanders are not consistently adhering to the Standard Operating Procedure (SOP) for managing FILs. Instead, the detectives prioritise statistical case finalisation rather than focusing on the actual investigative substance. In my observation, while reviewing the dockets at the Station, it often seems that cases are being expedited to court primarily due to the focus on maintaining performance statistics rather than thoroughly evaluating the case's merits for a successful prosecution. A noteworthy instance is when a fingerprint is recovered from the exterior of a vehicle. Despite this, the crime scene examiner's statement lacks clarity about the precise location where the fingerprint was found—whether it was on the door handle or elsewhere. Additionally, pertinent evidence and statements crucial to the case are absent from the docket. Consequently, the Senior Public Prosecutor (SPP) lacks confidence in the case's readiness for court enrolment. This tendency at stations highlights a concern where the pressure to meet performance metrics might compromise the quality and effectiveness of the legal proceedings (Sample B participant no. 4).*

*The extent to which FILs are followed up on and investigated can be significantly impacted by resource limitations within law enforcement authorities. A lack of staff members could result in the use of only FILs connecting more serious property crimes and serial rapists and murders. Many reported FILs may be assigned low priority due to inadequate cooperation between the*

*detectives and forensics to track their progress. Additionally, some investigators may not be using the lead because of apathy or a lack of awareness regarding the significance and impact of the FIL. (Sample C participant no. 1).*

*Detectives tend to emphasise cases that have more prominence or include serial criminals, even if forensic examiners do not usually contact them regarding the status of FILs (Forensic Identification Leads). The hierarchical structure and resources available determine how thoroughly FILs are analysed. In our nation, it is necessary to get buccal samples for DNA FILs, which must be verified before a report is produced for court purposes. Less than 7% of detectives submit a confirmation sample in sexual offence investigations, for example. There can be significant regional variations in the importance of FILs, how they help investigations, and how they are used in various crimes. Suspects can relocate regularly to avoid detection or search efforts. Law enforcement organisations with limited funding may find allocating personnel and technology for suspect tracing challenging. In today's technologically advanced world, suspects might take steps to remove their digital traces, making it more challenging to monitor their online communication and activity (Sample C Participant no. 2).*

*More communication and cooperation between forensic professionals are needed to hamper the smooth incorporation of FILs into investigations. Increasing awareness, funding training, and allocating resources more effectively can help overcome these issues and motivate investigators to use these priceless forensic tools more extensively to improve their investigations (Sample C participant no. 3).*

*Monitoring the results of FILs reported to detectives and looking into the root reasons for their underutilisation should be given more attention. This entails determining whether it is due to insufficient evidence to sustain court proceedings, insufficient follow-up investigations by the detectives, a lack of understanding, the complainant's unavailability, or difficulties in tracking the suspect. To evade detection, suspects connected to criminal networks may go unnoticed by removing themselves from public contact. Suspects may use disguises to alter their appearance, making it more challenging to identify and track them. Witnesses or associates who are hesitant to assist the police in their search for the suspect's whereabouts could hinder their efforts (Sample C participant no. 4).*

Commanders should focus on undetected FIL cases and call in tracing teams' and crime intelligence's assistance before they close them. A greater effort must be made to get undetected FIL cases ready for trial to improve the detection rate. The literature shows that, despite extensive investigation efforts and the attentiveness of investigators, finding a suspect is difficult in some cases (Geberth, 2020:1-47). In some instances, a lack of information makes it difficult to locate a suspect or make an arrest. Even though technology and the instruments detectives use have greatly improved over the past decades, it is sometimes impossible to apprehend suspects.

The information supplied by victims, witnesses, and people with knowledge of the crime or suspect; physical evidence at the scene of the crime; psychological profiling; police and other agencies' files; informants; personal identification numbers; vehicle registration numbers; physical descriptions; and photographs are some of the ways to trace suspects. Investigators need detailed information from various sources, including victims and witnesses, to find a suspect. Finding them is much easier if victims or witnesses can describe or identify suspects. This information includes motivations, skills, and possible non-suspects. Descriptions of alleged offenders is obtained by means of interviews. Informers are also an invaluable source of information. Perpetrators who use stolen cell phones can be traced by means of cell phone surveillance. Witness and victim accounts in dockets often help to trace suspects (SAPS, 2022:34).

Since every case is unique, many reasons account for why it is difficult to trace a suspect. A multi-faceted strategy that includes cooperation between law enforcement agencies, the use of technology, and extensive investigative methods, is often needed. Challenges in the detective environment affect investigations, including the investigation of FILs (Kempen, 2016:11). Detectives also face significant resource-related challenges such as an insufficient number of detectives and vehicles, and a lack of IT equipment. Moreover, talent deficiencies at supervisory level and ineffective command and control pose obstacles (Schwartz, [sa]:1-11). In response to a parliamentary question, the Minister of Police disclosed that the staffing level of Detective Services was 40.4% of the ideal complement. The Minister attributed that the significant turnover rate among detectives directly impedes the efficiency of investigations, leading to a high ratio of case files per detective (*Daily Maverick*, 2023:np).

Additional explanations that detective participants (Sample A) gave for the underutilisation or withdrawal of FIL cases at court include a lack of additional supporting evidence and robust command and control by detective commanders. Moreover, the inability to use the case information in FIL case dockets; delayed forensic results; the prioritisation of docket reduction; detectives failing in their duties; failure to take confirmation samples; and difficulties locating complainants or suspects also contributed to the underutilisation and withdrawal of cases at court. Literature also mentions feeble attempts to trace suspects (Makhaza, 2018:57).

Detectives complained that heavy caseloads and scarce resources hamper their ability to do FIL follow-ups and investigations. Inexperienced commanders' poor directions and the detailed information required on SAPS5 forms during docket inspections were also listed. The backlog and delays in forensic services such as DNA match reports, make the processing and finalising of FIL cases difficult and time-consuming. As cases age, it gets more challenging to track down a suspect. Additionally, commanders' obsession with performance measurements and the unintended consequences of pursuing statistics to reduce the number of pending case dockets at a station result in incomplete investigations submitted to the state public prosecutors. The following narratives underscore the reasons for the non-enrolment or withdrawal of cases at court:

*The ambiguities that might undermine the case's potential to succeed in court have not been clarified. For example, key witnesses are unwilling to testify again or resolve contradictions in their testimony (Sample A participant no. 4).*

*The case only includes relevant data, paperwork, reports, and critical pieces of evidence, and the likelihood of success in court is thus diminished. The complainant does not want to proceed with the case, or the complainant cannot be traced to provide an additional statement. (Sample A participant no. 13).*

*No or weak corroborating evidence to support the FIL evidence. (Sample A participant no. 15).*

*Supervisors must thoroughly peruse the case docket to confirm court readiness (Sample A participant no. 18).*

*There is so much pressure on managing the Station statistics of investigation that cases are just pushed to court, although the investigation is complete to chase performance statistics. (Sample A participant no. 24).*

*The DNA match forensic reports were outstanding (Sample A participant no. 27).*

*Each case is unique, and the decision to withdraw prosecution involving FIL evidence depends on legal, evidentiary, procedural, and strategic considerations. The availability or credibility of expert witnesses who can effectively explain and defend the forensic evidence in court might be*

*lacking, weakening the presentation of the evidence. Issues related to chain of custody, authentication, or admissibility could lead to challenges that hinder prosecution. If the case gains significant public attention or has broader implications, prosecutors might withdraw the prosecution to prevent potential negative consequences or backlash. Key witnesses, including those related to the forensic evidence, might become unavailable, or their credibility might be compromised, leading to doubts about the case's viability. (Sample C participant no. 2).*

*There are numerous reasons why FIL cases might not proceed to court enrolment. The prosecution rigorously assesses these cases and refrains from enrolling less severe offences when the evidence within the docket appears feeble, marked by loopholes, or needs more crucial evidence. Since forensic evidence constitutes circumstantial proof, it necessitates additional corroborative evidence. Given the significant caseload in the courts, they cannot dedicate excessive time to cases that exhibit frailty in their evidence (Sample C participant no. 3).*

*If the FIL evidence is not strong (e.g., touch DNA or fingerprints taken from outside a vehicle stolen from a shopping centre), there may be doubts about the case's viability in court. There may be gaps or inconsistencies in documenting the chain of custody for the forensic evidence, which could raise concerns about tampering, contamination, or mishandling of the evidence, undermining its credibility. The FIL might even conflict with other types of evidence, witness testimonies, or the overall narrative, causing uncertainty about the case's coherence. Information from victims, witnesses, and people with knowledge of the crime or the suspect, physical evidence at the scene of the crime, psychological profiling, police and other agency files, informants, personal identification numbers, vehicle registration numbers, and physical descriptions like photographs are some of the ways suspects can be found. Investigators need to obtain detailed information from various sources, including victims and witnesses, to find a suspected person. Finding suspects will be much easier if victims or witnesses can describe or identify the people who committed the crime. This information includes motivations, skills, and possible non-suspects. Obtaining personal descriptions by speaking with people who can characterise the alleged offender is frequently done through interviews. Finding suspects in situations involving vehicles, such as armed robberies, depends heavily on the type of vehicle and its registration. Eight participants mentioned informers as a source of information, while the others did not. The information in witness and victim accounts is frequently helpful in the case dockets that have been analysed to help find the suspect (Sample C participant no. 4).*

According to the participants, countless factors contribute to unenrolled or withdrawn cases in court. Commanders play a direct or indirect role in this by insisting on the submission of case dockets to public prosecutors when the investigation is incomplete, which smacks of poor command and control. The forensic-examiner participants (Sample B) mentioned workshops to encourage detectives to follow up and investigate reported FILs. Detectives must have a good understanding of the contribution that FILs can make to crime detection. Some of them close cases without doing a thorough investigation for the sake of statistics. Despite minimal contact with forensic examiners, an international forensic expert claimed that detectives often prioritise sensational cases or cases involving serial criminals. There are differences between regions regarding the importance of FILs, their investigation assistance, and their investigation of different crimes.

Because it is circumstantial, forensic evidence requires extra supporting evidence. Due to their overwhelming caseloads, courts devote more time to cases with good evidence. The thoroughness of a police investigation determines prosecutors' withdrawal or not from prosecution, the assembly of evidence, and the perceived severity of an offence. Unlike cases involving elderly victims or people without disabilities, cases involving minor victims and people with disabilities are more likely to be scheduled for court proceedings but do not proceed to trial (Machisa et al., 2017:14-15).

The thoroughness of a police investigation, the gathering of the evidence, and the gravity of a crime determine the prosecutor's decision to continue with the case in court. Legal and evidential criteria are not the sole determinants in prosecutors' choices to proceed with a case. Equally significant are the performance benchmarks established for monthly case resolutions and conviction rates (Machisa et al., 2017:14-15). Moreover, the literature maintains that tracing suspects identified by FILs is difficult since they often do not have valid addresses. In addition, maintaining dockets requires a significant amount of work (Makhaza, 2018:61). It is evident that FILs are underutilised in South Africa. Many historical FILs are still under investigation and some FIL cases have been closed as undetected or withdrawn (AGSA, 2023:19, 34). The evaluation of the CAS/ICDMS underscores the underutilisation of FILs as an investigative tool and the high number of FIL cases that have been withdrawn or are undetected.

According to the data on the status of FILs received between 1 January 2015 and 31 December 2022 in the CAS/ICDMS system, a significant percentage of FIL cases are qualified as "withdrawn". Many withdrawn cases deemed finalised on the CAS/ICDMS were not ready for court enrolment and should have been investigated further. If these instances remain closed, it would be a lost chance to raise the detection rate.

When law enforcement agencies receive FILs that either link different crime scenes without a person of interest connecting them or link one crime scene to a person of interest, they should gather information from witnesses, victims, and informants to understand the suspect's identity, physical characteristics, last known whereabouts, and possible motivations during the investigation phase. To keep tabs on suspects' whereabouts, investigators may conduct surveillance at the places they frequent or of the people connected to them. Law enforcement can recruit the public's help by releasing descriptions of suspects and asking for tips or leads in the media or on social media. Based on the information gathered, investigators use databases such as criminal histories and driving or immigration records, to look for similarities. Law enforcement agencies use technology such as cell phone tracking, security cameras, or social-media monitoring, to find a suspect's location or online activities. Cooperation between various spheres of government and law enforcement organisations such as sharing information and resources in the search for a culprit, is often of great value. Law enforcement can also use undercover agents or informants to collect information and covertly locate the suspect. In FIL cases such as serial-rape cases, the media can also be sued to circulate an identikit of the suspect (SAPS, 2022:1-34).

### **Theme E: The Reliability of FILs**

All the detective participants (Sample A) indicated that they had complete confidence in the scientific reliability of their FILs. Most detectives claimed that the courts had never questioned the scientific reliability of their FILs. Both the defence and the courts had, however, questioned other aspects of their evidence such as the chain of custody, witness statements, and evidential value. The participants agreed that forensic examiners should be qualified and authorised, should have passed competence tests and should have functioning forensic equipment. Furthermore, the participants viewed a technical review of findings and outcomes before they are disseminated to detectives as vital because it guarantees the forensic process's dependability and integrity.

Apart from that, the forensic-examiner participants (Sample B) believed that the validated forensic test methods and regular inspections performed in adherence to the SOPs ensure reliable forensic results. They were in agreement that an ISO-compliant quality management system facilitates a legitimate and dependable forensic identification and analysis environment. Furthermore, all participants agreed that forensic results and findings should be subjected to technical and peer evaluation.

Shortcomings in the complete impartiality required by ISO standards are exemplified by difficulties in interpreting DNA mixing (Dror & Pierce, 2020:800). The international forensic experts pointed out that although total objectivity could not be guaranteed, prejudice could be eliminated through

bias management training, stringent procedural constraints, and the external assessment of results before they are disclosed. Techniques such as Bayesian analysis and evaluative assessment, can increase impartiality. Interpretation criteria and probabilistic genotyping techniques in the handling of mixtures are crucial to laboratory objectivity.

### **Theme F: The Value of FILs in Criminal Investigations**

All the participants in the study observed that FILs not only increase the likelihood of early detection, the rate of detection, and the probability of conviction, but also result in longer sentences because the centralisation of related cases makes concurrent court procedures possible. Seeing that they connect cases, FILs were perceived as a way to resolve cold cases, maximise investigations, and save time throughout the investigative process. Although most participants (84.2% [32/28]) agreed that FIL investigations can help to achieve the National Development Plan's goal to ensure citizens' safety and security by eliminating serial offenders from society and preventing reoffending, they are of different opinions. The following extracts reflect the opinions of some detective participants (Sample A), forensic-examiner participants (Sample B), and international forensic experts (Sample C):

*The value of FILs lies in their capacity to unearth concealed connections and associations, shedding light on potential suspects or accomplices (Sample A participant no. 3).*

*By utilising forensic leads, detectives can establish patterns or modes of operation, allowing them to connect crimes that appear to be unrelated and possibly identify serial offenders, even in cold cases (Sample A participant no. 10).*

*Forensic investigation leads can potentially exonerate innocent individuals because they present concrete evidence that negates accusations and establishes an alternative picture (Sample A participant no. 15).*

*Establishing databases supporting FILs has cost benefits for the CJS in the medium to long term. Operating is cheaper than relying only on traditional investigative techniques (Sample A participant no. 21).*

*These FILs effectively reduce the number of potential suspects, which helps save time and money by focusing inquiries on those with the most excellent chance of involvement (Sample B participant no. 2).*

*We can use FILs to find hidden connections, highlight trends, and bring to light previously undetected details that add to a thorough understanding of a case (Sample B participant no. 3).*

*Investigators can build their investigations more effectively and efficiently by using the insights obtained from FILs as a systematic foundation and to detect serial rapists and multiple offenders in other crimes (Sample B participant no 4).*

*The usefulness of FILs rests in their capacity to convert ad hoc information into valuable knowledge, enabling reasoned decisions and tactical actions in investigations to solve cases. Numerous crimes would remain unsolved if comparative searching were not conducted on forensic databases. FILs facilitate the identification of serial and repetitive offenders. DNA FILs are vital in identifying and preventing numerous serial offenders from engaging in additional criminal activity. The allocation of resources to forensic services is justifiable, as the costs of prolonged investigative efforts to resolve these cases would likely exceed the investment in forensic services and identifying FILs (Sample C participant no 2).*



*By utilising FILs, law enforcement can use science and technology to fill in knowledge gaps and help solve complicated crimes that might otherwise go unresolved. These FILs act as a road map for detectives, pointing them toward the most pertinent lines of inquiry and increasing the likelihood of a successful conclusion. One must be cautious in overstating the value of databases, and the cost-benefit should be considered when determining what biometrics should be uploaded from what sources (Sample C participant no. 3).*

FILs are an invaluable tool in the early detection of crime recidivism and assist in investigations by improving detection, conviction and sentencing terms, in particular when several cases are linked (AGSA, 2022:13-16; Doleac, 2017:165; Ge, Sun, Li, Liu, Yan & Budowle, 2014:163; Santos et al., 2013:1; Smith & Horne, 2023:555969; Speaker & Wells, 2021:10. Triverio & Márquez, 2022:158; Walsh, Curran & Buckleton, 2010:1174). FILs can be used to:

- Identify potential suspects by comparing their DNA to that discovered on a crime scene.
- Establish an accused person's innocence or guilt.
- Exonerate convicted individuals of an offence they were falsely accused of.
- Identify missing persons and human remains.

### **Recommendations**

Based on the primary and secondary data resources, the following recommendations are made:

- The forensic-fingerprint community should continue to develop systematic methods to measure the quality of fingerprints. Fingerprint examiners should be wary of potential bias in their reporting and testimony.
- The use of algorithms to measure the quality of marks may eliminate bias regarding the quality of fingerprints.
- Fingerprint examiners should not get overenthusiastic about the uniqueness of fingerprint FILs.
- All parties in the criminal justice system should make a concerted effort to get to the truth, which includes assessment and critical consideration of scientifically intricate and technologically advanced evidential material.
- Improve the legislative framework of FILs. National Instruction 13 of 2017: Case Docket Management should be updated to include the management of FILs and some aspects in the standing operation procedure. Moreover, the Criminal Law (Forensic Procedure) Amendment Act (No. 37 of 2013) should be reviewed to permit familial searching FILs in the most heinous crimes and allow future DNA technologies to include phenotyping to identify missing persons and unidentified bodies.
- Strengthen the interaction between the SAPS and the National Prosecuting Authority (NPA). It is recommended that the NPA and detectives collaborate more closely during the investigative process. A common understanding of centralising cases linked by FILs and the prerequisites for enrolling cases based on fingerprints and DNA skin cells is vital. Participants have called for constructive engagement regarding the criteria for dismissing court proceedings in the absence of sufficient supporting evidence.
- Address the acute resource challenges that detectives and forensic services experience.

## Conclusion

The detective participants (Sample A), forensic-examiner participants (Sample B) and international forensic experts (Sample C) in this study acknowledged the value of FILs, particularly their contribution to solving crimes and identifying recurrent and repeat offenders. The reliability of FILs is maintained when a Quality Management System (QMS) based on ISO standards is adhered to in the forensic examination and verification of FILs. The findings revealed that detectives have to contend with significant resource constraints when they investigate FILs, which results in the underutilisation of FILs and failure to achieve the desired detection and conviction rates.

The SAPS is advised to address the concerns of detectives and forensic services. It is vital to resolve the problematic aspects of their working conditions such as inadequate resources and incompetent commanders. The organisation should prioritise competence at every level, including the recruitment, training, and retention of detectives, as competence has a significant impact on the investigation of FILs and the detection of crime. The findings of this study will influence the public's perception of client satisfaction and will enhance the SAPS's reputation for conducting effective criminal investigations by means of FILs.

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