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The Relevance of Forensic Laboratories in Assisting with Fighting and  
Solving Crime in South Africa.

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## **Abstract**

According to media sources, there seems to be a major backlog of cases of crime within the criminal justice system, more specifically in forensic laboratories, some even as old as a decade, that still need to be investigated and concluded, in South Africa. Many cases have also been struck off the roll for various reasons, such as lack of evidence, unavailability of witnesses or inadequate facilities available to conduct tests for investigative purposes. This research takes the form of a desktop study that brings to light factors that affect the investigation of crime as well as prevention of crime, within forensic laboratories in South Africa. The current state of forensic laboratories is one such variable that seems to be hindering its own progress in assisting with fighting and solving crime, both locally and internationally. Forensic laboratories play a major role in assisting with crime prevention as well as solving crimes that have already occurred. The presence of more forensic laboratories will assist in creating jobs, increasing job satisfaction, as well as play a major role in contributing towards reducing overall crime rates and other factors associated with a high crime rate, such as the population of correctional centres. When resources and facilities are adequately used to its full potential, by trained and competent staff, it positively contributes to the reduction of crime, deterrence of crime and indirectly affects various other institutions within the criminal justice system such as correctional facilities, where innocent suspects may have been wrongfully held for long periods of time while criminals are still liberally roaming the streets without a care in the world.

Key terms: forensic laboratory, South Africa, investigation, crime, reduction, factors.

# Chapter 1

## 1. An Introduction to the Study

### 1.1. Introduction

When a media source, such as newspaper is consulted, there are many articles that report and discuss the nature of crime that has recently been committed, recently solved or follow up stories to crime that was committed weeks, months or, in some cases, even years ago. The bad usually outweighs the good. In South Africa, according to various media sources, such as newspapers and online sources, there seems to be a major backlog in the investigation of crime, particularly those that require the use of forensic investigation methods to be concluded, such as the use of DNA analysis, fingerprint identification or ballistics testing. There are various possible reasons for this backlog, which will be discussed further in this research.

While most associations to crime are negative, as crime usually causes harm and pain to individuals and families and brings disharmony and sorrow to the families and communities of those affected by crime, positive effects of crime do also exist. Therefore, crime can also be viewed as an important and a necessary component of society because it brings people together in their time of need, to support and assist each other and strengthens social cohesion amongst communities as well as creates jobs for many people, who rely on crime to earn a living, such as the police, forensic investigators, laboratory technicians, lawyers and judges to name a few.

The purpose of this research is to establish the relevance as well as the importance of forensic laboratories in assisting with fighting and solving crime in South Africa. Crime has taken over most, if not all, societies in South Africa. While there may be some positive outcomes of crime, the major reaction towards crime is negative, as mentioned, the bad outweighs the good. In order for measures to be put in place to reduce or prevent the occurrence of crime, the various factors, such as the police, forensic laboratories, the courts and correctional facilities, that play a role in assisting with the investigation and prevention of crime need to be understood. This research focuses on forensic laboratories within the processes of the investigation of crime and assisting in

the prevention of crime. Chapter two of this research comprises of an in- depth discussion of forensic laboratories, both, in South Africa, and internationally. This research has been broken down into six chapters.

Chapter one of this research paper begins by providing definitions of the concepts that will be used throughout the research, this will provide a background and better understanding of the terms used in the research. It goes on to provide a background to the topic as well as the research problem. It is important to understand how and why the problem exists as well as how the problem is contemporary and therefore a relevant topic that needs to be researched. It also provides a basic outline of the research in order to assist with gaining an understanding of how the research was conducted and the various procedures and protocols that were followed when conducting the research.

Chapter two of this research will comprise of a review of available literature on the topic. This chapter will cover aspects of the research such as the history and development of forensics, a discussion of the different categories within forensic science, a discussion of the history and development of forensic laboratories, both, internationally as well as locally and an outline of the criminal justice system of South Africa. Chapter three will discuss the theoretical frameworks relating to the topic of the research. The theories that will be discussed include the classical school of criminology, the deterrence theory and Locard's principle of exchange.

Chapter four explains, in detail, the methodology that was used to conduct the research, information on the sample of the study as well as limitations that could hinder the results and how to overcome them as well as the ethical considerations of the study that need to be addressed and how they will be addressed to avoid any unethical behavior of the researcher while conducting the research. Chapter five provides a thematic analysis and a discussion of the findings from the secondary data of the research. The research questions that will be established in chapter one, will be answered in chapter five of the research. Chapter six will provide a conclusion of the research as well as an overall discussion of the objectives of the research and make appropriate recommendations relevant to the topic of the research, recommendations will also be made for practitioners within the field of study and recommendations for possible future research on this topic.

## 1.2. Definitions and Conceptualization of Terms Used in the Research

There are various concepts that are used throughout this research, these include terms such as crime, forensics, forensic science, forensic laboratories, and correctional centers to name a few. This section aims to provide a definition as well as conceptualization of concepts that will be used throughout the research. In order to gain a thorough understanding of a concept, it is important to understand the meaning and context in which it is used. Examples, where possible, will be used to assist in understanding the various concepts that have been used in the research.

### 1.2.1. Crime

There are various definitions of crime. For example, according to Van Zyl (1996) in Bezuidenhout and Little (2011), crime is defined as “the illegal, willful human action that constitutes a transgression of the law, to which is linked sentencing by a court of law after a hearing and conviction” (Van Zyl, 1996 in Bezuidenhout & Little, 2011, p. 11). He also states that individuals from different backgrounds will view a concept from a different angle and each will have their own meaning and understanding, such as students with a legal background view crime as “an act that contravenes the law”, while a student with a social sciences background may view crime as “behavior that is harmful to individuals and society” whereas other individuals see crime as “an act that violates moral code of the collective majority” (Bezuidenhout & Little, 2011, p. 11).

Despite these views, it needs to be noted that the definition of crime can be judicial or non-judicial. Judicial means pertaining to the law or justice, Bartollas (1997) in Bezuidenhout & Little (2011), informs us that “the word ‘crime’ is derived from the Latin word ‘*crimen*’, which means “judgement, accusation and defense” and defines crime as any action that is prohibited by law” (Bartollas, 1997 in Bezuidenhout & Little, 2011, p. 11). Crime consists of various elements that need to be proven before an action can be construed as a crime. These elements vary from country to country as definitions of crime vary from one country to another.

Crime can be divided into two categories, namely, statutory crime and common-law crime. Statutory crimes are “crimes that are recorded and published by the government in statutes of law or legislation, such as books called *Government Gazettes*” (Bezuidenhout & Little, 2011).

Examples of statutory crime include drinking and driving or traffic violations. These laws are regularly reviewed and updated. Common-law crimes “are crimes such as murder, theft and robbery that have not been recorded or published in Government Gazettes, but rather have been considered crime for centuries and are identified and defined by the Roman-Dutch legal system which is the source of the South African common law” (Burchell, 2005 and Snyman, 2008 in Bezuidenhout & Little, 2011, p. 12).

Non-judicial definitions of crime include that of Van Der Walt, Cronje and Smit (1985) in Bezuidenhout & Little (2011) who state that “crime is an anti-social action that involves a threat, violation or infringement of the stability and security of a society and its members” (Van Der Walt, Cronje and Smit, 1985 in Bezuidenhout & Little, 2011, p. 13) such as prostitution, public drinking or searing excessively in public. Actions that contravene the non-judicial definition of crime are not usually punishable.

Lilly et al (1989), state that “crime is a complex phenomenon that is demanding, intriguing and challenging to explain its many sides” (Lilly et al, 1989, p. 7). Mc Cafferty (2003), states that definitions of crime vary from country to country (Mc Cafferty, 2003). According to Singh (2011), crime is defined as “human conduct that is in violation of Criminal Law” (Singh, 2011, p. 91). There are various types and subtypes of crime, such as murder which is broken down into different categories such as serial murder, mass murder, spree murder and muti murder, to name a few; rape which can be categorized into single incident rape or serial rape (Bezuidenhout & Klopper, 2011).

### 1.2.2. Murder

According to South African law, murder is defined as “the unlawful and intentional killing of another person”. According to Burchell and Milton (2007) in Bezuidenhout, in order for an act to be classified as murder, “it needs to fit certain criteria, which includes, the act must be unlawful, meaning, and for example, it was not an act of self-defense. As well as the killing being caused by a direct application of force to the body such as shooting, stabbing or poisoning or an indirect method such as scaring a person into having a heart attack that leads to their death. An act of self-defense would need to be proved in order for the act not to be classified as murder, this can be done, for example, with the use of CCTV or video footage. It also needs to be understood that

murder is committed against a living human being that has been born alive and was still breathing at the time of the killing.

Murder is regarded as an attempt that has been planned and there is evidence of intent,” for example, the victim had received threats or previously experienced violent acts at the hands of the perpetrator. “Unplanned murder” is referred to as culpable homicide which Burchell and Milton define as “the unlawful negligent killing of another human” (Bezuidenhout, & Klopper, 2011, p. 189). Culpable homicide is unplanned and there, usually, is no intention to kill the victim. An example of culpable would be a person ran across the highway and got run over by a vehicle, in this instance, the driver of the car did not intend to kill the pedestrian, he or she did not decide that they are going to run over someone who is crossing the road, rather the actions of the pedestrian were careless.

There are many different subcategories of murder such as serial murder, mass murder, spree murder, family murder, muti murder, farm murder and police murder. Serial murder, which, according to Adler, et al (1996), Brown et al (2007), Glick (2005) and Hickey (2002) in Bezuidenhout & Klopper (2011), is defined as “the killing of multiple victims over a period of time ranging from days or weeks to months, years or even decades.” Most serial murderers have a minimum of about three to four victims and serial murderers usually evade apprehension. In many instances, the victim is unknown to the perpetrator, however, the perpetrator may choose to kill victims of a certain description, for example, a specific race or women with a specific hair color. According to Brown et al (2007), in Bezuidenhout & Klopper (2011), a spree murder, occurs when “a single person kills three or more victims within a period of hours, days, weeks or even months in different locations.” Spree murder can be regarded as a subtype of serial murder.

Mass murder, according to Adler, et al (1996), Brown et al (2007), Glick (2005) and Hickey (2002) in Bezuidenhout & Klopper (2011), is defined as the killing of multiple victims in a single episode or during one event within a few moments or hours by one or more perpetrators. Mass murderers are usually apprehended by the police, turn themselves in or commit suicide. Mass murderers are usually psychologically unstable or very stressed out individuals who have faced a stressful life event such as the loss of a job or the loss of a loved one that was very close to them. Mass murderers also usually have a minimum of three to four victims. Family murder can be regarded as a mini mass murder, because there are multiple victims, the whole family, is killed in, usually, a single

location. With regards to a family murder, in most instances, the perpetrator is a member of the family, perhaps an angry child of the family.

According to Murray & Sanders (2005), in Bezuidenhout & Klopper (2011), “the word muti is derived from a Zulu word *umuthi*, which means root, plant, tree or medicine.” Muti is a form of traditional, usually, herbal medicine. In some cases, the term is used in a general sense, such as, a person made a home remedy for the flu and called it his or her muti for the flu. Some traditional healer’s use parts of animals and in some instances even humans to make their muti as it is believed to make the muti stronger or serve a specific purpose, for example, a human hand will attract customers to a specific business. The terms muti murder and muti killing are sometimes used interchangeably. When body parts are required for the purpose of making muti, it is, supposedly, best to harvest the body parts while a person is still alive as it is believed that the properties of the medicine will then be stronger. The death of the victim whose body parts have been harvested for the purpose of making muti. The death of the victim results from the excessive bleeding of injury and not a murder, as previously defined.

A farm attack refers to “all criminally inclined attacks on the farming community.” Farms are isolated homesteads, therefore criminals have more time to commit more than one type of crime during a farm attack, and these could possibly include, but are not limited to, robbery, assault, rape and eventually murder, in most instances a mass murder. Gunshots on farms may not attract much attention as hunting is usually common on farms. Farm attacks occur regularly in South Africa against all races and the number of incidents of farm attacks is currently on the rise, despite South Africa already having the highest rate of farm murders in the world (Bezuidenhout & Klopper, 2011).

There is a high number of killings of police officials as it is ranked as a high risk profession. According to Bezuidenhout & Klopper (2011), police murder refers to “causing the death of an official without a lawful excuse, and with the intent to kill the official.” Most police murders occur when a police official responds to a crime scene and the crime is still taking place, for example, a bank is still being robbed and police officials arrive and disturb the perpetrators resulting in the police officials being shot.

As previously mentioned, people commit murder for various reasons, such as a stressful life event, like the loss of a job, the loss of a loved one or inability to cope with stressful situations that occur daily. Many murders may have a psychological disorder therefore committing murder gives them a sense of relief, satisfaction or pleasure. Some people are also influenced by other factors such as their upbringing, their age, level of education and their community, as to whether to commit a crime or not and the extent and brutality of the crime (Bezuidenhout, & Klopper, 2011).

### 1.2.3. Rape

According to the Criminal Law Sexual Offences and Related Matters Amendment Act 32 of 2007, rape occurs when “any person (A) who unlawfully or intentionally commits an act of sexual penetration with a complainant (B) without the consent of (B), is guilty of the offence of rape”. The act of sexual penetration is defined as follows in Chapter 1, subsection 1 of the Act:

“Any act which causes penetration by any extent whatsoever by –

- (a) The genital organs of one person into or beyond the genital organs, anus, or mouth, of another person;
- (b) Any other part of the body of one person or, any object, including any part of the body of an animal, into or beyond the genital organs or anus of another person; or
- (c) The genital organs of an animal into or beyond the mouth of another person” (De Wet, J.; Potgeiter, C. & Labuschagne, G. N., 2010).

According to De Wet et al (2010), in Bezuidenhout & Klopper (2011), a serial rapist can be defined as “a person who has engaged in sexual contact with two or more victims, without their consent, in a minimum of two separate incidents over an extended period of time.” victims who fall prey to serial rapists are usually strangers, while single incident rape is usually committed by someone who is known to the victim. In South Africa, there is no difference between single incident rape and serial rape, every incident is treated as a new case until investigators notice that a pattern may be forming regarding the modus operandi of the perpetrator.

There are various reasons as to why a person may commit an act of rape, these could include anger, perhaps because a rapist has strong feelings of hostility towards woman, possibly due to failed

attachment with his mother during childhood or continuously being resented by women; wanting to feel a sense of power, because the rapist doubts his masculinity and feels that it needs to be proved by committing rape; or seeking revenge by inflicting pain and brutality on their victims as it gives them a sense of relief and pleasure.

#### 1.2.4. Criminology

There are many definitions of criminology. Bezuidenhout & Little (2011), define criminology as “a discipline that gathers and analyses empirical data from actual events to explain criminal offences and the community’s reaction to them.” Whilst Lanier and Henry (2004) in Bezuidenhout & Little (2011), view criminology as “the systematic study of the nature, extent, cause and control of law- breaking behavior.” Criminology focuses on various aspects of crime, such as, the criminal act itself, the perpetrator, who is the person committing the crime and the victim, which is the person who the crime was committed against. Further to that, Bartol & Bartol (2010) in Bezuidenhout & little (2011), state that criminology is “the multi-disciplinary study of crime.” The discipline of criminology incorporates knowledge from various sub- disciplines, such as the criminal justice system, criminal law, crime theories and victimology, to name a few. Criminology can also be viewed as a science, as it is a multi- disciplinary study. Forensic criminology is “a scientific or methodical approach to complete an analysis or investigation of criminal events or actions” (Ovens, 2011).

#### 1.2.5. Criminologist

A criminologist is “someone whose professional training, occupation and earnings mainly relate to the scientific study and analysis of crime phenomena and criminal behavior” (Bezuidenhout, & Little, 2011, p. 2). In South Africa, a student who has studied criminology at postgraduate level has earned the title of criminologist. A criminologist plays an important role in the criminal justice system, both in South Africa as well as internationally. However, in many instances, the value of this role is greatly neglected and overlooked, possibly because the value and importance of this role has not yet been realized and appreciated by society and the criminal justice system. Criminologists are experts in the field of criminology who are able to provide valuable assistance to all components within the criminal justice system.

Ideally, a criminologist should be based at every police station in order to assist with the investigation of crime as well as the planning and implementation of various innovative crime prevention strategies. The term criminologist, although sometimes used interchangeably, should not be confused with the term investigator.

### 1.2.6. Investigator

According to Chamelin et al, (2012), “an investigator is someone who gathers, documents and evaluates evidence and information. This is accomplished through the process of investigation. The most fundamental purpose of criminal investigation and forensic science is to discover the truth. By making this purpose the cornerstone of their behaviors, investigators can remain faithful to their oath of office and the accompanying ethical standards” (Chamelin et al, 2012, p. 2).

An investigator usually collects, documents and studies evidence after a crime has been committed, while a criminologist studies the outcome of the work of an investigator as well as all parties that are involved in an incident. The role of a criminologist can be viewed as both proactive and reactive, while the role of an investigator, such as a police officer, can be viewed as a reactive role.

### 1.2.7. Criminal investigation

A criminal investigation is “a systematic search for the truth aimed at finding a positive solution to a crime that has occurred, by using objective and subjective clues” (Klopper, 2011, p. 400). Objective information is “the factual proof in a criminal investigation and the objective explanation thereof; or, in other words, the mute, circumstantial or indirect evidence, for example, physical clues such as blood, semen, fingerprints and hair.” (Klopper, 2011, p. 400). Subjective information is “the evidence that is offered by people who were directly or indirectly involved in the crime in their roles as, for example, victims or witnesses” (Klopper, 2011, p. 400). The entire process from start to end is regarded as the criminal investigation. The criminal investigation begins at the crime scene and is concluded when a perpetrator is appropriately sentenced for their wrongful actions.

Four additional objectives of the investigative process are to “(1) establish that a crime was actually committed,” this is usually done by surveying and documenting the crime scene and searching for evidence that will prove or disprove whether a crime was actually committed, for example searching for any traces of gunpowder in the instance where a victim may have been shot;

“(2) identify and apprehend the suspect(s),” this is usually done by interviewing witnesses and victims who in turn assist with providing a description or sketch of the suspect or suspects that will be circulated via sources such as the media; “(3) recover stolen property,” in cases such as a robbery or theft, items, for example, a vehicle may have been taken, this would need to be recovered, and returned to the rightful owner; and “(4) assist in the prosecution of the person(s) charged with the crime,” which is done when the investigation has been concluded.

A series of tests are conducted that will assist in proving whether or not a person was involved in a crime, for example a semen sample found on a rape victim will be analyzed and compared to that of a suspect, once the tests have been conducted and the results analyzed and verified, it is presented to a judge in court where a punishment is meted out to the offender that has been found to be guilty of the crime that was being investigated (Chamelin et al, 2012).

#### 1.2.8. Forensic investigation

According to anonymous (2016b), on the website wisegeek.com, forensic investigation, “is the practice of lawfully establishing evidence and facts that are to be presented in a court of law” (Wisegeek, 2016). Forensic implies that it is to be used in court, therefore, a forensic investigation includes all types of investigation including crime scene investigation, investigation of white collar crime, such as fraud investigation, and cybercrime investigation.

A forensic investigation consists of three phases, the preliminary investigation, in-depth investigation and the concluding investigation. A preliminary investigation is that which takes place immediately after a crime has been committed, this is usually done by surveying the crime scene and documenting evidence that has been found at the crime scene as well as interviewing victims or possible witnesses of the crime, the preliminary investigation is used to determine whether there is enough physical evidence available to peruse the investigation further or not. If there is sufficient evidence and witness statements available, an in-depth investigation is then conducted, where evidence is gathered and collected, witnesses are asked to give statements and tests are conducted on evidence that has been found. During the concluding investigation results that have been obtained from the in- depth investigation are used to compile reports that will be presented in court, which will assist in the sentencing of an offender and possible even the freedom of an innocent person who may have been wrongfully convicted (Bezuidenhout, 2011).

### 1.2.9. Forensic science

According to Weber (2016), on the South African Police Service (SAPS) website, forensic science is “the application of scientific methods in the investigation of crime and specifically the examination of physical exhibit material.” The word forensics is of Latin origin and it means “for the courts” (SAPS, 2016). The concept of forensic science is discussed further, in a greater amount of detail, in chapter two of this research.

### 1.2.10. Forensic laboratories

According to Raut (2016), on the website SantoshRaut, forensic laboratories are “multidisciplinary science and technological institutions that undertake highly specialized and sophisticated scientific work in the service of crime detection, law and justice” (SantoshRaut, 2016). Forensic laboratories comprise of various units, such as the biology units, firearm (ballistic) units, disputed documents unit, toxicology, latent fingerprint, forensic pathology, forensic anthropology, forensic ectomology and forensic odontology, which each have their own specialized functions (Bezuidenhout, 2011). The functions of forensic laboratories include but are not limited to providing investigative leads on cases and testing and analyzing evidence that will assist in identifying a suspect or linking a suspect to a crime scene (SantoshRaut, 2016). The concept of forensic laboratories will be further elaborated on, in chapter two of this research.

### 1.2.11. Awaiting trial prisoner

There are various concepts commonly used within the criminal justice system of South Africa, these include awaiting trial prisoner or detainee who is “all persons who are lawfully detained in a correctional center, but who have not yet been afforded a trial or who have not been sentenced yet” (Booyens, 2011, p. 57). An awaiting trial prisoner or detainee, as the name suggest, may have been arrested due to the fact that they were suspected of having committed a crime, for example, they fitted the description of a possible suspect that the police have been searching for or they have been caught red- handed and apprehended by the police, witnesses or possibly even the victim while committing a crime.

Detainees are usually placed in holding cells until enough evidence has been gathered in order to pursue a trial and determine the sentencing or release of an awaiting trial prisoner. Holding

suspects that are awaiting trial also assists in reducing the possible recurrence of a crime, for example, in that of serial murder or serial rape cases. It is important to remember that an awaiting trial prisoner or detainee has not yet been proven guilty or innocent, neither has he or she been sentenced as yet.

#### 1.2.12. Offender

An offender or an inmate is “any person, convicted or not, who is who is detained in custody in any correctional center or who is being transferred in custody or is on the way from one correctional center to another” (Booyens, 2011, p. 57). In the case of an offender or inmate, it has been proven that they have committed a crime that is under investigation. In some instances, guilt has been proven but the appropriate sentencing may not have been handed to the offender as yet due to various reasons such as an assessment of the offender still needs to be conducted before sentencing can be handed down, especially in cases where it is suspected that the offender may be psychologically disturbed or mentally unfit.

#### 1.2.13. Bail

Bail is defined as “a form of security, usually money, paid by a suspect to be released from a correctional center, with the understanding that the suspect will return for trial or forfeit the bail if they do not comply with the bail conditions” (Booyens, 2011, p. 57). In South Africa, correctional centers are overcrowded, this will be discussed in detail later in the research, and therefore, it is not always possible to hold each and every suspect until they have been afforded a trial. Bail is granted to specific suspects who meet a stipulated criteria. It is often difficult to be granted bail as the conditions that need to be met in order to be granted bail have become stricter in recent years. Stricter bail conditions also seem to be contributing to the problem of overcrowding in holding facilities of correctional centers.

#### 1.2.14. Parole

Parole is the privilege of “being released from a correctional center before the end of ones sentence after complying with certain conditions and showing acceptable behavior while in detention” (Booyens. 2011, p. 57). An offender becomes eligible for parole after he or she has served a specific amount of their sentence. In order for an offender to become eligible for parole, certain

conditions needed to have been adhered to by the offender, such as displaying good behavior, showing remorse, wanting to better themselves by taking part in activities within correctional centers, such as learning or skills development courses that may be offered by the institution.

#### 1.2.15. Correctional center

A prison, now referred to as a correctional center is defined as “any place established under the Correctional Services Act 111 of 1998 as a place for the reception, detention, confinement, training or treatment of persons liable to detention in custody or to detention in placement under protective custody” (Booyens, 2011, p. 57). The reason for the change of name from prisons to correctional centers was due to the change in identity and purpose of this institution from a military style institution to a reformatory institution. The aspect of correctional centers is discussed further in chapter two of this research.

### **1.3. Background of the Research**

The topic of this research has been located in current literature, especially in the media, therefore it is important to explore further and understand the concept as it is a contemporary issue. In an article that appeared in *The Times* and *The Sowetan* newspapers, it was revealed that hundreds of thousands of cases were being struck off the roll, for various reasons. Upon further investigation, it was also established that to date, cases that are almost a decade old are still being investigated or investigations of crime that has occurred a long time ago have just been concluded.

According to Nair (2015), hundreds of criminals are walking free as the national prosecuting authority has failed to adequately perform their jobs. It has been stated that 117 660 cases were struck off the roll during the previous year, 2014/2015, which is 5.3% more than the previous year, 2013/2014, this is a serious matter of concern. This means that thousands of criminals are walking free and thousands of innocent people are locked away in overcrowded correctional centers awaiting trial for crimes they have not committed. Reasons for cases being struck off include irregularities in obtaining evidence and presenting it to the court. This is said to be due to poor investigation, insufficient preparation and cases taking too long for the investigation to be

concluded by SAPS, availability or unavailability of witnesses, forensic reports and language interpreters being unavailable (Nair, 2015).

According to the green paper on policing (2013), the Constitution of South Africa, Section 35(3) states that *“Every accused person has a right to a fair trial, which includes the right to have their trial begin and conclude without unreasonable delay; to be present when being tried; to the benefit of the least severe of the prescribed punishments if the prescribed punishment for the offence has been changed between the time that the offence was committed and the time of sentencing; and of appeal to, or review by, a higher court.”* (Green paper on policing, 2013).

Some cases, that have not yet been investigated, are reinstated once outstanding issues have been resolved, such as more evidence has been gathered or testing and analysis of relevant evidence has been concluded. This may have various consequences to all parties involved, such as emotional pressure and stress on victims and their families because they feel they would be reliving the trauma that they thought they have left in the past as well as many witnesses would now be unavailable because they have either died, moved away or forgot the sequence of events that had occurred at the crime scene, physical evidence may also have been damaged or destroyed as some forms of evidence, such as blood have a limited storage period or possibly even contaminated due to factors such as negligence or mishandling of evidence.

Detectives and laboratory technicians in South Africa are overloaded with cases that need to be investigated, the international norm is 50 to 60 cases at a time per detective but detectives in South Africa are carrying between 100 to 150 cases at a time and sometimes even up to 200 less serious cases. The police say that it is difficult to get detectives onto training programs and a third of them had never attempted a training course throughout their career. Another challenge that the system is currently faced with is that police make a quick arrest before conducting a thorough and proper investigation. Many police officers are unaware of what the law states and this is indeed a huge problem within the criminal justice system (Nair. N, 2015). Premature arrests also contribute to the problem of overcrowding in correctional centers.

Further research has revealed that many cases, some almost a decade old are still pending investigation or have just been concluded. In an article published on 22 June 2016, it was established that police are appealing for victims and witnesses to come forward regarding a rape

that occurred on 6 May 2007 (News24, 2016). In another article, by Teboho Setena, a suspect was convicted and sentenced to 30 years' imprisonment on 15 June 2016 for the rape of three women that occurred between 2004 and 2014. In this instance, sentencing was handed down approximately 12 years after the first incident took place (News24, 2016). After such a long period of time, the integrity of the evidence may be questionable as some sources of evidence, such as body fluid, e.g. semen, have a limited storage period. ‘

Evil' mother; stepfather jailed for raping, murdering young daughter by Tammy Petersen, published on News24 on 19/09/2015, tells a story of an innocent child who was assaulted, raped and murdered by her mother and stepfather, she passed away in February 2013. On 18 September 2015, a man, known to the victim as her stepfather, was sentenced to six years' imprisonment for the assault, rape and murder of his five-year-old stepdaughter, while the mother of the child was sentenced to ten years for assault with the intention to cause grievous bodily harm. The child was assaulted and killed on 1 February 2013. A sentence was handed to the suspects two and a half years after the crime was committed. Witnesses that had since moved away needed to be traced and located in order for the case to be concluded and an appropriate sentence handed down to the perpetrators of this heinous crime and loss of an innocent life. (News24, 2016).

From the above mentioned examples, it has been revealed that there seems to be a lot lacking within the criminal justice system in South Africa. Criminals are freely roaming the street or awaiting trial for a long period of time before justice is served, which is contradictory to what is expected as stated in the Constitution, which is that every accused has the right to a speedy trial. In some instances, a prisoner may spend more time awaiting trial than the actual prison sentence itself. This is unacceptable because as mentioned, every accused has the right to a speedy trial and correctional centers are now also faced with the problem of overcrowding.

Accused suspects need to be made aware of the verdict of their crime quickly so that it serves as a deterrent to possible future offenders who intend committing a crime similar or more violent in nature and to prevent the perpetrator from reoffending. Forensic laboratories play a major role in assisting to combat all these problems that the criminal justice system is currently faced with as this facility plays a significant role is assisting investigators and other stakeholders in performing their duties efficiently. The roles and functions of forensic laboratories in South Africa will be discussed further in Chapter two of this research.

## **1.4. The Research Problem**

From the examples that have been discussed earlier, it needs to be acknowledged that there seems to be a delay in the investigative process, more specifically procedures that take place in forensic laboratories that assist in the investigation of crime, for crimes that have been committed in South Africa. The investigative process seems to be prolonged resulting in criminals walking free, victims not getting the justice which they deserve and innocent people spending large amounts of time in correctional centers, awaiting trial for crimes they have not committed, in some instances, awaiting trial offenders spend more time awaiting a trial than the duration of the actual sentence itself.

Forensic laboratories play a major role in assisting with the investigation of crime, by conducting various necessary tests and experiments that are required in order to obtain information from evidence that has been collected from crime scenes, in South Africa, however, this facility is not being utilized to its full potential, due to various factors. South Africa has a very high crime rate, evidence is collected from crime scenes and sent to forensic laboratories for testing and analysis on an ongoing basis. The continuous influx of evidence that requires procedures to be performed is queued and backlogged resulting in procedures taking longer to be concluded.

No matter what the situation, if there is an influx of work to be completed, more time or more assistance will be required to complete the task at hand. For example, during busy periods, such as the festive season, there is an increase in the number of incidents of crime, such as shoplifting, that occurs. In order to prevent or reduce this, shopping malls would put specific measure in place, such as increase trading hours, tighten security, especially during busy periods of time, and employ more staff to assist. These measures that would be put in place would possibly deter people from committing petty crimes, such as shoplifting or theft from people, as there will be a greater risk of them being caught.

Learning is facilitated by research and research is better understood by asking questions. In order to gain more knowledge or a better understanding of a topic that is being researched, relevant questions pertaining to the topic at hand need to be asked and answered. There are many questions that can be asked regarding the investigation of crime and forensic laboratories in South Africa. The research questions that are being asked, in this research, include:

- What are the current roles of forensic laboratories in South Africa?
- What relevance do forensic laboratories hold in fighting and solving crime in South Africa?
- Will the presence of more forensic laboratories in South Africa mean improved service delivery?
- Will the establishment of more forensic laboratories speed up investigative processes resulting in criminal cases being investigated and concluded faster?
- Will more forensic laboratories mean offenders are sentenced sooner, therefore possibly deterring future offenders from committing crime due to an efficient system?
- Will the population of currently overcrowded correctional centers decrease significantly due to more forensic laboratories being established in South Africa?

## **1.5. Objectives of the Research**

Based on the earlier discussion, on the background of this research, it has been established that there is a delay in the investigation of crime in a country with a high crime rate. This delay in the investigative process could possibly be a reason for the high rate of crime in South Africa. There are various institutions that contribute to the investigation of a crime that has been committed, these include the police, forensic laboratories, the courts and correctional centers to name a few.

While all aspects of the criminal justice system, which are discussed in detail in chapter two of this research, are important and have been noted, this aim of this research is to focus specifically on one component that plays a major role in the investigation of crime, namely forensic laboratories. Once a crime has been committed and evidence has been collected and documented, it is sent to forensic laboratories for testing and analysis. Therefore, it can be said that forensic laboratories play a major role in the investigation of crime.

The objectives of this research are numerous, however, due to the focus of this research being specifically on forensic laboratories in South Africa, the aims of this research includes, to highlight the importance of forensic laboratories in South Africa; to be established whether the presence of

more forensic laboratories could be beneficial to society and the criminal justice system as a whole; to establish reasons why the investigative process is hindered; to establish whether forensic laboratories in South Africa meet international standards; to establish whether or not the presence of more forensic laboratories will assist in speeding up the investigative process and result in more efficient service from officials and to establish whether or not the increased presence of forensic laboratories will indirectly decrease the population of institutions within the criminal justice system, such as correctional centers and rehabilitation centers to name a few.

Once the research has been conducted and the outcomes of the research are available, further decisions regarding methods of improving the situation that South Africa is currently being faced, in forensic laboratories, the crime rate and the backlog in investigative processes need to be taken into consideration and measures put in place to improve the situation. This research may also assist to help grow and develop the field of criminology and forensic studies in South Africa, at both an academic and institutional level.

## **1.6. Methodology of the Research**

Research is important in order to relatively address a phenomenon such as crime. When conducting research, data needs to be collected in a responsible, scientific and ethical manner. A researcher should always remain neutral when conducting research, researchers should not be bias and should not allow their personal beliefs and opinions to affect the outcome of the research. A specific direction should be taken when conducting research. It is important to acknowledge the fact that people usually change their perceptions and opinions based on new findings, discoveries and current trend (Bezuidenhout, 2011).

A desktop study will be used as the method of data collection for this research. A desktop study is the process of “gathering and analyzing information already available in print or published on the internet” (Business Directory, 2015). Desktop research is an unobtrusive method of data collection as it does not require the participation of people as sample to be used for data collection. Instead it uses a sample of books, articles and other published sources as a sample which will later be analyzed and discussed to present findings on the topic of the research (Sturwig & Stead, 2013).

A qualitative approach has been taken as the data that needs to be analyzed is in the form of facts and information and not numbers or statistics. Primary and secondary sources of data collection will be used, these include books, journal articles, policy documents, newspaper articles and internet research. Internet research is “when the researcher uses sources found via the internet as a method of data collection; this includes but is not limited to search engines, blogs, newsgroups and direct access sites” (Sturwig & Stead, 2013, p. 19). The findings of the study will be discussed, in chapter five of this research, in the form of a thematic analysis.

As with all research that is conducted, there are limitations to this research too, which will be discussed in detail in chapter four. Suggestions on how to possibly overcome the limitations will also be discussed. Another important aspect to take into consideration when conducting research is that of ethical considerations. Although humans have not been used as a source of data collection for this research, there are still ethical considerations that need to be taken into account, these, as well as ways to overcome these challenges, will also be discussed in chapter four of this research.

## **1.7. Conclusion**

When a crime is committed, there are various stages of an investigation that sometimes occur at different institutions that need to be concluded before a case is concluded. One such institution is forensic laboratories. Forensic laboratories are one such institution, which assists police officials and investigators, where tests are performed and results analyzed before a case is presented to the court for the sentencing of an offender or the release of an innocent person to take place.

According to various print and online media sources, it is prevalent that there is a serious need for concern when it comes to the investigation of crime in South Africa, particularly those crimes that require additional services such as those of forensic laboratories in order to be concluded. Cases of crime are taking much longer than usually expected to be completed. This has dire consequences for all parties involved in the investigation of cases of crime. Forensic laboratories are currently faced with various challenges, which will be discussed later in the research, that hinder this facility from developing, as an institution.

The purpose of this research, as previously mentioned, is to determine the relevance of forensic laboratories in assisting with fighting and solving crime in South Africa. In order to holistically understand the discussion of the research, this chapter has defined and discussed concepts that are relevant to the topic of the research. Relevant real life examples from various media sources have been referred to, in order to highlight the background and the reality of the research problem that South Africa and the Criminal Justice System are currently faced with. There are numerous objectives of this research, which have been discussed and relevant research questions have been asked, which will be answered in chapter four. This research takes the form of a desktop research, which will be further elaborated on in chapter four.

## Chapter 2

### 2. A Review of the Literature on Forensic Laboratories

#### 2.1. Introduction

Television crime investigation programs seem to have had a negative effect on the investigative process as it greatly misleads its audience. Spectators assume that what is seen on TV is reality when in fact that is far from true and merely a form of entertainment. Television programs have shown empty laboratories producing test results that usually take weeks to retrieve, being processed and concluded in a matter of a few minutes or sometimes even seconds. This phenomenon is termed the CSI effect. Di Fonzo (2005), defines the CSI effect as “the perception of the near- infallibility of forensic science in response to the TV show” (Di Fonzo, 2005, p. 3). The CSI effect negatively affects all stakeholders involved in the investigative process of solving a crime (Durnal, 2010).

In reality, tests take time to be conducted and concluded and the results analyzed before it can be returned to the relevant responsible investigator. Television programs have a limited amount of time to be screened, therefore everything that is seen on television appears to be occurring at a rapid rate, which as previously mentioned, is not the reality of forensic laboratories . There are skilled and trained workers who work in forensic laboratories and very rarely do workers from forensic laboratories also respond to crime scenes and collect and document evidence as well as analyze it.

In order to assist in gaining an understanding of forensic laboratories and its functions, this chapter consists of a review of the available literature on forensic laboratories. It begins with the history and development of forensic sciences and goes on to discuss forensic laboratories in South Africa as well as internationally. It is important to understand the history and development of forensic laboratories as it provides a foundation to the understanding of the situation we are currently faced with. An understanding of the foundation, will assist in identifying challenges and allow room for suggestions for the development and improvement of forensic laboratories in South Africa.

## **2.2. The History and Development of Forensic Science**

When a crime is committed, it is usually reported to the police by a witness. A uniformed police officer reports to the crime scene to secure the crime scene, acquire the services of additional emergency workers, such as an ambulance or the fire brigade, if needed, collect evidence and open a case that will be investigated. Once evidence is documented and collected, it is sent to the forensic laboratory for testing and analysis. As soon as evidence is received at the laboratory, it is documented so that it can be stored appropriately and easily located at a later stage as well as sent to the various sections of the laboratory as it is required. In some cases, DNA analysis may need to be performed, when biological evidence is present, this may assist in the identification of a suspect or may help link the perpetrator to the crime scene. A report on the findings is then forwarded to the investigating officer and the prosecutor. Often analysts are required to present the results of the findings or testify in court (Omar, 2008a).

A crime scene is “the environment where a crime has been committed. It can comprise of a single or multiple locations” (Anonymous, 2002, p. 14). A primary crime scene is where the crime actually took place. A secondary crime scene is a scene linked to the primary crime scene, for example, a dead body was found washed up on the river bank, in this instance, the crime was committed in another location and the evidence was relocated. It is important to recover physical evidence during a crime scene investigation in order to convict a perpetrator or release an innocent person. Physical evidence is “Any material item that is used to prove or disprove an issue” (Anonymous, 2002, p. 15). Evidence is examined in a forensic laboratory and used to serve justice.

According to Anonymous (2002), a forensic science laboratory is “a laboratory where Forensic Science is practiced, providing a support infrastructure to the Crime Scene Processing team in the analysis of physical evidence.” (Anonymous, 2002, p. 15). There are various definitions of forensic science, according to Alexander (2016), Forensic Science is “The application of scientific technology to supply accurate and objective information reflecting the events that occurred at a crime scene.” (Alexander, 2016). While according to Weber (2016), on the SAPS website, forensic science is the application of scientific methods and principles to the investigation of crime. The word forensics is a Latin derivative that is understood to mean “for the courts” (SAPS, 2016). According to the SAPS Forensic Science Laboratory (FSL) website (2014), forensic science can

be defined as “the practical application of science to matters of the law.” Forensic refers to law or the judiciary process.

A forensic scientist analyses physical evidence, provides expert testimony and provides training in the recognition, collection and preservation of physical evidence (Alexander, 2016). Many scientific fields can be applied to forensics, these include biology, geology, odontology, psychology, pathology, ectomology, chemistry and physics. The ultimate goal of forensic science is to link a potential offender to a crime scene or a crime. The intent of any analytical procedure is to provide accurate and reliable data to answer a scientific question (Marais, 2014). It is necessary to respond to and control a crime scene as soon as possible after an incident has occurred in order to secure and protect the scene and prevent the contamination of the crime scene and prevent the loss of valuable evidence (Anonymous, 2002).

The reality of forensic laboratories has been greatly misrepresented by the entertainment industry. Most people have a misconception that a forensic laboratory consists of high tech equipment operated by men and women in white coats who can perform multiple functions and get results with seconds of feeding minimal data into a system. This is a serious misconception due to glamorization of the field of forensic science by the entertainment industry. In reality, forensic science consists of highly trained individuals who specialize in a specific field of forensics that they have studied and been well trained in. (Palmer, n/d).

According to anonymous on the website forensic- medicine.info (2016), forensics or forensic science is “the application of scientific methods and principles to answer legal questions for court purposes” (Anonymous, 2016a). A forensic scientist must arrive at conclusions based on only what evidence is made available. The “Eureka” legend of Archimedes is considered the earliest account of the use of forensic science. In this instance, Archimedes was able to prove that a crown was not made of gold, as indicated, by examining principles of water displacement.

The earliest account of the use of fingerprints to establish identity was during the seventh century. According to an Arabic merchant, Soleiman, a debtor’s fingerprints were fixed to a note and given to the lender, this was regarded as proof of the validity of the debt. The use of fingerprinting is said to have begun in about 1750 BC, when the Babylonians used fingerprints to sign their identity on clay tablets. Later, in 1823, J.E. Purkynie discovered the possibility of classifying fingerprints

into different categories and this marked the beginning of the use of fingerprinting. During the 1900's, the use of fingerprinting developed. Nowadays, fingerprints are used in crime scene investigations for reasons such as identifying victims or linking suspects to a crime scene. The study of fingerprints is called dactyloscopy (anonymous, 2016).

The first association between medicine and law appeared in 1248 in a Chinese book called *Hsi Duan Yu* (The Washing Away of Wrongs). This book offered advice on how to differentiate between deaths by natural and unnatural cause. The first written account of the use of medicine and ectomology to solve crimes is linked to a book written in China in 1248 by Song Ci (1186- 1249) entitled *Xi Yuan Ji Lu* "collected cases of injustice rectified." With regards to the use of forensic ectomology, a story is told of where a murder was committed using a sickle, all the members of the society were told to gather around with their sickles, flies are attracted to the smell of blood and therefore gathered at one sickle, which indicated that it was the murder weapon. The perpetrator later confessed to committing the murder. The book also highlighted how to distinguish between different causes of death, e.g. between drowning and strangulation (Stoiloff, 2016).

During the sixteenth century in Europe, medical practitioners began studying the cause and manner of death. Ambrose Pare French studied the effects of violent death on internal organs. Two Italian surgeons, Fortunato Fidelis and Paolo Zacchia, laid a foundation to modern day pathology, they studied changes that occurred in the body structure as a result of diseases. During the late 1700's, writings on these topics began to surface. Some examples include "A Treatise on Forensic Medicine and Public Health" by the French physician Fod, and "The Complete System of Police Medicine" by the German medical expert Johann Peter Franck (Anonymous, 2016a).

In 1775, a Swedish Chemist, Karl Scheel, came up with a method of detecting arsenic in a corpse. This method was further developed in 1806 by a German Chemist, Valentin Ross who detected arsenic poison in the stomach walls of a victim and English Chemist James Marsh, who used chemical processes to confirm that arsenic was the cause of death during a murder trial in 1836 (Anonymous, 2016a).

According to Anonymous (2016a), later, in England, the use of forensic science in legal proceedings indicated an increase in the use of logic and procedure in solving crimes. In 1784, John Toms was tried and convicted for the murder of Edward Culshaw, when the victim's body

was examined, a pistol wad that was found in the wound perfectly matched a torn newspaper found in the suspect's pocket. In a separate incident, in 1816, a farmworker was tried and convicted for the murder of a young maid who was violently assaulted and drowned in a shallow pool. The police found footprints, the impression of corduroy cloth with a sewn patch on it and grains of wheat and chaff by the poolside. The pants of a farm worker nearby, matched the prints in the soil at the poolside.

Modern forensic science is said to have originated in the late nineteenth century. European criminal investigators began using identification techniques such as fingerprinting to solve crimes. The field of forensic science expanded during the twentieth century which is when its application to legal issues became more common. Forensics involves collecting and analyzing evidence, such as DNA, blood, semen, saliva, hair, bite marks, fingerprints, fibers, handwriting and voice identification, to assist in solving crimes. An examination of the crime scene is vital for an investigator, in order to gather clues and collect evidence before the crime scene is contaminated and valuable evidence is lost (Saferstein, 2015).

Alphonse Bertillion (1853- 1914), developed a personal identification system in 1882, this used a combination of body and facial measurements. Another contribution to forensic science was that of Dr. Francis Galton (1822- 1911). His work on fingerprints was published in 1892. Alexandre Lacassagne (1844-1921) is known as the founder of modern forensics. He has made many contributions to forensic science, including beginning the science of ballistics (Stoiloff, 2016).

### **2.3. Categories of Forensic Science**

There are various sub-categories within the field of forensic science that can be used to analyze evidence in a forensic laboratory. This includes serology, odontology, toxicology, psychology, microanalysis, DNA analysis and fingerprinting. Each category plays a different yet equally important role from the other in investigating crime. Not all crime scenes are the same and therefore different evidence collected from different crime scenes and therefore would require different types of tests to be performed. For example, in a rape case, semen may need to be tested by means of methods of serology and matched to that of a suspect while in a case of house robbery,

fingerprints may need to be analyzed in order to try and find a possible match to that of the prints retrieved from the crime scene.

Sometimes different categories of forensics need to integrate with each other in order to arrive at a meaningful conclusion to an investigation. For example, if a house robbery and a murder were committed at the same crime scene, the serology department of the forensic laboratory will test blood samples that have been found at the crime scene in order to verify that all samples came from the victim or whether there may have been blood left behind by the suspect that will help to positively identify the perpetrator of the crime. While, the dactyloscopy division will analyze any fingerprints that may have been found at the crime scene and the ballistics department will analyze any ammunition that may have been retrieved from the crime scene.

A forensic serologist studies and analyses blood, semen, saliva and other body fluids that may be present at a crime scene. They also determine the type and characteristics of blood, perform blood tests, bloodstain examinations and prepare testimonials and presentations for court purposes. Blood is considered one of the most important forms of physical evidence. The presence of blood can indicate a lot, for example, it can determine whether or not a person was present at a crime scene, it can help identify a victim or suspect, bloodstains also tell us about the position and movement of a victim or suspect during a crime as well as who was struck first, from which angle, the position that they were in and how many times. Blood can still be detected even if it has been cleaned up or wiped away. Blood is a slightly alkaline fluid that is made up of water, cells, enzymes, protein and inorganic substances. Blood contains red and white blood cells. Forensic scientists show an interest in red blood cells and the serum of the blood as this helps determine the freshness of the blood sample (Anonymous, 2016a).

The blood type of a person is determined using the A-B-O system which was discovered in 1901. Wet blood has more value than dry blood as more tests and analyses can be performed. Blood begins to dry approximately 3 to 5 minutes after being exposed to air, as it dries the color of the blood begins to change from red to brown/ black. Blood can be found in various forms, such as pools, smears, drops or crusts. Each form enlightens us about the incidents that had taken place at the scene of the crime, for example, the height and angle from which blood fell or from which direction was the victim struck and where was the suspect standing. If blood is correctly stored, refrigerated, red blood cells can be stored for up to 42 days and the serum that contains white blood

cells can be stored for up to a year. DNA can be extracted from various body fluids, however, blood is the most commonly used (Saferstein, 2015; Anonymous, 2016a).

Forensic odontology, also referred to as forensic dentistry, involves the identification of a victim or a suspect by comparing evidence found at a crime scene to dental records. Forensic odontology can be used to identify victims or perpetrators years after an incident has taken place as teeth are highly resistant to decomposition and destruction. The United States of America have a fairly well-developed system of dental records that are accessible to investigators to assist in identifying victims and potential suspects where bite marks are present. There are 7 main classifications of bite marks, hemorrhage, a small bleeding spot; abrasion, leaves an undamaging mark on the surface of the skin; contusion, is a ruptured blood vessel or bruise; laceration, is when skin is torn or punctured; incision, which is a neat puncture of the skin; avulsion, which is the removal of skin; and artefact, which is when a piece of the body has been bitten off (Anonymous, 2016a).

Forensic toxicology is the study of substances, such as poisons, that can harm or kill a person. Forensic toxicologists study the post-mortem indicators of poisoning. Poison can be administered to a person by ingestion, injection, inhalation or absorption through the skin. There are various ways to identify poison, such as chromatography, which is a technique that separates the various compounds of a sample or immunoassay, which is identifying the antibodies that make up the foreign bodies in the blood sample. A forensic toxicologist must assist in determining which substances are present, in what quantity and the effect of the substances, a toxicologist must also bear in mind that a substance will affect each individual differently based on their, age, weight, and height and body structure. One of the first celebrated cases of the use of toxicology in forensic science was that of Mathieu Orfila (1787- 1853), the “father of toxicology.” He testified in an arsenic poisoning trial in Paris in 1840 (Saferstein, 2015; Anonymous, 2016a; Miami Dade County, 2016).

Forensic psychology is the application of psychology to legal investigations. A forensic psychologist is tasked with treating mentally ill suspects, analyzing a criminal’s mind and liaising with various legal experts. This field of work can be very dangerous as there are various associated risks, such as working with criminals who display violent tendencies. A subdivision of forensic psychology is forensic neuropsychology, which is “a specialized area of forensic medicine that applies the functioning of the brain and the nervous system to legal issues involving the mind and

behavior.” A forensic neuropsychologist assists in determining whether or not a person is fit enough to stand trial or not. Forensic neuropsychologists also examine and assess the brain of suspects and children suspected to have been abused (Anonymous, 2016a).

Forensic microanalysis is the science of analyzing, identifying and comparing micro trace evidence, such as fibers hair, partial fingerprints, tool marks and fragments of ammunition. Ideally, a micro-analyst is required to have a master’s degree or higher, unfortunately this is not the case. Only a few hold the necessary qualifications, this is due to reasons such as, unavailability of forensic science programs, laboratories show more interest in proficiency testing, there is a limited source of knowledge available and an unavailability of resources (Saferstein, 2015).

The purpose of a microanalysis is to identify or compare, or both, evidence that had been found at a crime scene. There are various different methods that can be used to perform this function. In some instances, more than one method has to be used before a conclusive result is obtained. Techniques that are used for identification of micro evidence include, microscopic analysis, electrophoresis, spectrophotometry, chromatography, mass spectrometry, atomic absorption/emission, neuron activation and x- ray diffraction (Saferstein, 2015; Anonymous, 2016a).

DNA analysis has recently been overtaking the use of serology to analyze evidence. The DNA double helix structure was discovered in 1953 by American scientist James Watson and British scientist Francis Crick. DNA is a polymer molecule, meaning the same pattern is repeated, therefore only a small amount is required in order to be. There is a shortage of DNA forensic laboratories in America, there are only 120, and therefore a backlog of about a years’ worth of cases at each laboratory. DNA evidence is the most reliable source of evidence, however problems may arise if samples are not properly collected and stored. Since 1999, the United States of America’s government began collecting DNA samples of all babies born to create a database of DNA records. Many people were not happy with this decision and called it a bio- invasion. This prompted the collection of DNA samples from accused offenders which will assist investigators in tracing and locating possible suspects in future cases as well as closing cases that may still be open and the perpetrator has not yet been convicted as well as cases where it is suspected that the wrong suspect was convicted (Saferstein, 2015; Anonymous, 2016a).

Fingerprints are “ridges on the upper skin of the hands and feet of humans.” Fingerprints are used for various reasons, such as identifying unknown victims, witnesses, verifying records and linking a suspect to a crime scene. Each person has a unique fingerprint. The study of fingerprints is also known as dactyloscopy. Sometimes fingerprints are not always visible to the naked eye and therefore need to be searched for, these types of prints are called latent prints. Methods of collecting and lifting latent prints include dusting for prints using powder and tape, silver nitrate, amido black, the cyanoacrylate fuming method and iodine fuming method. Different types of powders can be used to dust for fingerprints depending on the type and color of the surface. Fingerprints need to be lifted with care and integrity otherwise the print will get damaged and not be able to be used for the purpose of forensic analysis (Saferstein, 2015).

Many countries such as the United States of America, Canada the United Kingdom and South Africa have adopted an Automated Fingerprint Identification System (AFIS) which keeps a record of the fingerprints of all citizens, it is used for many purposes such as criminal identification, performing background checks and verification of the identity of individuals (forensic medicine, 2016). Having such a database available to forensic laboratories and investigators is a welcomed step in the right direction towards developing the field of forensic investigation.

According to Anonymous (2016a), there are two types of experts that investigate a crime scene, the investigator and the Reconstructionist. A Reconstructionist attempts to mimic the conditions of the scene before the event took place. In order for a scene to be reconstructed, there needs to be physical evidence present, as well as witnesses. In many instances, a forensic animator uses animation and computer aided design software to assist in the reconstruction of the crime scene.

## **2.4. International Dimensions of Forensic Laboratories**

The world’s first forensic laboratory was established in Lyon, France in the year 1910 by Edmond Locard. The first forensic laboratory, also referred to as a crime lab, in the United States of America (USA) was established in 1930 by the Los Angeles County Sheriff’s Department. The Federal Bureau of Investigation (FBI) laboratory was established in 1932 and in 1937 Paul Kirk (1902-

1970) set up the first academic criminalistics program in the United States of America at the University of California (Stoiloff, 2016).

In America, forensic laboratories were established during the 1930's, by mid-1970's, 47 states had forensic laboratories. The four major national forensic laboratories in America are the FBI crime lab, Drug enforcement Administration (DEA), Bureau of Alcohol, Tobacco and Firearms (ATF) and the Explosives crime lab. Most states in America also have smaller forensic laboratories that assist larger, major forensic laboratories (Alexander, 2016). The two most established forensic laboratories in America are the FBI and ATF crime laboratory's (Anonymous, 2016a).

The FBI forensic laboratory is considered to be the world's largest forensic laboratory and handles violent crimes. It comprises of four main sections, scientific analysis, which deals with DNA, hair and fibers, materials, firearms, tool marks, chemistry, toxicology, and questioned documents; special projects, which analyses film, photography, composite art and computer designs; fingerprinting and investigative operations and support, such as lie detection. The ATF forensic laboratory is a very high tech laboratory that handles explosives, bombs, arson, trace evidence, firearm ownership and usage, disaster response, field support and gang intelligence. There are also other private specialist laboratories that assist the government laboratories in performing their functions timeously (Anonymous, 2016a).

An eyewitness or a victim may not always be the best source of information at a crime scene, for various reasons such as still being in a state of panic or interpreting the series of events to his or her perception. An investigator must use his or her experience and all available sources to determine what had taken place at a crime scene before, during and after the crime was committed. Physical evidence is the most reliable form of evidence at a crime scene it includes transient evidence, which is temporary and can easily be lost or changes, such as blood begins to dry after a few minute; odors, which are diffused and eventually disappear; temperatures, which constantly change due to factors such as the weather and time, for example, a body temperature begins to decrease once a person dies; and imprints such as fingerprints or footprints which can easily be rubbed off or removed by unnecessary activity that may be taking place at a crime scene (Alexander, 2016).

There are several ways of classifying evidence including biological, chemical, physical, and miscellaneous. Biological evidence includes blood, semen, saliva, sweat, tears, hair, bone, tissues, urine, faeces, animal material, insects, bacterial/ fungal samples. Chemical evidence includes evidence such as fibers, glass, soil, gunpowder, metal, minerals, narcotics, drugs, paper, ink, cosmetics, paint, plastic, lubricants and fertilizer. Physical evidence sometimes also referred to as impression evidence consists of fingerprints, footprints, shoe prints, handwriting, firearms, printing, number restoration, tyre marks, tool marks and typewriting. Miscellaneous evidence includes voice analysis, polygraph results, photography, stress evaluation and psycholinguistic analysis (Alexander, 2016).

Forensic laboratories in the USA currently perform the following functions, lab tests, including drug analysis, trace evidence analysis such as fiber and hair comparison and analysis, paint comparison and analysis, glass comparison and analysis, fire debris and explosives analysis, gunshot residue analysis, tape comparison, soil and building materials comparison and analysis and lamp and filament examinations; biological services such as performing biological fluid identification and species origin, DNA analysis and bloodstain pattern interpretation; Firearms and tool mark identification such as firearm operability, projectile comparison, gun powder pattern interpretation and footwear and tyre impression comparison; toxicology such as breath and blood alcohol analysis, urine analysis, and drugs in biological fluids and tissues; fingerprint and latent identification and comparisons as well as specialized analysis such as computer and data recovery and voiceprint analysis. There are many future possibilities within the field of forensic science. Scientists are currently working on developing faster and more efficient methods to perform laboratory tests (Alexander, 2016; Stoiloff, 2016).

Conditional evidence is evidence that is produced by a specific event or action and is important in the reconstruction of a crime scene as well as determining the circumstances within which an event had taken place for example, the direction of blood splatter indicates from which direction a murder victim may have been struck or the displacement of furniture at a crime scene may indicate that a confrontation had occurred, the presence of gunshot residue or gunpowder implies that a firearm was discharged at the crime scene (Alexander, 2016).

Forensic investigations include, being able to recognize the difference between evidence and unrelated material, recognize patterns, analyze information, correctly collect and preserve

evidence, compare evidence and establish its origin, interpret information, reconstruct the events that took place before and during the commission of the crime and analyze results of laboratory tests that have been conducted on evidence that was found and collected from a crime scene. Forensic investigation also includes being able to analyze results that have been obtained in order to compile a report that will be presented in court, regarding the crime that has occurred (Alexander, 2016).

## **2.5. Forensic Laboratories in South Africa**

The South African Police Force was established on 1 April 1913 and the first Forensic Science Laboratory of The SAPS was established on 15 January 1971. It consisted of the biology, chemistry and electronics units. A new complex was occupied in March 1987 when the ballistics and questioned documents unit, previously under the South African criminal bureau, merged with the forensic science laboratory. On 01 April 2000, the explosive investigation service also merged with the forensic science laboratory (Weber, 2016).

Before any laboratory work can be conducted, laboratories need to be clean and contamination free. Once the conditions are satisfactory, relevant personnel view the evidence that is available and determine what tests and procedures need to be performed. Each step of the process must be properly documented by the person handling the evidence in order to maintain authenticity. Once the relevant tests have been conducted, evidence must be resealed, labelled and stored, for possible future use. Thereafter a report is prepared containing the findings of the tests that have been conducted. Physical evidence is the most important element in solving crime. Followed by witness statements and thereafter confessions of the perpetrators (Anonymous, 2016a).

According to Anonymous (2016a), the terms forensics and criminalistics are often used interchangeably. The term criminalistics refers to “the scientific collection and analysis of physical evidence in criminal cases” (Anonymous, 2016a). This includes the analysis of materials such as blood, fibers, fingerprints and bullets. The largest forensic laboratory in America is run by the Federal Bureau of Investigation. There are many different types of specialists in the field of forensic science, these include forensic pathologists, serologists, toxicologists, chemists,

odonatologists, paleontologists, anthropologists, entomologists, psychiatrists, accountants and engineers. A criminalist, also known as a crime scene technician, investigator or examiner, is a person who searches for, collects and preserves physical evidence that is present at a crime scene. Some criminalists also have interpretive skills such as crime scene reconstruction and offender profiling. The term criminalist was first used in 1897, by Hans Gross.

South Africa's main forensic laboratory is located in Pretoria while decentralized offices are located in Cape Town, Durban and Port Elizabeth. The forensic laboratories in Pretoria and Cape Town consist of all investigative units while the laboratory in the Port Elizabeth consists of a Ballistics and chemistry unit and the laboratory in Durban consists of a ballistics unit (Weber, 2016).

According to Weber (2016), the forensic science laboratories apply scientific principles, methods and techniques to the process of the investigation of crimes. The objective of this process is to systematically search for truth, bring offenders to justice and protect innocent people against wrongful prosecution. Results obtained from tests and analyses that have been conducted are used to arrive at a meaningful conclusion to be presented in court.

According to Marais (2014) and Weber (2016), the forensic science laboratories of SAPS consist of the following units, the ballistics unit, scientific analysis unit, questioned documents unit, biology unit, chemistry unit, and explosives unit. Each unit within the forensic laboratory serves its own unique function.

The ballistics unit is responsible for examining firearm and tool marks. The ballistics unit performs three main categories of investigation, namely, internal forensic ballistics, external forensic ballistics and terminal forensic ballistics. The activities of this unit include examining firearms and their mechanisms, examining homemade instruments and miscellaneous firearms, determining the type and caliber of ammunition used, determining the possible type of weapon used in the commission of a crime, microscopic comparisons of bullets and cartridges to determine which firearm they were fired from, the examination of ricochet possibilities, determination of the type of caliber or projectile, entrance and exit points of a projectile as well as other miscellaneous examinations of firearms and ammunition (Marais, 2014; Weber, 2016).

According to Marais (2014), the function of the scientific analysis unit is to render an effective service by applying principles of physics to evidence in order to arrive at an effective forensic

analysis of evidence. This unit analyses a variety of organic substances such as plastics, filaments, glass, synthetic fibers, fuels, vegetables, medicines and poisons and inorganic substances, such as soil, coins, jewelry, precious stones, metals, ceramics, paint, and primer residue. This unit is also responsible for determining physical matches, for example, if two pieces of a broken object fit together, they belong to the same object, and this plays a role in determining the origin of an object. The scientific analysis unit also performs diverse analyses not performed by other components of the laboratory such as determination of quantity of alcohol present in liquor or a chemical analysis of chemical substances such as oils, glues, adhesives, dyes and perfumes. Electronic examinations such as video and audio recording analysis, sound enhancements, and examination of electrical or electronic crime scenes, electrical fires, electrocution, cybercrimes, data retrieval, and voice comparisons are also performed by this unit. This unit also consists of a polygraph component, which is also known as lie detector, used to detect deviation in blood pressure and heartbeat when responding to questions. A person's heart rate may increase if they are lying about something that they have been questioned about.

The questioned documents unit are responsible for conducting investigations on handwriting, typewriting, tampering of documents, forged signatures, determination of origin of base material such as paper, ink and other apparatus e.g. stamps and sealing apparatus. This unit also attempts to restore damaged documents that may be vital to an investigation and also examines counterfeit banknotes (Weber, 2016).

According to Marais (2014), the functions of the biology unit are responsible for the analysis of biological evidence such as DNA, body fluids, human tissue and hair. The main aim of the biology unit is to possibly identify a human through forensic DNA analysis and microscopic comparison. This is done to assist in determining whether or not a person was present at a crime scene or has committed a crime. This unit also performs crime scene investigations and provides support, for example, performs facial reconstruction, collects entomological and odonatological evidence, performs mummified fingerprinting and exhumations of bodies. Crime scenes are investigated in order to collect evidence that will be analyzed at a laboratory in order to assist in reconstructing the crime scene and drawing effective conclusions relating to the crime that was committed.

The functions of the chemistry unit includes analysis in fields such as forensic drug analysis, which comprises of analyzing substances suspected of containing controlled or illicit substances,

attending to, investigating and reconstructing suspected drug- related crime scenes; fire and explosion investigation component which assists in the investigation of explosions and fires by analyzing material found at the scene to determine what type of explosives were used as well as rendering technical services to the bomb disposal unit to assist in evaluating and identifying homemade devices, in the event of suspected arson, the unit also analyses exhibit material to determine the presence of traces of liquid accelerants such as petrol or paraffin. Toxicology cases are also handled by this unit; this includes the investigation of suspected poisoning of people, animals and plants. Poisons that are analyzed by this unit include commercial herbicides and pesticides, metal poisons such as lead, mercury or arsenic poisoning and plant poisons such as traditional medicines. The presence of these substances is detected in food, water, plants, crops and hair, fur, skin, nails, organs and blood (Marais, 2014).

The explosives unit is responsible for the maintenance and management of the disposal of bombs and explosives. The activities of this unit includes the investigation of explosives related to incidents such as bomb threats, bomb incidents, suspicious articles and vehicles, searching for and collecting evidence at explosive- related scenes, handling and disposing of radioactive and toxic substances, and searching and safeguarding vehicles and premises for explosive devices prior to the arrival of important guests (Marais, 2014).

In South Africa, the forensic science laboratory in Pretoria analyses and stores evidence (Luke & Van Der Walt, 2011). The integrity of evidence is extremely important. No contamination of evidence should take place as evidence will lose its integrity. If evidence is properly collected, transported and stored, it will lead to the arrest of a perpetrator and freedom of an innocent person. Appropriate storage of evidence is required in order to maintain its integrity, should it need to be used at a later stage to perform more tests and analysis.

The Forensic Science Laboratory is responsible for providing scientific support to the South African Police Service. According to Hennop (2009) in Luke & Van Der Walt (2011), “The Forensic Science Laboratory has seven storage areas with shelving and a centralized air-conditioning system regulating the environment. This includes a ‘walk-in’ freezer where DNA samples are stored on a long-term basis. These storage areas are not strategically situated and can result in wastage. For example, the basement storage room is not equipped with a computerized system thereby hampering movement as well as the capturing of real-time information (Luke &

Van Der Walt, 2011). Evidence is placed according to availability of space. The system only identifies open spaces and does not take into consideration the effort required from the analyst collecting the DNA from the different storage areas” (Luke & Van Der Walt, 2011). An improper storage system could also possibly result in evidence getting mixed with that of other cases or the contamination of evidence before it is even analyzed. This mistake could have serious repercussions for all parties involved in a case, including the victims, offenders and law enforcement officials involved in the investigation of the crime.

Biometric access is required to access any evidence in the lab, this step is in place so it is known who has access to and handled the evidence and when, however, it does not eliminate the possibility of contamination of evidence. It is important to note that even though a system is in place to record and track evidence in the laboratory, the arrival and storage of evidence is not always captured immediately. Some storage areas, such as the basement storage facility does not have computer facilities. Centralization of storage facilities eliminates unnecessary handling and movement of evidence. Storage bags are currently used and are not the best method to store evidence, shelves should be put in place to store evidence as bags cannot be stacked as this may result in contamination. Evidence is currently stored where there is available space, there is no system or method in place as to where evidence needs to be stored and in what order (Luke & Van Der Walt, 2011)

The Criminal Record and Forensic Science Service (CRFSS) was established in May 2005. It provides “a more integrated approach to the analysis of exhibits and the presentation of expert evidence and expensive and scarce resources such as the photographic laboratory and crime scene equipment”. The purpose of this unit is to assist the SAPS in effectively preventing and combating crime. There are three components to the CRFSS, the criminal record center (CRC), which manages criminal records and uses sophisticated techniques to recover evidence from crime scenes; technology and technical management (TTM), which facilitates technology development and renders a support service to the SAPS; and the forensic science laboratory (FSL) which uses the application of forensic science for the purpose of crime detection and crime prevention (Omar, 2008a).

According to Omar (2008a), there has been a lot of criticism regarding the backlog of cases, especially those that require DNA analysis, at the forensic laboratory. While in 2008 it was

reported that cases obtained between 2004 and 2006 had eased, in 2015, it seems the laboratory is back at square one, that is with a backlog of cases that still need tests to be conducted in order for an investigation to be concluded (Nair, 2015; Omar, 2008). However, the South African Government is determined to find a solution to improve the functioning of the criminal justice system. The CRFSS of the SAPS still face various challenges such as the high cost of training, low salaries, high staff turn-over and other problems relating to the collection of evidence at crime scenes.

As stated by Omar (2008a), a lot of criticism has been received regarding backlogs when it comes to processing DNA. It needs to be noted that DNA analysis is a complex analytical process that is influenced by various factors. The approximate time taken to submit a report once a sample has been received by the laboratory is 120 days. The analysis usually begins about 30 days after the sample has been received and a report is written which takes approximately 90 days. The turnaround time is sometimes affected by factors such as the condition of the sample and factors it may have been exposed to e.g. sunlight or rain, the size of the sample and sometimes the urgency of the case. The delay in the process is a result of the backlog in cases that still need to be analyzed for the purpose of investigation.

There have been suggestions to cut down turnaround time by 10%. When compared internationally, 120 days seems quite reasonable. The average turnaround time at the FBI DNA Forensic Science Laboratory is approximately 1 year and Canada is about 114 days. Sometimes, up to 42 000 cases that require DNA analysis are received in a year. Not all cases qualify for analysis to be performed as some may not show the presence of fluid that can be analyzed for DNA or there may not be enough of a substance available to perform the required tests (Omar, 2008a).

In some instances, evidence may not have been collected or stored correctly before reaching the laboratory which damages the integrity and the value of the evidence. Environmental factors may also affect the quality of evidence. Many field workers are not properly trained to collect evidence at crime scenes. Sometimes equipment is not available or of a poor quality. In some instances, a prosecutor may be required to submit a letter to request the analysis of an exhibit, this results in many cases being left untouched while priority cases are attended to, if all cases are systematically analyzed there ideally should be no delay in results of tests being returned to investigating officials. If results are not ready on time, for the court, it results in the postponement of cases hence dragging

the investigation further. False cases also waste a lot of valuable time and resources, especially if the laboratory is not instructed not to continue with the testing of a sample (Omar, 2008a).

According to Omar (2008a), there also seems to be a shortage of staff, there are about 210 staff in total, in the biology unit, of which, only about 30 perform DNA analysis. Many skilled scientists have left South Africa to work in foreign countries or for the government. The SAPS is unable to offer a higher salary in order to retain staff. There is also not much room for growth and development many scientists may need to apply for promotions in other departments and need to be trained again or remain in the same position for many years which leads to low job satisfaction and frustration.

The successes of the laboratory are always appreciated by the relevant investigating officers, the courts and the community. Technological advancements have contributed, but are not responsible for, the continuous successes of the laboratory. Advancements include the integrated ballistics identification system, the DNA criminal intelligence database, the national drug intelligence database and many other technological developments (Marais, 2016). Modern forensic science has transformed previously unusable clues into valuable pieces of evidence that can be used to solve cold cases and reopen solved cases where convictions were not completely convincing to officials.

## **2.6. Functioning of the Criminal Justice System in South Africa**

The South African Criminal Justice System (CJS) comprises of three components, which are law enforcement, the judicial system and corrections. The law enforcement component comprises of the South African Police Service and the Metropolitan police services. The judicial system refers to the courts. There are four levels in the judicial system, lower courts which comprise of the magistrates court and regional courts, high courts, Supreme Court of appeal and the constitutional court. The corrections component of the South African Criminal Justice System consists of the South African correctional centers, which are divided into four categories, unit management centers, private correctional centers, super maximum correctional centers and centers of excellence (Booyens, 2011).

Post the democratization of South Africa, there was a vision, of the Justice, Crime Prevention and Security Cluster, of a seamless link between the police, the courts and corrections, referred to as the Integrated Justice System which was established in 1997. In February 1998, the Mulweli Consortium was tasked to investigate and report on the function and the transformation of the Criminal Justice System. According to Du Rand (2005) in Booyens (2011), the report brought to light a high number of case withdrawals, a low conviction rate, and backlogs in court cases and overcrowding in correctional centers (Booyens, 2011).

Various components were identified in order to smoothly implement an integrated justice system, some recommendations were too expensive to implement, and therefore some components within the system were revamped and improved. This improved system was known as the Integrated Justice System 2000 Plus Strategy. This aim of this strategy was to achieve greater efficiency in the management of cases, persons and exhibits that were handed over to the court as evidence in cases being investigated (Booyens, 2011).

According to Du Rand (2005) in Booyens (2011), the successful implementation of this strategy would have resulted in shorter case cycles, more cases going through the system at any given time, fewer withdrawals of cases, fewer lost case files, fewer postponements of cases which would reduce the number of awaiting trial detainees, a higher conviction rate, priority crimes being given the urgency it deserves and assist in the eradication of corruption within the criminal justice system. Three major achievements have been made by the integrated justice system board since its inception, these are the court process project, the automated fingerprint identification system (AFIS) and the inmate tracking system within correctional centers (Booyens, 2011).

The court process project was initiated in the year 2000, with the aim to implement an integrated criminal case management system through improved tracking of case files and dockets which would result in a reduced number of lost case files and dockets, reduce trial delays, reduce duplication of cases, quicker and improved access to information and verification of identities, a reduced number of postponement in cases due to misplaced or lost files and an improved record keeping and administration system of offender admission and releases. The automated fingerprint identification strategy is a computerized database that holds the information of offender in South Africa, this system assists in the identification of wanted criminals. The inmate tracking system

within correctional centers has been implemented to ensure that the correct detainees are taken to court or released from custody at the correct times (Booyens, 2011).

According to Burger (2005) in Booyens (2011), despite the implementation of this advanced system, correctional centers still face the problem of overcrowding, mainly in the awaiting trial sections, those that have been incarcerated include inmates awaiting trial, qualifying for bail inmates awaiting sentencing and plea bargaining. There have been suggestions made to house awaiting trial prisoners in a separate facility, in order to assist to ease the problem of overcrowding in correctional centers (Booyens, 2011). The implementation of stricter bail conditions has also contributed to the overcrowding of correctional facilities.

The first component of the criminal justice system is law enforcement agencies which consist of the South African Police Service and the Municipal/ Metropolitan Police Service (MPS), which are watched over by the Independent Complaints Directorate, which later changed its name to the Independent Police Investigative Directorate (IPID) (Booyens, 2011).

The main aims of the SAPS are to enforce the law and enhance national security in the country. Prior to 1995, the police took on the identity of a force, post 1995, they changed their identity to a service, and however, in recent times they seem to have reverted to being a force, this is a major concern for the institution as many officers may be confused about their role and identity. “The SAPS consists of 11 divisions, these are: career management, crime intelligence, visible policing, criminal record and forensic science services, detective service, protection and security service, financial and administration service, legal service, management service, national evaluation service and operational response service” (Booyens, 2011).

The MPS has three main functions, they are, crime prevention, traffic policing and the enforcement of municipal by- laws. Municipal by- laws cover various activities not attended to by the SAPS such as the noise control, building restrictions, street trading and the keeping of exotic insects or animals. The independent complaints directorate was established in 1997 to keep watch over law enforcement agencies and investigate alleged cases of brutality or misconduct perpetrated by these law enforcement bodies (Booyens, 2011).

According to Burger (2005), in Booyens (2011), the aim of the judicial system, also referred to as the courts, which is the second component of the South African Criminal Justice System, is to

“uphold and protect the South African Constitution and the rules of law” by “delivering accessible, fair, speedy and cost- effective administration of justice.” The four main approaches of punishment used by the judicial system are deterrence, incapacitation, retribution coupled with restoration and reintegration (Booyens, 2011).

Punishment is used to deter people from committing crime as it involves pain or suffering, which rational human being usually tend to avoid, for example corporal punishment, imprisonment or community service. Incapacitation involves removing people from a society and placing them in an environment where they will not be allowed to further commit crimes, such as in a rehabilitation facility or a correctional center. Retribution and restoration aims to make peace between the offender and the victim of crime, for example an offender may have to provide a service to the victim such as painting their house or doing their gardening to a specific period of time, this could also include conflict resolution courses being attended by both parties that are involved. This is usually meted out by communities rather than criminal justice agencies. Reintegration aims to restore the balance between an offender and the community in which the offender has committed a crime, in this instance, an offender may be placed in a rehabilitation facility and later reintegrated into society. As previously stated, the court structure consists of four hierarchies, the magistrate’s court and regional courts, high courts, Supreme Court of appeal and the constitutional court (Booyens, 2011).

There are various sentencing options that courts resort to when sentencing an offender and there are many factors that are taken into consideration when an offender is sentenced, and these include previous offences, the age, level of education and living conditions of the offender. Sentencing options usually include fines, imprisonment, community corrections, and correctional supervision (Booyens, 2011). Punishment and sentencing is handed to the offender based on these as well as other factors. For example, a juvenile offender may be sentenced to community service or a rehabilitation center within the community. This will not completely disintegrate the individual but rather motivate them to change themselves before it becomes too late.

The third component of the criminal justice system is corrections. According to Burger (2010), in Booyens (2011), the Department of Correctional Services is responsible for “the detention of inmates in safe custody while maintaining their human dignity, enforcing the punishment meted out by the courts and correcting offending behavior” (Burger, 2010 in Booyens, 2011, p. 84).

A brief history of the transformation of the correctional system in South Africa, tells us that in the early 1900's, prison populations were inflated, mainly due to the fact that prisoners were used as cheap labor by mining companies. As laws were put in place, prisoners' rights were now being protected and citizens were not allowed to be subjected to harsh punishment such as solitary confinement while awaiting trial. Prisoners were also offered, what is now termed parole, for good behavior while in prison. Punishments that were previously implemented in correctional centers were extremely harsh.

During the 1960's and 1970's legislations were put in place to assist in the rehabilitation of prisoners, this system still used them as laborers at a ridiculous rate to farmers, however, there was little or no focus placed on the corporal punishment aspect. Prisons housed mainly political prisoners, groups of people causing political unrest and people who transgressed by- laws that existed at the time. During the 1980's prisons began focusing on rehabilitation, to an extent, until an influx of political prisoners (white paper on corrections, 2005).

It was in the early 1990's that prisons slowly began to reform. Methods of rehabilitation, other than detention, were being phased in and used as a method of punishment for offenders. This was supposed to assist in curbing the problem of overcrowding. Correctional centers were now under the department of correctional services and no longer the department of justice. Post 1994, the correctional system was to be based on the principles of freedom and equality. The correctional system began to demilitarize in order to enhance rehabilitation. Juveniles were to be housed separately from serious offenders in order to limit unnecessary trauma and strengthen the possibility of a possible successful reintegration of offenders into society as law- abiding citizens. Post democracy, there has been various developments and improvements constantly taking place within the department of correctional services in order to rehabilitate inmates back into society as developed and responsible law- abiding citizens of the country (white paper on corrections, 2005).

Various options are being explored to attempt to control the problem of overcrowding in correctional centers, these include a separate facility to house awaiting trial offenders, courts being in session on a Saturday, and to allow certain awaiting trial prisoner who could not afford bail to be released conditionally. The name change from the department of prisons to the department of correctional services was aimed revealing a change in identity of the institution from a military style punishment environment to a rehabilitative environment (white paper on corrections, 2005).

“The responsibility of the Department of Correctional Services is not merely to keep individuals out of circulation in society, nor to merely enforce a punishment meted out by the court. The responsibility of the Department of Correctional Services is first and foremost to correct offending behavior, in a secure, safe and humane environment, in order to facilitate the achievement of rehabilitation, and avoidance of recidivism” (white paper on corrections, 2005, p. 37).

## **2.7. Challenges Currently Faced by the Criminal Justice System of SA.**

Just as with every other institution around the world, the criminal justice system of South Africa is also faced with many challenges. These challenges affect all components of the criminal justice system. Some challenges that these institutions are regularly faced with include funding, growth and development and other logistical challenges. The police, in particular are faced with a dilemma in that, firstly, as previously discussed, they are unsure of their identity. They are also, in most instances, over worked and under paid due to the ever increasing rate of crime and number of cases that need to be investigated. Due to continuously having large amounts of cases to investigate, it is very difficult, sometimes nearly impossible, for police officers to be sent on training programs that will assist in updating their knowledge and introducing them to newer and more advanced methods and techniques that would make their jobs easier to do and assist them in producing work of a higher standard and better quality (Omar, 2008a).

When employees are over worked, they do not attain job satisfaction, which results in a lack of interest and enthusiasm in the work they are currently doing. This can have many negative repercussions such as employees in forensic laboratories may mishandle evidence which will result in contamination of evidence or mix up case files and evidence which could possibly result in an innocent person being imprisoned while the actual perpetrator of a crime is still freely roaming the streets scoping out his or her next victim or planning how and when to commit their next act of crime.

Most, if not all departments within the criminal justice system are faced with the problem of a lack of funding. A lack of funding results in various other problems for an institution, for example, departments are faced with a shortage of staff as there is no funding available to employ more staff or even train existing employees which will result in a lack of opportunities for employees to grow

and develop both personally and professionally. There is also a high number of current employees, in most departments, that have not been properly trained, therefore, a lack of funding also hinders their performance and their progress as there is no funding available to purchase new equipment to conduct tests that are sometimes required for investigations to be conducted and completed.

South Africa is also faced with the challenge of an unusually high unemployment rate, which could also be a possible reason as to why people resort to committing crime, which in turn depletes the resources of the government. For example, a person may commit a crime such as theft or shoplifting in order to feed his or her family, the suspect is then apprehended and put in prison to await his or her trial, which may take a long time for a date to be set due to the current backlog of cases that still need to be investigated. In this time the relevant department has lost space, which is already a scarce resource in correctional centers, the department also has to spend funding on food for the awaiting trial detainee as well as provide education, usually in the form of training, and the implementation of a rehabilitation program which also incurs costs, such as a salary for the facilitators of rehabilitation programs.

According to Booyens (2011), the criminal justice system is also faced with a high number of case withdrawals. Reporting of false cases and case withdrawals wastes already scarce or unavailable valuable police resources. The unavailability of resources that are required to conduct investigations results in court dates being repeatedly moved to accommodate for the backlog of cases that still need to be investigated that the criminal justice system is currently faced with. In many cases, the backlog has caused the destruction and contamination of valuable evidence which has resulted in cases being closed without the investigations being completed due to the unavailability of evidence. This in turn contributes to the overcrowding of holding facilities such as correctional centers

The responsibility of corrections of offenders is the responsibility of society as a whole and not only correctional centers. Overcrowding is regarded as the biggest challenge that is currently being faced by correctional centers. Overcrowding places strain on the government as they are now unable to provide adequate service and facilities to rehabilitate offenders as there is a depletion of funds at a quicker rate. The department of correctional services views rehabilitation of offenders as “1. The correction of offending behavior; 2. Human development and 3. The promotion of social responsibility and positive social values” (white paper on corrections, 2005, p. 12).

According to Burger (2010) in Booyens (2011), “in 2009, the South African correctional population was made up of 165 230 inmates (including children, youth and adults). This figure was made up of 115 753 sentenced offenders and 49 477 awaiting trial detainees.” “In March 2009, correctional centers were a staggering 44% overpopulated.” Possible reasons for this overpopulation include the implementation of stricter bail conditions, the handing down of sentences that cannot be suspended and a longer waiting period before an offender can be eligible for parole. In South Africa, there are 239 correctional centers nationally, which were classified into one of four categories, as previously mentioned, unit management centers, private correctional centers, super maximum correctional centers and centers of excellence (Booyens, 2011, p. 83).

## **2.8. Conclusion**

This chapter has discussed the history and development of forensic science as a discipline as well as the history, development and current state of forensic science laboratories both locally and internationally. Shortcomings in the current system that is in place were brought to light, identified and discussed. The state of forensic laboratories in South Africa was also discussed as well as the functions of each unit within the forensic laboratory.

Some challenges that the forensic laboratories are faced with include a lack of storage space, not enough competent and properly trained staff and a ridiculous load of work, in some instances, officials are faced with twice and sometimes even three times the stipulated number of cases to be investigated at any given time. Comparisons were made between the system in place in South Africa and internationally.

South Africa seems to be ahead of some better developed countries in certain aspects of the conducting of tests and turnaround time of results in forensic laboratories. South Africa seems to be moving forward in the right direction, to an extent, however, there is still much room for improvement, growth and development of the field of forensic science and forensic laboratories. The criminal justice system of South Africa is highly dependent on the work of forensic laboratories in order to conclude cases and sentence the correct perpetrators accordingly.

## Chapter 3

### 3. Paradigms and Theoretical Framework of the Research

#### 3.1. Introduction

When a situation is viewed, it is usually done so through a person's perspective that has been influenced by various situational factors which they have come across throughout life and through experience. Similarly, when research is conducted, the steps taken to conduct the research and the view in which results are interpreted have also been influenced by various external thoughts, ideas and factors, of both the researcher and the environment and time in which the research is being conducted. From a research perspective, a view is called a paradigm. Paradigms are influenced by factors such as the time when a phenomenon has occurred as well as the happenings in society at that point in time.

Theories attempt to assist the researcher as well as the audience by providing a better understanding of a concept that is being researched. Theories constantly change and develop as circumstances in different environments and current times are continuously changing. Once a theory is understood, it can be used to explain a phenomenon, such as crime, and used to discuss further on other relevant topics pertaining to a phenomenon. For example, a theory that is used to discuss crime, can also be used to discuss the aspect of forensic laboratories, which is dependent on crime in order to function. This is done in this chapter of the research.

This chapter will discuss the paradigms of this research and further goes on to explain the relevant theoretical frameworks that are related to the topic of the relevance of forensic laboratories in assisting with fighting and solving crime in South Africa. There is a countless number of criminological theories that have been developed over time. However, this chapter of this research will discuss how the Classical School of Criminology, the Deterrence Theory and Locard's Exchange Principle are relevant to forensic laboratories when it comes to investigating and solving crime, as well as assisting with crime prevention specifically within forensic laboratories in South Africa.

### **3.2. Paradigm of the Research**

According to Steyn (2014), there are three, main, broad types of research, these are positivistic research; interpretive research which is also referred to as descriptive- interpretive research or hermeneutics; and constructionist research, which is also referred to as semiotics. Positivistic research is based on the view of positivism, which firmly believes that there are facts out there to be discovered, which can be observed and objectively discussed, this means that the researchers thoughts, feelings and opinions will not affect the research in any way. Interpretive research aims to understand and describe the deeper meaning of information that has been researched. In this paradigm, the writings of the researcher may, in some way or another, be influenced by the researcher's thoughts and opinions as the researcher is more deeply involved in the subject that is being researched. Constructionist research aims to identify the purpose of facts and knowledge that has been made available. It aims to explain how knowledge fits into the explanation of other relative concepts that are being researched.

This research takes on the paradigm of positivistic research, which assumes that there is an objective reality out there. The aim of positivistic research is to discover facts and laws in order to arrive at a cause and effect statement about a phenomenon. There are three paradigms of each type of research, the ontology, the epistemology and the methodology. The ontology, which is assumptions about the nature of the world, of the positivistic perspective of research believes that the social world is stable and unchanging. The epistemology, which is assumptions about how to gain knowledge, assumes that these factors are determined by objective measurement through a detached stance, this means that the views of the researcher, ideally, should not affect the outcome of the research. The methodology, which is the actual methods used to conduct research, used to conduct positivist research includes using objective observation, interviews, questionnaires and experiments. The positivistic paradigm takes on a linear approach that is whereby the research questions are defined, thereafter data is collected and analysed and followed by the results being made available to the relevant community that the research has been aimed at (Steyn, 2014).

The reason that this research takes on a positivistic approach to conducting research as the aim of the researcher is to arrive at a cause and effect statement about the phenomenon how of forensic laboratories are an important component of the criminal justice system when it comes to assisting with fighting and solving crime in South Africa. The ontology of this research is that crime and

forensic laboratories will always be an important part of society and the criminal justice system. The epistemology of this study is based on relevant media sources such as newspaper articles, online sources and studies that have been previously conducted. The methodology used to conduct this research is a desktop study, where information is gathered from secondary sources of data, analysed and the findings discussed in the form of a thematic analysis, in chapter four of this research.

### **3.3. Theoretical Framework of the Research**

According to Van der Westhuizen (2011), the purpose of a theory is to propose an explanation for a phenomenon, such as crime. “A theory is a set of interconnected statements that explains how two or more events or factors relate to one another. Criminological theories attempt to explain why people commit crimes and the reasons behind crime trends.” A statement or a hypothesis undergoes various tests and retests before it can be regarded as a theory. Many factors play a role in contributing towards the development of a theory (Van der Westhuizen, 2011, p. 124).

According to Tibbetts (2012), a theory is “a set of concepts linked together by a series of propositions in an organized way to explain a phenomenon (Tibbetts, 2012, p. 2).” Some theories lead to the development of other theories, while other theories oppose already existing theories. Theories are constantly developed and improved, depending on the circumstances and happenings at the time. There are various relevant theories that can be used to explain the importance of forensic laboratories in assisting with fighting and solving crime in South Africa, these include the classical school of criminology, deterrence theory and Locard’s exchange principle, each of which will be discussed further in this chapter (Tibbetts, 2012).

### **3.4. The Classical School of Criminology**

Cesare Bonesana Marchese de Beccaria (1738- 1794), was an Italian mathematician and economist who was identified as the father of the Classical School of Criminology. According to Monachesi (1973) in Lilly et al (1989), Beccaria lived in a time where people were treated in a cruel manner

and criminals even worse, this prompted him to anonymously, due to fear of political reprisal and prosecution, publish his views on penal reform in the form of a book in 1764. By 1767, the book titled “*on crimes and punishment*”, that Beccaria, anonymously, published was translated into English and its publication was welcomed throughout Europe (Lilly et al, 1989).

According to Radzinowicz (1966) and Vold (1958) in Lilly et al (1989), Beccaria’s argument, in *on crimes and punishment*, can be summarized as “*First, in order to escape war and chaos, individuals gave up some of their liberty and established a contractual society. This established the sovereignty of a nation and the ability of a nation to create criminal law and to punish offenders. Second, because criminal laws placed restrictions on individual freedoms, they should be restricted in scope. They should not be employed to enforce moral virtue. To prohibit human behavior unnecessarily was to increase rather than decrease crime. Third, the presumption of innocence should be the guiding principle in the administration of justice, and at all stages of the justice process the rights of all parties involved should be protected. Fourth, the complete criminal law code should be written and define all offences and punishments in advance. This would allow the public to judge how and if their liberties were being preserved. Fifth, punishment should be based on retributive reasoning because the guilty had attacked another individual’s rights. Sixth, the severity of the punishment should be limited and it should not go beyond what is necessary for crime prevention and deterrence. Seventh, criminal punishment should correspond with the seriousness of the crime; the punishment should fit the crime, not the criminal. Fines, for example, would be appropriate for simple thefts, while the harsher sanctions of corporal punishment and labor would be acceptable for violent crimes. Eighth, punishment must be a certainty and inflicted quickly. Ninth, punishment should not be administered to set an example; neither should it be concerned with reforming the offender. Tenth, the offender should be viewed as an independent and reasonable person who weighed the consequences of the crime. Offenders should be assumed to have the same power of resistance as non- offenders. Eleventh, for Beccaria, the aim of every good system of legislation was the prevention of crime. He reasoned it was better to prevent crimes than to punish them*” (Lilly et al, 1989, pp. 12- 15).

The Classical School of Criminology can be summarized as, according to Tibbetts (2012), “the classical school of criminology theory is a perspective that is considered the first rational model of crime, one that was based on logic rather than supernatural or demonic factors; it assumes that

crime occurs after a rational individual mentally weighs the potential good and bad consequences of crime and then makes a decision about whether to engage in a given behaviour; this model is directly tied to the formation of deterrence theory and assumes that people have free will to control their behaviour ” (Tibbetts, 2012, p. 236).

Human beings are rational beings, they tend to want to seek pleasure and avoid pain whenever possible because pleasure is good, and it gives a person a pleasant feeling of joy and satisfaction, whereas, on the other hand, pain and punishment is uncomfortable and brings feeling of misery, sadness, anger and negativity. (Bezuidenhout & Little, 2011). Therefore, if committing a crime is beneficial to an individual, they will go ahead and commit the crime with the hope of not being apprehended and punished at a later stage. However, if an individual believes, after carefully weighing his or her options, that there is a very high possibility that he or she will be apprehended and punished for committing a crime, he or she will not go ahead and commit a crime.

With regards to the classical school of criminology and forensic laboratories in South Africa, the presence and efficient work of forensic laboratories could deter individuals from committing crime in the future. If the work of forensic laboratories is completed sooner than it is at the current rate, results will be obtained sooner, resulting in cases being concluded faster and punishment being meted out to offenders sooner than the rate it currently is. People will rethink committing crime as they will fear the possibility of being apprehended and punished sooner than is currently taking place.

An increase in the efficiency of the work of forensic laboratories in South Africa can be obtained by an increasing the number of forensic laboratories that perform tests and analysis of evidence from crime scenes. Another suggestion to improve the situation could be to employ more qualified and properly trained staff as well as send existing staff for training and refresher courses. An increase in the number of people that are employed, overall, will also, possibly, assist in reducing the number of incidents of crime as many people resort to committing crime due to the fact that they are unemployed and still have to take care of their personal needs as well as the needs and demands of their families. When word travels that competent staff are conducting tests in forensic laboratories, this will serve as a further deterrent to people who may be considering wanting to commit a crime of any sort. They will be deterred by the fact that they may be apprehended and punished, and punishment is what people will tend to want to avoid at all cost.

### 3.5. Deterrence Theory

During the Enlightenment era of Beccaria's writing, there was another scholar, Jeremy Bentham (1748- 1832), who shared the views of Beccaria. Bentham was an English jurist and philosopher who agreed with Beccaria that punishment should be a deterrent to the perpetration of crime and that human behaviour was a result of free will. Beccaria and Bentham studied prisons and advocated for reform. Their work formed the foundation of various laws and rules, many of which are still in practice today. Laws that are implemented today are specific and punishments for the commission of crime fit the crime and not the offender. All offenders should, ideally, be treated equally before the law, despite factors such as the status, class or family to which they belong. (Lilly et al, 1989).

According to Tibbetts (2012), the deterrence theory is “the theory of crime associated with the classical school of criminology, which proposes that individuals will make rational decisions regarding their behaviour. The deterrence theory focuses on three components: the individual's perception of 1 Certainty of punishment, 2 Severity of punishment, and 3 the swiftness of punishment” (Tibbetts, 2012). The deterrence theory fills the gap that Beccaria left out when developing his theory on crime, which is the factor of punishment. (Tibbetts, 2012, p. 238) This theory basically emphasizes that human beings are rational beings. They will weigh their options in terms of will they gain pleasure or experience punishment for their actions. Human beings are logical beings and hence will tend to seek pleasure and avoid pain at any cost. Punishment tends to be avoided because in most cases, punishment results in physical or psychological pain (Bezuidenhout & Little, 2011).

The deterrence theory plays a role in attempting to explain how the presence of these forensic laboratories is expected to deter crime. If there are more forensic laboratories in South Africa, with properly trained staff, cases would be solved faster, evidence won't get misplaced, mixed up, contaminated or even destroyed, because it has been stored for so long and witnesses, who usually “forget what happened”, go missing over time or die won't be required to testify or give statements as often. The presence of more efficient forensic laboratories in South Africa may create a knock-on effect within the criminal justice system. This could mean that cases will be investigated and concluded sooner resulting in a more rapid apprehension and sentencing of a perpetrator which will not only deter other people from committing crime, but may also decrease the waiting period

for a court hearing to take place. Quicker arrest and convictions of perpetrators of crime may serve as a deterrent to other possible offenders.

Jobs would also be created and unemployment reduced. Current employees would also experience greater job satisfaction as well as less fatigue and stress. The population of correctional centres may also drastically decrease, as many inmates are still awaiting trial, resulting in an improvement of the condition of correctional centres. If awaiting trial prisoners are removed, either released, placed in a different facility or sentenced, there will not be such a large number of awaiting trial detainees occupying space in correctional facilities. Government may also save on resources and funding, to an extent, as there will be less crowding in rehabilitative institutions such as correctional centres.

With regards to forensic laboratories in assisting with fighting and solving crime in South Africa, the deterrence theory aims to reiterate that because human beings are rational beings and therefore will think carefully about their actions before doing anything, this includes committing crime. Human beings will weigh their options and be deterred from committing crime is there when is a certainty of swift and severe punishment for their actions. Forensic laboratories producing results faster an court proceedings being concluded faster will result in the deterrence of people wanting to commit crime in the under the pretext of gaining pleasure.

### **3.6. Locard's Exchange Principle**

According to Trimpe (2006), the Locard's Exchange Principle states that "with contact between two items, there will be an exchange" (Trimpe, 2006) or in simpler terms, according to Anonymous on the website forensic medicine (2016a), "every contact leaves a trace" (Anonymous, 2016a). This basically means that for example, if someone enters a room or a crime scene, they will bring in and leave something behind as well as remove and take with them take something from the room or crime scene which they have been in contact with, along with them, for example, a person who enters a room may drop strands of hair on the carpet as well as pick up fibres from the carpet or beddings while in the room or a perpetrator may leave tyre tracks or shoe prints close to an

outdoor crime scene and mud will also be stuck on their tyres or shoes (Trimpe, 2006; Anonymous, 2016a).

The value of trace evidence, also referred to as contact evidence, was first recognised in 1910 by Edmund Locard, hence, this theory has been named after him. Edmund Locard was also the director of the first forensic science laboratory that was established, which was located in Lyon, France. He discovered this principle of exchange after solving a strangulation case by examining fingernail scrapings.

With regards to forensic laboratories assisting with fighting and solving crime in South Africa, Locard's principle of exchange plays a role in this process. After a crime has been committed, contact with the crime scene must always be kept to a minimum in order to avoid the contamination of the crime scene and possible loss of valuable pieces of evidence that are required by the investigators and forensic laboratories to conduct tests and arrive at a conclusion as to what has occurred at a crime scene and who is responsible for the commission of the crime that is being investigated. For example, if unauthorized personnel enter a crime scene, they will touch things at the crime scene, this will cause them to leave their fingerprints behind on objects that are present at the crime scene such as a light switch, they may also do regular tasks such as drink water or smoke at a crime scene which will result in their DNA being left behind at the crime scene. There are severe consequence to this, such as the wrong person being apprehended and sentenced, especially if collation evidence was not thorough at the crime scene or evidence has been mixed up in the laboratory, due to whichever factors may be prevalent.

Locard's exchange principle is used as a basis of the collection of physical trace evidence from a crime scene. Trace evidence is small, yet measurable, sometimes almost invisible evidence, such as strands of hair or fragments of the perpetrators skin under the fingernails of a victim, that can be found at a crime scene. Trace evidence is always present in some form or another, no matter how well a crime scene may have been "cleaned up." Trace evidence may not alone solve a case, however, it may suggest links between other clues or evidence that may have been found at a crime scene, for example, skin under the fingernails of a rape victim may indicate that a struggle had ensued between the victim and the perpetrator and the victim scratched the perpetrator in self-defense. The skin can be tested and analyzed for DNA in order to assist with apprehending the

perpetrator of the crime. Examples of trace evidence include strands of hair, partial or complete fingerprints, fibers, glass pieces, paint chips, soil and gunshot residue (Oberg, 2004).

According to Oberg (2004), in most instances, trace evidence, together with the application of Locard's principle of exchange can be used to attempt to reconstruct a crime scene. There are various examples of the use of Locard's principle to infer what may have occurred at a crime scene. Some examples of the application of Locard's principle are, when paint chips from a hit and run scene are analyzed, they assist in determining the make and model of the perpetrators car. Upon inspection of the car, there may be scratches or missing bits of paint, this will link the suspect to the crime scene. The presence of broken glass at the crime scene of a burglary may infer that a window may have been broken in order to gain entry into the premises. There is a possibility of finding blood on the window pane, even if it has been wiped off, which can be analyzed for the DNA of a suspect. When a firearm is discharged, gunpowder residue is usually left behind, on the hands or clothing of the user of the firearm or on items that may have been close to the location of where the firearm was discharged. In some instances, a suspect may have walked or driven through dirt or stepped in blood at a crime scene, the footprints or tyre tracks left behind would provide information regarding the direction and patterns of movement of the suspect(s). Substances that created the footprints may still be present on the shoes or tyre of the car of the suspect, this will assist to link a suspect to a crime scene.

According to Appel et al (2004), Physical evidence can never be wrong, only its interpretation may contain errors. However, factors that influence the quality and integrity of evidence includes offender actions, victim actions, secondary transfer, witnesses, the weather, decomposition, insect activity, animal predation, fire, fire suppression efforts, the police, emergency medical technicians, crime scene technicians, forensic scientists and coroners, (Appel, 2004; Chisum & Turvey, 2000). The actions of all parties present at a crime scene, distort the crime scene in some way or another. This may possibly result in valuable evidence being removed from a crime scene or relocated. This is regarded as the contamination of evidence. Contaminated evidence is evidence that has lost its integrity and is unable to be used to properly and successfully conduct and conclude investigations of crimes that have been committed. If evidence is unlawfully removed or relocated at a crime scene, investigators will not be able to draw meaningful conclusions about the sequence of events that may have occurred at that crime scene.

When considering the use of Locard's exchange principles within forensic laboratories, the laboratories need to be clean and free of any possible causes of contamination. If a laboratory is clean and organised, there is little or no risk of the contamination of any valuable trace evidence, which would result in tests being performed faster and more accurately, as evidence would be easily accessible and not misplaced or damaged due to factors such as negligence. A clean and hygienic laboratory leaves no room for the transfer or loss of valuable evidence and prevents the Locard's principle of exchange from occurring in a forensic laboratory.

This would also result in cases being closed sooner and the correct perpetrators being arrested and sentenced sooner than the current rate as well as innocent people being freed from incarceration for crimes that they may not have committed. Fewer cases would be struck off the roll and valuable resources would not be wasted and depleted unnecessarily. Just as with the classical school of criminology and the deterrence theory, when cases are investigated and solved sooner, it may possibly serve as a deterrent to possible future offenders as they will rationalise that there is a very high possibility that they will be caught, apprehended and sentenced, or rather punished, which is what human beings seek to avoid and would rather indulge in pleasure over punishment as punishment results in pain and suffering.

### **3.7. Conclusion**

A paradigm can be described as a world view of a phenomenon. When viewing research through the positivism paradigm, knowledge is viewed as referring to the real world while the descriptive-interpretive paradigm of research views knowledge as the subjective feelings about the world and, lastly, the constructionist paradigm views the topic that is being researched in terms of how it fits into a broader social context of the society and the world. No paradigm is better or worse than the other, the paradigm that the researcher will choose to view his or her research through is dependent on the topic and method of the research or phenomenon that is being studied. This research has taken on the view of the paradigm of positivism.

Theories are statements that are linked together and used to attempt to explain an occurrence or a phenomenon, such as crime. This chapter has discussed theories and frameworks relevant to the study of forensic laboratories in South Africa. This chapter began by going back to basics, it has

discussed the paradigm of the research, followed by a discussion of the Classical School of Criminology, the Deterrence Theory and Locard's Principle of Exchange.

The Classical School of Criminology was the first rational model that was used to attempt to explain why people commit crime. It proposed that human beings are rational beings who seek to attain pleasure and avoid pain and punishment at all costs. When inferring this theory to the relevance of forensic laboratories in assisting with fighting and solving crime South Africa, it is explained that should tests be concluded and results released at a rapid rate, offenders will be punished accordingly. There will be less delays in the sentencing of an offender which will in turn possibly deter future occurrences of crime as human beings want to avoid punishment, which is guaranteed once they have been successfully convicted of an offence. The Classical School of Criminology has made significant and lasting contributions to the study of crime and the criminal justice systems around the world (Lilly et al, 1989).

The deterrence theory filled the gap that had left out in the Classical School of Criminology, which was the aspect of punishment. When there is a certainty and swiftness of punishment, this should further deter human beings from committing crime as, previously mentioned, they want to avoid pain and punishment and rather seek pleasure. The punishment received by an offender should fit the offence that has been committed and not the offender. External factors, such as the family or class to which an offender belongs, should not affect the handing down of sentencing and the punishment of an offender.

Lastly, Locard's principle of exchange was also discussed. This theory has proposed that every contact that is made will leave a trace of some sort or another. Examples of the application of Locard's exchange principle were also discussed. Forensic laboratories should always be neat, clean and in a hygienic state in order to minimise the contamination of evidence. Evidence should also always be correctly and neatly stored which will minimise, if not eliminate, any possibility of the loss of integrity of a sample that may still need to be tested or needs to be stored for possible retesting or to perform additional tests at a later stage, should the need to do so arise.

## **Chapter 4**

### **4. Research Design and Methodology of the Research**

#### **4.1. Introduction**

When a crime is committed, it is usually reported, to the police contact centre, by a witness. The contact centre will then dispatch a police officer to respond to the crime scene. The first officer that responds to the crime scene is responsible for securing the crime scene and determining whether the assistance of additional emergency services, such as an ambulance or fire brigade, are required. It is the responding officer's duty to ensure that minimal contact is made with the crime scene in order to prevent any possible contamination of the crime scene and probable loss of valuable evidence that will assist in the successful conclusion of an investigation and apprehension of a suspect (Gilbert, 2010; Saferstein, 2015).

Once the detectives and the forensic unit have arrived at the crime scene, the crime scene is recorded by means of sketches and photography. It is imperative to document a crime scene as it has been found as this information and possible clues will be valuable to the investigation at a later stage. An investigator should know the difference between clues or evidence and unrelated material at a crime scene. Notes should always be taken by the investigating officer at a crime scene. Note-taking is a very important part of the investigative process as it assists the investigating officer when compiling reports at a later stage. In many instances, especially with the current situation, of a major backlog of cases still waiting to be investigated, that the criminal justice system is faced with reports on cases are compiled at a much later stage, the taking of notes by an investigating officer at a crime scene will greatly assist him or her when reports are being compiled as it is impossible to remember everything about a specific case. Evidence is then carefully collected, packaged and labelled accordingly before it can be transported to a forensic laboratory for relevant tests to be conducted. Once tests have been concluded at the forensic laboratory, the results are handed over to the investigating officer and evidence is stored, to be

made easily available should further tests need to be conducted at a later stage. The investigating officer will then compile a report which will be presented in court (Gilbert, 2010; Saferstein, 2015).

The above discussion is an example of a methodology that is followed when a crime is reported, in the same way, this research has also followed a specific methodology in order to be completed. As mentioned in chapter one of this research, this chapter will discuss the design of the research as well as the methodology that has been used to conduct this research on the relevance of forensic laboratories in assisting with fighting and solving crime in South Africa. This chapter discusses the steps that have been taken in order to conduct this research, provides the details relevant to the sample of the research, it also explains the method of analysis of the findings of the research, discusses the limitations of the research and how they can be overcome as well as the ethical considerations relevant to this research.

## **4.2. Research Methodology of the Study**

According to Struwig & Stead (2013), research is “the process of gathering and analyzing information” (Struwig & Stead, 2013). Research is conducted for various reasons, such as to explore, explain or describe a phenomenon, an assumption or a finding (Neuman, 2006). According to Neuman (2006), there are two main types of research, basic research and applied research. Basic research is “research designed to advance fundamental knowledge about how the world works and build/ test theoretical explanations by focusing on the “why” question. Basic research allows readers to gain an understanding of the concept that is being researched. The scientific community is the primary audience.” (Neuman, 2006). Applied research is “research designed to offer practical solutions to a concrete problem or address the immediate and specific needs of clinicians or practitioners.” Applied research is more in- depth research and aims to offer concrete solutions to problems that may need to be addressed, urgently. There are 3 types of applied research, evaluation research, action research and social impact research (Neuman, 2006).

According to Bezuidenhout (2011), methodology is “method used to collect and analyze data.” The methodology of a study is a path that is followed in order to obtain results. This allows for a duplication of the study in other geographical areas which also assists with verification of the research by other researcher, should a need arise to do so (Bezuidenhout, 2011). It is important for

other researchers to be able to duplicate a study as this proves the reliability and validity of research that has already been conducted. An analogy that can be used to convey the importance of the methodology is documenting a crime scene, one may be able to do so in a comfortable environment, such as an indoor crime scene where a robbery, rape and murder may have occurred, however, should the need ever arise, one should also be able to comfortably duplicate this process at another location, such as a an outdoor crime scene, a busy location such as in the city or even an isolated location such as a farm and yield the same results.

According to Steyn (2014), there are four stages to the research process, defining the research question, designing the research, doing the research and writing the results of the research. A research question is prompted by a thought, an idea, an experience or an observation, thereafter a question to be asked is refined from the idea. A research design is a plan on how you will conduct gather and analyse data. It includes details such as your techniques that will be used, sampling method, method of data collection and method of data analysis (Steyn, 2014).

In this research, the research questions were defined in chapter one, these questions that are being asked, for the purpose of this research, include, What are the current roles of forensic laboratories in South Africa?; What relevance do forensic laboratories hold in fighting and solving crime in South Africa?; Will the presence of more forensic laboratories in South Africa mean improved service delivery?; Will the establishment of more forensic laboratories speed up investigative processes resulting in criminal cases being investigated and concluded faster?; Will more forensic laboratories mean offenders are sentenced sooner, therefore possibly deterring future offenders from committing crime due to an efficient system?; and Will the population of currently overcrowded correctional centers decrease significantly due to more forensic laboratories being established in South Africa?

This research has been designed in the form of a qualitative, desktop study that shares a positivistic view of the world. The sample of the study includes newspaper articles as well as online media sources. The research was then conducted by gathering relevant readings and articles on the topic that is being researched, which is the relevance of forensic laboratories in assisting with fighting and solving crime in South Africa. Thereafter, the results of the research then written made available to other scholars and future researchers. The research questions of this research were prompted by and based on a contemporary issue that South Africa is faced with. The design of this

research is discussed further in this chapter, these include the methods used to gather a sample for the study, the techniques that have been used to collect the data for the research and the method that has been used to analyse the data that has been collected for the research.

This research takes on a qualitative literature study approach as the data that was collected is in the form of thoughts and opinions rather than numbers and statistics. According to anonymous on the business directory website, a desktop study is the process of “gathering and analysing information already available in print or published on the internet” (business directory, 2015). Qualitative research aims to make predictions, which is an expected outcome of this study. A full literature review was conducted, in chapter two of this research, and gaps in the system as well as themes of the research were identified. Internet research is a valuable tool and has grown tremendously since its inception (Struwig & Stead, 2013). For the purpose of this research, information and print as well as online sources of information were used to collect data on crime, the criminal justice system and forensic laboratories in South Africa. The information that was gathered was then read and analysed. Different themes and concepts that were identified and have been discussed further, in chapter five of this research.

The data that has been gathered was analysed in the same way as if it were obtained from other sources, the only difference is that data has been obtained from secondary sources such as books and articles rather than primary sources, such as human beings (Struwig & Stead, 2013). Internet research or a desktop study is an unobtrusive methods of data collection. It includes the examination of documents to gather information. This method does not involve interaction with human beings. Some sources may be bias therefore data should be triangulated, meaning alternative sources that support the evidence should also be consulted. Sources found on the internet also need to be properly referenced in order to avoid crimes such as plagiarism, which may be regarded as a punishable offense (Struwig & Stead, 2013).

### **4.3. Sample of the Study**

According to Neuman (2006), a sample is “a small set of cases a researcher selects from a large pool and generalizes to the population” and a population is “the abstract idea of a large group of many cases from which a researcher draws a sample and to which results from a sample are

generalized” (Neuman, 2006). For example, a group of twenty students are selected to form part of a research study from a class of two hundred students, the two hundred students is regarded as the population while the twenty students that have been selected to be studied are regarded as the sample of the study. The twenty students participate in the study and the results that have been obtained are inferred to all two hundred students of the class.

The type of sampling that has been used is purposive sampling. Purposive sampling is “a non-random sampling method in which the researcher uses a wide range of methods to locate all possible cases of a highly specific and difficult to reach population.” (Neuman, 2006). For example, if a researcher was conducting research which needed to obtain data from people who have been victims of robbery, the researcher may identify and interview only people who have been victims of this type of crime. Specific sources of information, such as books, newspapers, magazines and online sources regarding forensic laboratories, in South Africa, have been used a source of collection of secondary data to be analyzed for the purpose of this research.

The sample of the study refers to what the researcher is going to study. There are various methods that can be used to choose a sample to study, a sample is a part of a population that is studied and inferences made about the rest of the population. Data collection refers to the way in which data is collected. Methods of data collection may take many forms, such as interviews, focus groups or surveys. The aim of data analysis is to translate the data that has been collected into a meaningful answer to each of the research questions that have been proposed earlier, in chapter one (Steyn, 2014). The data that needs to be analysed has been collected in the form of collecting and reading through relevant readings on crime and forensic laboratories in South Africa.

The sample of the study includes current literature on the topic that is being researched. The sample for collection of data was created by using the method of purposive sampling, books, journal articles and newspaper articles relating to the topic were collected and analysed. The method that has been used to analyse the data that has been collected during this research is discussed, in detail, in the next section of this chapter. Thereafter, inferences and conclusions are going to be drawn from the available data. Recommendations will also be made for the purpose of development as well as future studies within the field of study (Struwig & Stead, 2013). A desktop study has been chosen, over a qualitative study, due to time constraints of the researcher.

#### **4.4. Analysis of the findings of the Secondary Data**

When qualitative research is conducted, the data that has been gathered is used to describe details about people that have been observed or studied, events that have occurred and actions that have taken place. When conducting qualitative research, the data that is obtained is usually in the form of documents, notes, or recordings, such as images and audio and video recordings. Once data has been collected from various sources, it needs to be sorted and analyzed in order for the findings of the research to be better understood and the research report presented to its audience. The analysis of the data that has been gathered allows, both, the researcher and the audience to improve their understanding of a phenomena, expand existing theories as well as expand a person's already existing knowledge on a particular topic that has been researched (Neuman, 2006).

According to Neuman (2006), "to analyze data means to systematically organize, integrate and examine; as we do this, we search for patterns and relationships among the specific details. In order to analyze, we connect particular data to concepts, advance generalizations and identify broad trends or themes." The analysis of qualitative data involves the introduction and use of themes or concepts to better understand that data that has been gathered during the collection phase of research process. Hence the use of a thematic analysis to analyze that data that has been gathered during this research. According to Vaismoradi et al, (2013), a thematic analysis is classified as a "descriptive qualitative approach to data analysis, and an analytical overview and comparative discussion of the approaches' definitions, aims, philosophical background and data analysis process" (Vaismoradi et al, 2013). A thematic analysis of the data that has been collected during the research "provides both a description as well as an interpretation of the data, both of which emphasize the context, integration of manifest and latent content, drawing thematic map, non-linear analysis process and no peer checking."

There are various steps that need to be taken in order to analyze the data that has been gathered while conducting research on a particular topic. The steps that are involved in the process of the analysis of data include the conceptualization of the data, open coding, axial coding and selective coding of the data that has been gathered. The conceptualization of data is a way to organize and make sense of the data that has been gathered, the process of conceptualization begins during the

data collection phase. Conceptualization of the data links data and reveals new themes as well as links themes, which have been uncovered during the research, to each other.

The data that has been gathered then needs to be coded, this means that that data that has been collected needs to be divided into different themes which have now been uncovered.

According to Neuman (2006), there are various stages of the coding of data. The first type of coding is called open coding, which is “the first coding of qualitative data that examines the data to condense them into preliminary analytical categories or codes.” The next phase of the coding of the data is “axial coding. Axial coding is the second phase of coding qualitative data during which the researcher organizes the codes, links them and discovers key analytical categories.” Axial coding tends to focus more on the themes that have been uncovered, rather than the data that has been gathered. Axial coding also plays a role in raising more questions about the topic that is being researched, as well as combining and breaking down themes that have already been identified. Axial coding also reinforces connections between the evidence that has been found and the concepts that have emerged during the research. Selective coding “is the last phase in coding qualitative data that examines previous codes to identify and select data that will support the conceptual coding categories that were developed.” This phase of the coding of the data assists the researcher in reorganizing the themes that have been identified throughout the process of the analysis of the data and elaborates further on the topic of the research.

Just as it is vitally important for an investigator to take notes while investigating a crime scene, it is equally important for a researcher to continuously make and keep notes during the entire research process, in order to be able to recollect information when it is needed at a later stage, such as when compiling reports on the findings of the research. The amount of information that is available from the data that has been gathered, is greatly dependent on the richness of the data that has been gathered during the collection phase of the research process.

During this research, the data has been gathered from secondary sources such as books, newspaper articles and online media publications. Once the data was gathered and read through, concepts began to surface, these concepts were then further researched and elaborated on, in chapter one of this research. The concepts were discussed in chapter one as this will enable the audience to better understand the research from the beginning of the report. The themes that have emerged

throughout the research will be further elaborated on in chapter five. The discussion of these themes have been facilitated by published sources of information as well as the notes of the researcher.

#### **4.5. Limitations of the Research**

Limitations of research refer to factors that may not have been included in the research due to various possible reasons, for example, if a study was to be conducted on workers in forensic laboratories, a limitation would be that the researcher may not be able to interview each and every person that is employed in a forensic laboratory for various reasons such as time constraints or unavailability of the members of staff at the laboratory because they may be required to work specific shifts. In this instance the researcher is faced with a limitation regarding the collection of data and would need to find a way to overcome the limitation, such as using an alternate method for the collection of data that is required for the research.

According to Neuman (2006), limitation of this research is that some information or sources may be unavailable or difficult to collect, due to reasons such as lack of funding to purchase data that may be unavailable to use in public spaces such as a library. Therefore, alternate sources may have to be referred to for the purpose of the collection of data for the research. Some sources of data collection may not have been updated resulting in the researcher having to refer to an older version of the data. Should newer literature be unavailable, the most recent version of the literature was used in the research.

In some instances, the data that has been gathered may not be able to directly answer the research questions that have been asked by the researcher. In order to overcome this limitation, the researcher would need to carefully plan the research process and take into consideration units of measure and the characteristics of the collection of data, the time of the collection of the data and methods of sampling that have been used to collect the data. In some instance, the researcher may even need to reconsider the research questions that are being asked.

Many publications of data tend to be very vague and do not cover all aspects of a concept. This can be overcome by the researcher consulting various sources of data in order to verify a finding. This concept is referred to as the triangulation of data. When conducting research, if data is not triangulated, a limited amount of information may result in both reliability and validity problems

of the data that has been collected. Problems with the validity of the data arise when the theoretical definition of a concept does not match the data that has been collected by the researcher and reliability problems arise when definitions of terms and concepts, are unstable and, constantly change over time. The problem of missing data also affects the reliability and validity of a source of the collection of data when conducting research. In some cases, data goes missing before it can be analyzed and published. In some cases, data can even go missing during the collection process. It is very important for a researcher to always back up data in various places and in different formats in order to safeguard the data that is being collected and analyzed for the research. In this instance, note-taking also plays an important role in the research process.

Some sources of information may be bias, therefore data should always be triangulated, and meaning that alternative sources that support the evidence that has been found should also be consulted and referred to. Sources found on the internet also need to be properly referenced in order to avoid committing an act of plagiarism when writing the research report (Struwig & Stead, 2013).

Another limitation of the use of a desktop study as a method of conducting research is the problem of excessive quoting of information. The researcher tends to quote information in order to avoid committing an act of plagiarism while writing a report on the research that has been conducted. Excessive quoting of information can result in the creation of a false impression of the data that has been gathered. A way to overcome this limitation of a desktop study would be for the researcher to make detailed notes throughout the research process that include thoughts, ideas and arguments on a specific theme or concept that will be included in the discussion of the findings of the research when compiling a report on the research that has been conducted.

The researcher must fully understand the substantive topic in order to collect and use relevant data. Sometimes there may be data available on a topic, but not enough information, this can be overcome by conducting a thorough literature search and a comprehensive literature review on the topic that is being researched. If not, false assumptions and interpretations will be made resulting in an accurate result and over inference of information. Background reading into the topic is also important to prevent this making assumptions about the data that is available to the researcher. A limitation to using internet sources, articles and readings is that sources may be outdated or inaccurate, in order to avoid this, the researcher has triangulated the information that has been cited

in the readings against references as well as other sources of information. In some instances, websites and webpages are updated or become unavailable and therefore cannot be reaccessed at a later stage, should the need arise to do so (Neuman, 2006).

#### **4.6. Ethical Considerations of the Research**

According to Bezuidenhout (2011), ethical behavior means “along with ethics, it refers to moral principles and behavioral expectations that researchers should adhere to when interacting with other people. When conducting research, the privacy and confidentiality of the research participants should always be the primary concern of the researcher (Neuman, 2006). A researcher should always behave in an ethical manner and treat participants in a manner in which they would like to be treated if the roles were reversed. Researchers should not be discriminatory or judgmental towards the characteristics, thoughts and opinions of others, rather remain neutral and not impose their values, opinions or beliefs onto research participants” (Bezuidenhout, 2011). This means that researchers should not try and impose their thought and ideas onto the subjects nor make suggestions towards the responses of a research participant when asking a question.

When conducting qualitative research, permission must always be granted to the researcher by the research participant, in writing. The research participant should always be informed that he or she is not obligated to answer any questions that they do not feel comfortable answering and that they are allowed to remove themselves from the study at any point during the collection of data. If the research participant is under the age of eighteen, they are regarded as a minor and permission must be granted to them to participate in the research process, by their parents or legal guardian. Data should be collected in an environment in which both the researcher and research participants are comfortable. The researcher must always respect the rights of the research participant and keep always their information private and confidential. When writing the report on the research, the researcher should not drop subtle hints that could possibly reveal the identity of the participant of the research (Neuman, 2006).

Due to the fact that secondary data, and not human beings, has been used as the sample for the collection of data for analysis for the purpose of this research, there are fewer ethical considerations that needed to be taken into account. However, the researcher is always obliged to behave in an ethical and considerate manner when conducting any form of research. All primary and secondary

data sources that have been used by the researcher needs to be acknowledged and referenced correctly, using the Harvard method of referencing, in order to avoid plagiarism. Plagiarism is a severely punishable criminal offence, which occurs when a source of information is used and not acknowledged as it is regarded as theft of another person's work or intellectual property.

#### **4.7. Conclusion**

When research is conducted, it is imperative to have a plan, also known as the methodology of the research, in place to assist the researcher in carefully planning and executing the various steps of the research process in order to successfully gather the relevant data that is required to complete the research process. Having determined the methodology of the research also assists the researcher in saving time, funding and other valuable resources that may have been allocated for the purpose of the research.

This research has taken on the form of a desktop study using internet sources, research articles and other sources of published information such as newspaper articles to gather information for the research. A qualitative research approach was used as the data has been gathered was in the form of thoughts and opinions rather than numbers and statistics. Internet research or a desktop study is an unobtrusive method of the collection of data as it does not require interaction with people to collect data. The sample used to conduct the research was secondary sources of data, such as newspaper articles and online media sources. Limitations of the study have also been noted as well as ways to overcome limitations. Ethical considerations of the study have also been acknowledged and possible ways to overcome them have been suggested.

## **Chapter 5**

### **5. Discussions of the Research**

#### **5.1. Introduction**

After the investigation of a crime has been completed, including all tests conducted, findings analysed and reports written, the findings of the investigation and inferences that have been drawn from the documentation of crime scene, the findings are presented to a judge in court. Once all arguments have been heard and witnesses, suspects and victim questioned and cross examined, a verdict is reached by the judge and a punishment that fits the offence is handed down to the perpetrator of the crime. All individuals should be treated equally before the law, factors such as class, status and the family to which an individual belongs should not affect the way their sentencing is handed down to an offender (Lilly et al, 1989).

Just as evidence and findings are presented before a judge in court, this chapter consists of a discussion of the findings of the research, from the secondary data, that has been conducted on the relevance of forensic laboratories in assisting with fighting and solving crime in South Africa. This chapter begins with a discussion on the statistics of crime and is followed by a thematic analysis of the findings of the research as well as provides an in-depth discussion of the findings of the research. This chapter also provides answers to the research questions that have been discussed earlier, in chapter 1.

#### **5.2. Statistics of Crime in South Africa**

Crime statistics are used to study criminal behavioral patterns, the characteristics and the motives of crime. There are various external factors that also contribute to a person's decision to commit a crime, apart from an individual being a rational being and having free will to make their own decisions, as advocated for by the classical school of criminology, these include age, level of education, economic status and the community to which a person belongs.

According to various media reports, crime is perceived to be out of control in South Africa. This statement is supported by the fact that there is a backlog in the investigation of crime in South Africa. According to Mc Cafferty (2003), statistics of crime are not always accurate and sometimes it is difficult to obtain information that is required (Mc Cafferty, 2003). Statistics may not always be a true reflection of the situation at hand as in many instance, many crimes go unreported for various reasons, such as lack of trust in the investigating authorities, better known as the police.

According to Singh (2011), the official crime statistics consists of “those crimes reported to the SAPS (police statistics) that result in prosecutions (court statistics) and convictions (correctional services statistics).” Police statistics are the most reliable and comprehensive of the three types of statistics, however, they are still not 100% accurate, due to factors such as a high number of crimes that are unreported crimes. This is known as dark figures. Singh (2011), defines dark figure of crime as “number of unreported crimes that are not reflected in official crime statistics.” Reasons for not reporting crime include crimes being viewed as insignificant or petty, people are unaware that a crime was committed, for example, fraud, which in some cases may only be detected years after the crime has been committed, the victim fears retaliation and secondary victimisation sometimes at the hands of the police, victims are embarrassed to report crimes, there is a lack of trust in the SAPS or the victim may not want to harm the offender, perhaps because the offender is well- known by the victim and his or her family so reporting a crime would result in conflict that could have been avoided taking place between two families that are known to each other.

Court statistics are usually lower than police statistics as the court statistics only consist of cases that have made its way to court with sufficient evidence being present and thorough investigations having taken place. In many instances, cases of crime that have been reported to the police are not pursued or investigated further due to a lack of available resources. The department of correctional services statistics only takes into account cases where sentencing of offender had resulted in imprisonment. The correctional statistics are usually the lowest of the three statistics as correctional statistics only take into consideration cases where an offender has been tried in court and found guilty of an offence and has therefore been sentenced to a correctional center for the purpose of rehabilitation. The increase in the population of correctional centers has placed an enormous strain on the department of correctional services’ valuable and extremely scarce resources.

The SAPS annual crime report (2017), presents the crime statistics that have been reported to and recorded by the SAPS. Crimes are either reported to police stations or detected as a result of police action such as roadblocks to arrest drunk drivers, search for drugs or illegal firearms. Unofficial crime statistics include data that has been collected from self- report surveys or the national crime victimisation surveys. Victim surveys focus on the victims of crime rather than the perpetrators of a crime. The victims of crime survey is a countrywide household- based survey that aims “to provide information about the dynamics of crime from the perspective of households and the victims of crime; to explore public perceptions of the activities of the police, prosecutors, courts and correctional centers in the prevention of crime and victimisation; and to provide complementary data on the level of crime within South Africa in addition to the statistics that are published annually by the SAPS” in their annual crime report (Victims of crime survey 2016/17).

Below are the statistics of two types and one sub- type of crime that regularly occur in South Africa, namely murder and sexual offences ,more specifically rape, under the category of sexual offences. Sexual offences include crimes such as rape, sexual assault, attempted sexual offences and contact sexual offences. The data of statistics that have been used to compile the graphs below have been retrieved from the annual crime statistics of the SAPS 2016/2017.

According to figures in the annual crime report 2016/2017, over the past five years, there has been an increase in the number of reported cases of murder in South Africa. According to figure one below, in the year 2012/2013, 16 213 cases of murder were reported to the SAPS, while, later on, in 2016/2017, 19 016 cases of murder were reported. It needs to be noted that these statistics only reflect the number of cases of crime that has been reported to the SAPS. Many cases of crime still go unreported for various reasons, as mentioned earlier. There are various possible reasons for the drastic increase in the number of reported cases of murder, these could possibly include the fact that people now find it easier to locate and access local police stations than they did previously, as more people are being educated and are now literate as opposed to the past when many people could not read or write at all. Another possible reason for the drastic change could also be an overall increase in the number of incidents crime that have occurred and actually been reported to the SAPS.

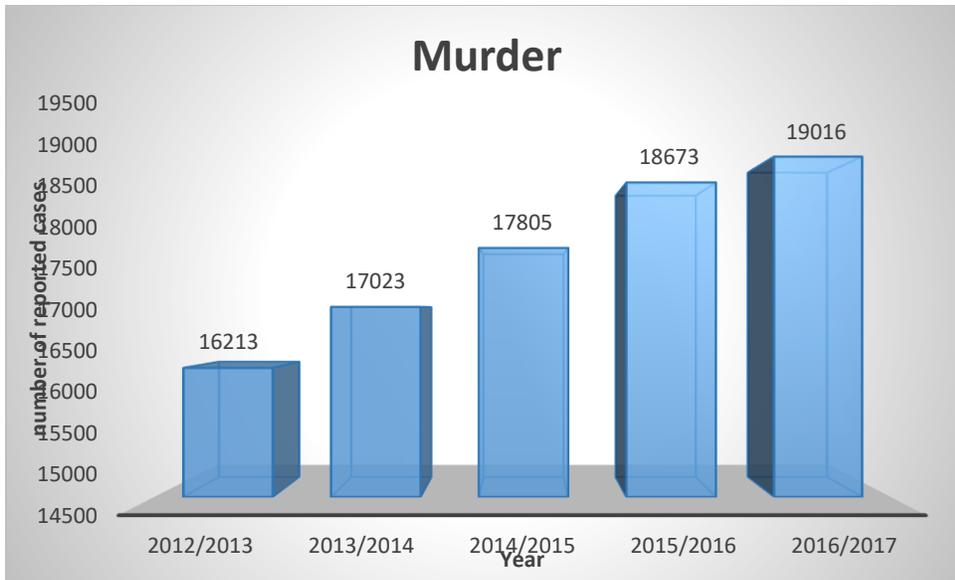


Figure 1: Number of reported cases of murder that have occurred over the past five years in South Africa. (Source: Statistics have been taken from the annual crime statistics of the SAPS 2016/2017).

While there seems to have been an increase in the number of reported cases of murder over the last five years, in South Africa, there has been a decrease in the number of reported cases of sexual offences over the past five years. Sexual offences include crimes such as rape, sexual assault, attempted sexual offences and contact sexual offences. According to figures two and three below, in 2012/2013 60 888 cases of sexual offences were reported, of which 48 408 cases were rape by 2016/2017, this number decrease to 49 660 cases of sexual offences, of which 39 828 cases were reported cases of rape.

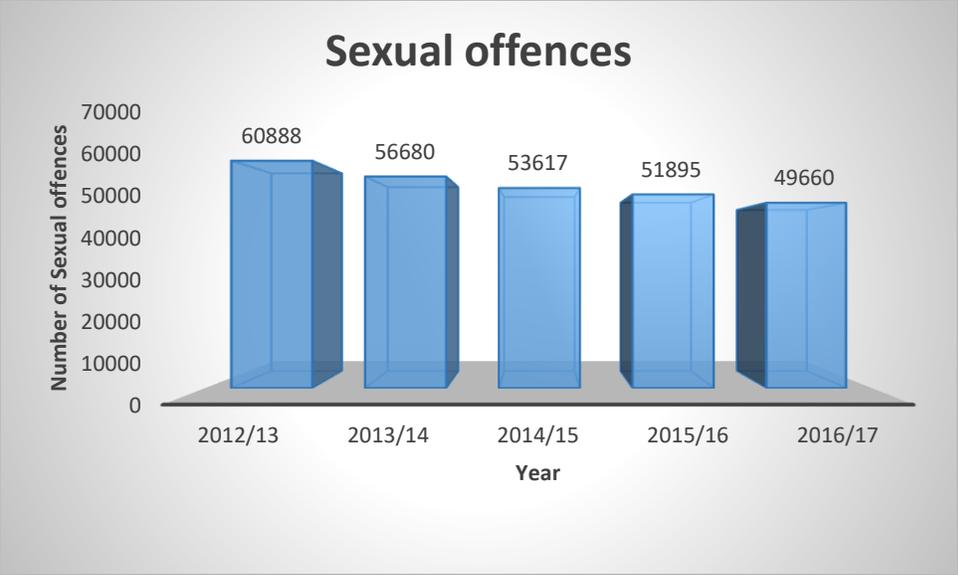


Figure 2: Number of reported cases of sexual offences that have occurred over the past five years in South Africa. (Source: Statistics have been taken from the annual crime statistics of the SAPS 2016/2017).

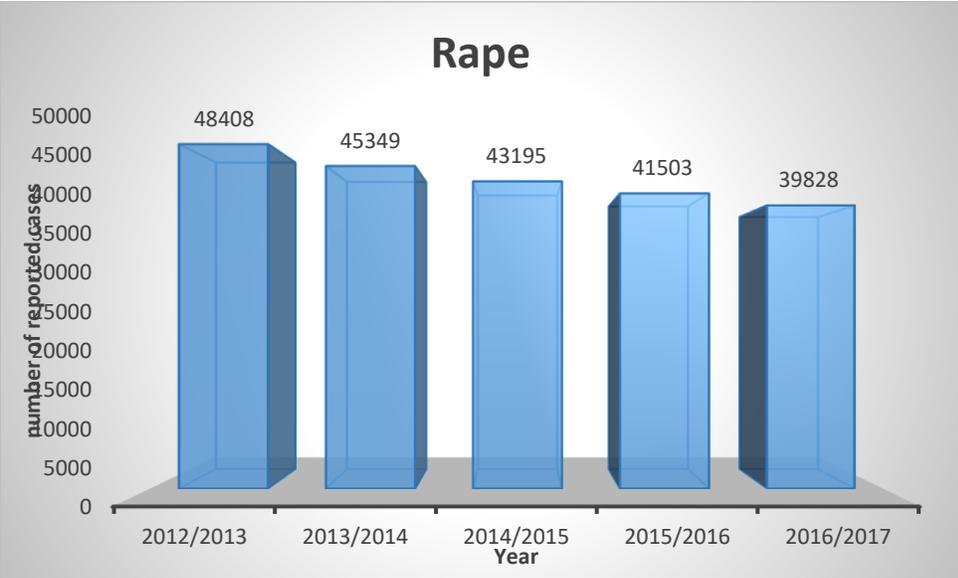


Figure 3: Number of reported cases of rape that have occurred over the past five years in South Africa. (Source: Statistics have been taken from the annual crime statistics of the SAPS 2016/2017).

There are various possible reasons for the decline of the statistics of the number of cases that have been reported to the SAPS. The statistics that have been discussed above, have been extracted from the 2016/2017 SAPS crime statistics that are available from the official SAPS website, therefore it is reiterated that the figures below only contain the number of cases that have been reported to the SAPS. Many incidents of crime still go unreported for various reasons. The stigma attached to the reporting of sexual crime, such as rape, is greater, especially for women, than the reporting of the occurrence of other types of crime.

The occurrence of sexual offences is very common, in some instances, many women have not been properly educated or still believe in the old fashioned way of thinking that men are superior and hence women inferior, therefore men are allowed to pass sexual remarks or demand sexual favors from women and women must oblige. This is a possible reason for women not reporting cases of sexual offences timeously to the SAPS. Many men and women do not report sexual offences as they felt it was their duty to perform the forced sexual acts or they are embarrassed to report the crime that has occurred for reason such as fear of secondary victimisation by the police or the perpetrator being known to the victim. This may create additional tension between the perpetrator and the victim at a later stage. Many police stations are not properly equipped and therefore, sometimes turn away victims of rape without even recording the incident that has occurred.

The victims of crime survey focuses on people's perceptions and experiences of crime as well as their views regarding the criminal justice system. The victims of crime survey does not replace police statistics, it merely adds to the information that has been retrieved from the SAPS annual crime statistics. It also provides information about contemporary crime trends in South Africa. According to Mc Cafferty (2003), there are many factors that affect why people do not report crime, these include hostility towards the police, they are unable to get to a police station for various reasons such as not having transport available and the police station is too far away, police are unhelpful and the police or community members further victimize victims of crime.

In many instances, crimes are not properly recorded when that are reported to the police, for example, maybe because there is no proper system to keep record of crimes that have been committed and poor turnaround time (Mc Cafferty, 2003). However, according to victims of crime survey (2016/17), most households reported that the SAPS had responded to them within 30

minutes of being contacted. Most people know where in their community the courts are and situated and have access to them. Most communities welcome former prison inmates back into their communities and assist them in finding employment to assist them with their rehabilitation, reintegration into society and with improving their lives (Victims of crime survey, 2016/17). New measures are currently being put in place to attempt to improve the relationship between the population and the police so that people find it easier to report crime to the SAPS (Mc Cafferty, 2003).

### **5.3. Thematic Analysis and Discussion of the Findings from the Secondary Data**

A large number of traditional forensic investigation methods have come under scrutiny in recent years due to the constant development of technology and improvement of scientific methods. In America, many scandals have been uncovered in forensic laboratories. These included stories of carelessness, bias, incompetence and excessive coziness of forensic laboratory staff with prosecutors among other embarrassing revelations that have raised major doubts regarding the accuracy and trustworthiness of reported findings from forensic laboratories. In February 2009, a recommendation was made by the National Academy of Sciences to create an independent regulatory body to oversee the work of forensic laboratories. It has been suggested that a research culture should be developed and inculcated in forensic laboratories around the world, where laboratory technicians focus more on scientific research rather than the legal aspect of the investigative process when conducting tests and analysis of samples of evidence (Mnookin et al, 2011).

It has been suggested that if a culture of research is inculcated into forensic laboratories, so that there will be less risk of error as there will be more research being conducted and better methods of research and testing being constantly being developed that will improve existing methods of testing and analysis of evidence. More research will result in more knowledge being uncovered about relevant investigations. A major obstacle in the field of forensic science is a lack of funding. It is strongly believed that forensic science will greatly benefit from a cohort of people that can serve both as academic researchers as well as field practitioners (Mnookin et al, 2011).

There seems to be a major shortage of forensic laboratories in South Africa, as well as internationally (Anonymous, 2016a; Omar, 2008a; Weber, 2016). America has forensic laboratories, also known as crime labs, in 47 states and smaller crime labs as well that assist each other, especially when there are major backlogs in cases that need to be attended to. South Africa has a main forensic laboratory in Pretoria, and smaller decentralized forensic laboratories in Cape Town, Durban and Port Elizabeth. The forensic laboratories in Pretoria and Cape Town consist of all investigative units while the forensic laboratory in the Port Elizabeth consists of a Ballistics and chemistry unit and the forensic laboratory in Durban only consists of a ballistics unit (SAPS, 2016). Two major laboratories for a country that has a very high crime rate and consists of nine provinces is clearly insufficient to uphold what is written in the Constitution of South Africa which, when summarised, states that every accused is entitled to a speedy trial when taking into consideration the number of cases of crime that are reported to the SAPS, and the backlog that police officers and forensic laboratory officials are currently challenged with, bearing in mind that there is still a large number of cases that go unreported for various reasons, as discussed earlier.

In this research, there were various findings that have surfaced. There are many social, political, and economic factors that could possibly limit the policing ability of the South African Police Service (SAPS) and its relative services such as forensic laboratories. As with other police services, the SAPS is also faced with economic as well as historical constraints. The SAPS suffer from a lack of resources in terms of skills, money and equipment. A lack of resources will also have a negative impact on the standard of basic training for officials which would in turn make it difficult to carry out effective investigations especially those that are time consuming and resource intensive. An investigative problem in South Africa is that there is a large volume of serious crimes which means that less time as well as fewer resources can be devoted to each investigation of crime (Hodgskiss, 2004).

Currently, there is a major backlog of evidence that needs to be analysed by forensic laboratories in South Africa, this backlog is slowing down procedures that usually take place in the criminal justice system, such as court proceedings and the sentencing of an offender. When a crime is committed, the crime scene is documented by means of photography, sketching and the taking of notes by the investigating officer, thereafter, evidence from the crime scene is collected, packaged, labelled and transported to a forensic laboratory for testing and analysis in order to obtain

information about the perpetrator of the crime as well as the events that occurred before, during and after the crime. Witness statements are also gathered. Once results have been obtained, the findings are then presented in a court where a judgement is passed as to whether an accused is guilty or innocent and sentencing is then handed down to the perpetrator of the crime. All these tasks assist the investigator in reconstructing the crime scene as well as arresting a possible perpetrator of the crime (Omar, 2008a).

Evidence from all over the country is sent to the main forensic laboratory that is situated in Pretoria, if possible, cases are distributed to other forensic laboratories that may have the relevant facilities that are required to perform tests on evidence that has been recovered from crime scenes. It would make more sense, as well as reduce costs if there were more forensic laboratories around South Africa. This would mean that evidence would be sent to the closest or least busy laboratory. Tests will be performed sooner and results obtained quicker resulting in the backlog that forensic laboratories are currently faced with being reduced drastically. Forensic laboratories will also be able to assist each other when cases of evidence that still needs to be tested starts building up. All forensic laboratories will also then be able to keep each other motivated to work hard and on staff on their toes to compete to always be the best performing forensic laboratory in the region or in the country.

According to Nair (2015), every accused is entitled to a speedy trial, however, this does not seem to be the case. At present, many weeks, months and even years have passed and cases have still not yet been solved. Hundreds of thousands of cases are being struck off the roll for various reasons such as insufficient evidence or unavailability of witnesses. There are many prisoners awaiting trial for crimes that they have not committed and there are also many criminals freely roaming the streets waiting for an opportunity to reoffend, with the preconception that they will not get caught. If crimes are solved at a quicker rate and cases closed sooner, it will serve as a deterrent to possible future offenders. In some cases, once a perpetrator of a crime has finally been convicted and sentenced, the period of the sentence is shorter than the time the suspect has spent awaiting his or her trial (Nair, 2015; Omar, 2008a; Stephens, 2007; Tibetts, 2012; Nesw24, 2016).

Crime scenes need to be attended to and secured as soon as possible after a crime has been committed. This reduces the chances of contamination of evidence at a crime scene as described by Locard's Principle of Exchange, which states that "every contact leaves a trace" (forensic

medicine, 2016). If there are too many people that come into contact with a crime scene, there is a high possibility that valuable evidence could be lost or leave the crime scene as well as unnecessary residue left behind at a crime scene. (Anonymous, 2002; Omar, 2008a)

While there is a backlog of cases that need to be investigated and tests need to be performed at forensic laboratories, there is also a shortage of forensic laboratories. Over and above that, there are also changes that need to be implemented in forensic laboratories in order to run the institution smoothly and prevent errors such as bias and wrongful convictions from becoming a regular occurrence in forensic laboratories. A wrongful conviction can have a negative impact on all parties involved and the consequences may be severe.

Each forensic laboratory is responsible for the results produced from the evidence that it has received. In some instances, there is room for error, both honestly and deliberately. This is a major cause for concern as inaccurate results could result in an innocent person being convicted of a crime that he or she has not committed and a perpetrator walking free. This has numerous consequences on both parties' lives as well as the lives of the victim(s) and their families. Many workers in laboratories are frustrated with their jobs, therefore, at times, they seem to be careless when it comes to the handling and the testing and analysis of evidence in the forensic laboratory which results in contamination of evidence and results of tests getting mixed up or possibly even misplaced. A possible solution to this would be to offer incentives, from time to time, to staff at forensic laboratories, for example, for a reduction in the number of inaccuracies produced by that specific forensic laboratory or a specific department within the forensic laboratory. This will keep staff of forensic laboratories on their toes and instill a sense of competitiveness and dedication to their work (Koppl, 2005). Forensic laboratories should also regularly check up on each other, this would assist in reducing errors made by forensic scientists. However, this can only take place if more forensic laboratories or satellite forensic laboratories are established around the country.

In science and research, in order for test results to be valid and reliable, when retested, the results that are obtained using the same methods need to be the same as the previous result. In order for forensic laboratories to be able to check up on each other, more forensic laboratories need to be established, that are a reasonable distance from the other. The work of forensic scientists is, generally, accepted as is, without much debate and criticism from the investigating officer. This is usually taken for granted by workers and causes them to become too complacent in their work.

There have been many suggestions to reform the work of forensic laboratories, such as forensic laboratories being independent of law enforcement and improved methods of documentation of forensic work within laboratories. Usually, workers in a forensic laboratory are solely responsible for the evidence that is in their custody. Due to obstacles such as time constraint and limited amount of staff, results of tests are not reviewed by peers and due to a limited number of laboratories that are located far away from each other, results and findings cannot be reviewed by other laboratories before it is presented in court (Koppl, 2005).

There seems to be a major lack of administration in the field of forensic science. According to Koppl (2005), eight features have been identified that contribute to reducing the quality of work produced by forensic laboratories. These are monopoly, dependence, poor quality control, information sharing, no division of labor, lack of forensic counsel, lack of competition and public ownership. Although these obstacles do exist, there are suggested ways to overcome them, as with every problem.

Each forensic laboratory usually has a monopoly over the evidence which it analyses, this means that no other forensic laboratory will examine the same sample of evidence as another. This encourages the sloppy, bias and sometimes even fraudulent work from forensic laboratories as work that has been produced is not usually audited. There should be cases where evidence is unknowingly sent to more than one laboratory for testing and verification. However, this can only occur if there are more forensic laboratories and a structure is put in place to oversee the smooth running of forensic laboratories, just a law enforcement agencies are watched over by the IPID. The presence of more forensic laboratories would mean that work is completed faster and there is still time for results to be verified by other laboratories before it is sent back to the investigating officer for presentation in court. This will also assist in reducing the complacency of staff at forensic laboratories (Koppl, 2005).

Forensic laboratories are dependent on the budget of law enforcement agencies, this means that they have a limited say in tasks such as the purchasing of equipment or hiring of staff as they would need to adhere to a budget that is part of another institution. In some instances, being dependent on a specific party, especially for funding, makes workers feel obliged to produce evidence that is in the sponsors or donors favor. While forensic laboratories are a part of law enforcement, they should be allocated a specific portion of the entire budget when it comes to

funding, this will give the institution some sort of independence from other aspects of the agency, allowing bias to be eliminated, to an extent (Koppl, 2005).

Systems that control the quality of work that is produced in forensic laboratories, which are currently in place, seem to be very weak, resulting in a poor quality of work being produced. If there is poor quality control, the results of quality of work will also be poor. In some instances, the quality of evidence that has been received may also have been of a poor quality or standard. In this instance, the work of forensic laboratories should be reviewed regularly in order to eliminate the occurrence of inconclusive findings from evidence (Koppl, 2005).

Although information regarding criminal cases are confidential, workers do not discuss with or seek the advice of colleagues without sharing too much detail of the case, this would assist in ensuring that the correct procedures are carried out and reduce any room for possible error during the investigative process of testing and analysis of evidence. However, discussions of evidence between forensic laboratory workers and law enforcement workers could, to an extent, create an unconscious bias when producing reports after the analysis of evidence has taken place. Evidence cannot be right or wrong, however, sometimes it is the interpretation of evidence that may be contain errors. Sharing of information should be regulated at all times and restricted when necessary. A factor that may cause bias in forensic laboratories is that many workers in forensic laboratories have previously been law enforcement agents. Due to experience in the field, they would expect a specific result to be obtained and work towards achieving that result instead of merely conducting the relevant tests. If there is a suspicion that evidence may be bias, then evidence should be sent to other laboratories for additional testing, analysis and verification of the results of the tests that have been conducted. (Koppl, 2005; Mnookin et al, 2011).

A division of labor regarding evidence may reduce the chances of bias. If work is shared, staff are able to check on the work of their colleagues and provide room for improvement in the future. This will possibly reduce or even eliminate any room for false interpretation of results and bias when conducting the relevant tests that are required to be carried out. For example, if one official conducts tests, another should interpret the results and compile a report on the findings. Forensic laboratories usually just provide the results of evidence without much guidance, explanation or advice to the intended party. Technicians that conduct tests in forensic laboratories should work closely with the investigating officer of a case in order to ensure that the evidence has been

interpreted correctly and provide support and guidance in order to better understand the results that have been produced when tests were conducted on evidence. Sometimes, this may result in a misinterpretation of evidence, which in turn may result in a wrongful conviction. A spirit of competitiveness between both staff and other laboratories would assist in an increase in the accuracy of results that have been produced, as well as provide a better service to all stakeholders (Koppl, 2005).

Forensic laboratories are publically owned, usually by law enforcement agencies such as the SAPS in South Africa. However, at times, the work produced in forensic laboratories may be unreliable and need further testing by other facilities such as private laboratories. If laboratories are privatized or viewed as an independent body, there may be stricter sanctions imposed which would reduce the occurrences of bias, poor performance and unreliability of test results from evidence that has been tested (Koppl, 2005).

#### **5.4. The Roles of Forensic Laboratories in South Africa**

CSI: Crime Scene Investigation, is a popular television drama series that documents the investigation of crimes that have been committed. In reality, juries and audiences are expecting what they are seeing on the television series, which is quick results being obtained from a minimal amount of evidence that has been obtained, to be the case in reality as well. The show, CSI as well as others such as law and order, criminal minds, bones and the mentalist have a damaging effect on forensic laboratories in real life as what is seen on television shows is expected from forensic laboratories in reality and, unfortunately, this is impossible due to a variety of reasons (Stephens, 2007). The CSI Effect has been defined by Di Fonzo (2005), as “the perception of the near-infallibility of forensic science in response to the TV show.” What really happens in forensic laboratories is not realistically portrayed on TV shows such as CSI. In reality, for example, if the size of a sample of DNA is too small, relevant tests cannot be conducted and a lack of information cannot lead to the conclusion of a case. Most tests that need to be performed in a forensic laboratory require time to be completed, unlike what is seen on television (Di Fonzo, 2005).

Forensic laboratories have been greatly misrepresented by the entertainment industry. They are extremely glamorized and therefore, people have a preconceived expectation of forensic

laboratories. People expect maximum results with minimal input because this is what they have been led to believe goes on in forensic laboratories as they have been exposed to it in the media in that way. The reality is that these processes are completed by highly skilled and trained individuals and they also take time to be completed. Not all types of results can be obtained by the touch of a button as misconceived by the entertainment industry. Although this would relieve a lot of pressure and produce results faster, unfortunately it is not yet a reality. There is still much needed improvement and development that needs to take place in order for forensic laboratories to grow and develop in every aspect (Palmer, n/d).

On the other hand, poor turnaround time could also be a possible reason as to why people are reluctant to report crime to the police as they have no faith in the police, hence resulting in inaccurate statistics and dark figures (Mc Cafferty, 2003). A possible reason for the poor turnaround time could be a result of the police still being unsure of their identity, if one is unaware of their roles and functions that need to be performed, they will be unable to perform it especially with no guidance available from colleagues and superiors as they are faced with the same situation of uncertainty (Marks, et al, 2009).

In South Africa, the role of forensic laboratories is “to apply scientific methods, principles and techniques in order to assist with investigating and solving crime that has been committed” (Marais, 2014; Weber, 2016). Various relevant tests and processes are conducted on samples of evidence that has been obtained from crime scenes and sent to the forensic laboratory for testing and analysis. The objective of the investigative process is to search for truth, bring offenders to justice and protect innocent people against prosecution (Weber, 2016). The forensic science laboratories of SAPS consist of the ballistics unit, scientific analysis unit, questioned documents unit, biology unit, chemistry unit, and explosives unit. Each unit within the forensic laboratory serves its own unique function, as has been discussed in detail earlier, in chapter 2 of this study (Marais, 2014; Weber, 2016).

## **5.5. The Relevance of Forensic Laboratories in South Africa**

Forensic laboratories need to be clean, neat and hygienic in order to eliminate the possibility of contamination of evidence when it arrives at the laboratory. Here again, this needs to take place to avoid Locard's principle of exchange from occurring, in forensic laboratories, once evidence that needs to be tested and analysed has reached the forensic laboratory. From the moment evidence reaches the forensic laboratory, there needs to be a properly managed system put in place to effectively receive, manage and store evidence in order for proper testing and analysis to take place in the forensic laboratory.

There needs to be a record of every person that comes in contact with evidence in a laboratory for whatever the reason may be and the access to evidence needs to be controlled by methods such as biometric identification so that people who do not need to access evidence will not be able to do so. This will also prevent evidence from being misplaced or going missing from storage in the forensic laboratory. Evidence should also, always, be stored in an orderly manner, for example, in the order that it arrived at the laboratory, so that it can be tested and analysed in that order and results obtained at a quicker rate. If there is no system in place to properly store evidence, many cases would be ignored and therefore resulting in cases being struck off the roll in turn resulting in many injustices such as criminals walking free, innocent people being in in correctional centres for crimes that have not committed and continuous pain and suffering to both victims and their families. (Forensic medicine, 2016; Luke & Van Der Walt, 2011; Omar, 2008a).

The staff of the criminal justice system, more specifically forensic laboratories need to undergo proper training and assessment before being employed by the relevant departments as well as those who are currently employed within the criminal justice system need to regularly attend revision courses in order to refresh and update their knowledge. Most staff that are currently employed to perform tasks in forensic laboratories do not hold the relevant qualifications that are required in order to complete these processes of testing and analysis in forensic laboratories. Tertiary institutions should also work together with institutions such as forensic laboratories in order to gauge what is required by them to function effectively and restructure their academic education and training programs based around that as it would be more beneficial to all parties, academic institutions would be able to teach relevant skills that are required and forensic laboratories will gain and be able to employ people that hold the relevant proper qualifications that are required.

Forensic laboratories should also offer practical training to students who intend pursuing a career in the field in order for them to experience what they are getting themselves into before they actually do so in order to experience the reality and forget the misconceptions that they have been taught about forensic laboratories by sources such as the media in the form of crime investigation series. Staff that are currently employed in forensic laboratories need to continuously undergo training and development programs as technology, equipment and trends are constantly changing, therefore it is important to be up to date at all times, in order to provide the best possible service and always ensure the reliability and validity of test results and analysis (Omar, 2008a).

The relevance of forensic laboratories is, ideally, to conduct relevant tests and investigations as quickly as possible in order to speed up the process of an investigation within the criminal justice system. This will assist various role players in the investigative process to differentiate between what the truth really is and what it is not, present findings to authorities who will then present to the court, resulting in justice rapidly being served to offenders, protecting innocent citizens and most importantly the quick and reliable work of forensic laboratories should serve as a deterrent to possible future offenders and reoffenders.

## **5.6. The Effect of the Presence of More Forensic Laboratories on Service Delivery**

There is a need to consider establishing more forensic laboratories, preferably, in major cities around South Africa as this would assist to ease the current backlog of cases that still need to be investigated in forensic laboratories. However, this is a large task and therefore, will require a lot of time to implement. Establishing more forensic laboratories should be viewed as a long term strategy of the South African government and the SAPS. If it is not feasible to establish complete laboratories, the option of smaller, decentralized laboratories such as the ballistics unit in Durban should be established around the country. This would assist by cases being referred to the nearest forensic laboratory, this move will also cut out transportation time and costs and result in tests being conducted sooner, results being obtained faster as well as justice being served at a quicker rate which could possibly deter possible future occurrences of similar or more serious crimes from occurring. Cases that need to be investigated would be referred to the closest forensic laboratory

and in the event of backlogs, forensic laboratories should be able to assist each other in concluding cases that need to be analysed. Forensic laboratories would also be able to check up on each other to eliminate bias and reduce the rate of inaccurate results obtained. It would also assist with keeping each other on their toes hence producing results at a quicker rate. Random retesting and verification of test results would also become a reality and no longer just a suggestion to improve the current state service of forensic laboratories (Koppl, 2005).

While this process of establishing more forensic laboratories around the county takes place, a medium term strategy to be considered, should be using smaller or private laboratories to assist the major laboratories with conducting tests or investigating urgent cases. Staff should also be sent on training courses regularly so that they are up to date with their knowledge on new technology and processes. Regular training sessions will also assist staff in performing tasks at a better rate and of an overall higher standard and better quality.

An immediate or short term intervention is also urgently needed to assist forensic laboratories. A better recording, storage and access system is needed in order for tests to be performed and results delivered timeously. At the moment, there is a system in place, however, it is not being properly implemented. Evidence is being stored wherever there is space available instead of in a systematic manner. This results in staff being unable to locate evidence to work with in a systematic manner as well as the quality of evidence being deteriorated before it is even tested. If it is not feasible to employ staff to reorganise and implement a proper storage and maintenance system, the government should consider the use of volunteer's or interns to manage this system, who may possibly be employed by the government at a later stage. The testing processes are generally quick, however, it is the backlog of evidence and inadequate storage of samples that has created and contributed towards creating such a major backlog in the forensic laboratories and in turn the entire investigative process and the criminal justice system.

## **5.7. The Effect of the Presence of More Forensic Laboratories on the Investigative Process**

Establishing more forensic laboratories around the country would also result in the creation of jobs as well as in this way indirectly reduce the crime rate as many people commit crime due to their status of being unemployed. Professionals that are currently employed would also now experience greater job satisfaction and less stress and fatigue as their workload would be reduced allowing them to perform their jobs better. Cases would also be concluded faster resulting in the possible deterrence of the recurrence of a particular crime due to the fact that possible offenders will be discouraged to offend as they will notice that justice is being meted out to offenders sooner than they realized.

The investigative process is generally quick, should processes be completed according to protocol. Testing at forensic laboratories do not require extremely large amounts of time to be completed, it is the major backlog that has been caused due to various factors, such as forensic laboratories not employing properly trained staff and not having a proper storage and retrieval system in place that seems to be slowing down the investigative processes, especially in South Africa.

The Investigative Psychology Unit (IPU) of the SAPS, as the name suggests, specializes in investigating crimes that have been psychologically motivated. The high rate of violent crimes are a serious concern. When a pattern in the occurrence of a crime begins to emerge, the IPU is tasked to investigate. According to Labuschagne (2008a) in Omar (2008b), the IPU specializes in investigating crimes such as “serial murder, serial rape, muti murders, pedophilia, intimate partner murders, child abductions and kidnapping, mass murder, spree murder, equivocal death scenarios (that is, helping to determine if a death is a result of an accident, murder or suicide) and extortion cases” (Labuschagne 2008a in Omar 2008b).

The IPU was established in 1996 as a division of the Serious and Violent Crimes Unit. It was later moved to the detective service and eventually was situated in the Criminal Record and Forensic Science Service (CRFSS). This unit of the SAPS is now headed by Professor Gerard Labuschagne and consists of three member’s at national level. The IPU usually assists in terms of the analysis of crime scenes, interviewing of suspects and witnesses, presenting evidence in court, developing

offender profiles, performing risk assessments, providing investigative guidance and compiling pre-sentence reports (Omar, 2008b).

The IPU receives information about cases either independently or via the provincial coordinators within the SAPS. The IPU is also responsible for providing training and refresher courses to members of the SAPS. Further to that, the IPU continuously conducts research in order to always be up to date on knowledge pertaining to the understanding of psychologically motivated crime and crime trends, improve training courses currently in place and to assist the unit in future investigations. The IPU regularly conducts research both locally and internationally and is affiliated with various institutions all over the world (Omar, 2008b).

The work of the IPU greatly assists in the investigation of crime in South Africa, particularly, those of a serious and violent nature or where it is suspected that the perpetrator may be psychologically ill. However, the work of the IPU seems to be geographically limited, the expansion of this unit throughout the country needs to be considered as it may possibly serve as a deterrent to future offenders, as described by the deterrence theory in chapter two, whereby if crimes are investigated at a quicker rate and sentencing handed down sooner, it may serve as a deterrent to crime. The IPU and forensic laboratories working together can be mutually beneficial in the solving and fighting of crime in South Africa as well as on the rate of service delivery and the investigative process.

## **5.8. The Effect of the Presence of More Forensic Laboratories on the Population of Correctional Centres**

Correctional facilities all over the world are violent, therefore inmates face a risk of being assaulted, coerced, raped or even killed by other inmates or officials. Officials are also threatened and fear being harmed by inmates as correctional centers are overcrowded and understaffed (Gear, 2001). South African correctional centers are constantly face problems regarding overcrowding, affordability, service delivery, management and governance. The population of correctional centers is continuously growing. Many prisoner contract diseases, such as TB or HIV/ AIDS and STD's. Inmates die of natural causes, such as old age and unnatural causes, such as being beaten to death or stabbed in prison. Overcrowding is a factor that negatively affects the amount of violence among the population of the correctional centers. Overcrowding in correctional centers

has a detrimental effect because it causes prisoners to inflict self-injury, because of heightened stress levels, aggressive behavior, increased drug use, inter-prisoner violence, easy spread of disease and infection. Communal cells are blind spots for violence and drug dealing in correctional centers (Muntingh, 2009).

When correctional facilities are overcrowded, offenders are usually placed in whichever section of the facility has space or a bed is available or one can be added. A facility is regarded as overcrowded when it exceeds the number of inmates that it can house due to the design of the facility or opinion of an expert. Even if new facilities are established, they usually fill up quickly. Overcrowding of correctional centers affects every aspect of institutional life for offenders, it reduces space for other activities such as education because space is now being used to house inmates instead of to conduct other activities such as educational lessons. Overcrowding also results in the rapid spread of germs and contraction of diseases more easily (Stinchcomb, 2011).

An example of this occurrence of violence and spread of disease has occurred and been reported to the media where, a juvenile inmate was repeatedly gang raped for four hours by 10 prisoners at St Albans Prison in Port Elizabeth, while his screams for help went unheard by the authorities. The teenager who was a first-time offender, was serving a two-year sentence when he was attacked and sexually assaulted in the juvenile section of the prison. This section consists of prisoners between the ages of 15 to 20 sharing 5 cells. Offenders are transferred to the adult section when they turn 21. The victim claims to have screamed loudly for help during the attack but his plea was unheard by the officials at the correctional facility (Adkins, 2004).

According to a former attorney, David Price, many short-term inmates, especially juveniles, are sent to correctional facilities for the purpose of rehabilitation, however due to their exposure to and experiences of violence in correctional centers, they return to society as hardened criminals and in most cases commit worse crimes than the ones they were initially sentenced for instead of returning to society as rehabilitated members that will positively contribute to the improvement of society. There are many instances in South Africa where juveniles share cells with adult inmates; this is due to the overcrowding of correctional centers in South Africa (Adkins, 2004).

Correctional facilities are an important and necessary component of the criminal justice system. These facilities will not lower the crime rate but rather serve as a method of rehabilitation to offender and as a deterrent to other possible offenders. However, sadly, in South Africa, a person

may commit a crime just to go to prison as the living conditions are seemingly better in a correctional center than outside one, because, in a correctional center, they have a place to sleep, will get an education and have three meals a day as well as possibly earn an income in some instances and be equipped with trade skills that will assist them when they are released from the correctional center. In some instances inmates may choose to commit further crime and remain in correctional centers as they see a business opportunity such as trading drugs for inmates (Stinchcomb, 2011).

A possible suggestion to reduce the population of correctional facilities would be to assess offenders and place them accordingly, in separate facilities, e.g. mentally ill patients should be placed in a separate facility, juvenile offenders should be placed separately from adult offenders, not so serious crime offenders should be subjected to alternate forms of rehabilitation such as community service and women prison settings should facilitate interaction with children (Stinchcomb, 2011).

When a person is imprisoned, they learn and develop a new culture and way of life (Kunene, 2002). Elimination of conflict and confinement or institutionalization of humans has failed to improve the condition of humans. Punishment is associated with suffering. There seems to be a preference for community based models if not, it could result in more pain rather than rehabilitation which is ideally the desired outcome once an offender has been incarcerated (Peacock, 2008). Once a person is exposed to a new environment, they begin to adapt and adhere to a new lifestyle, if, for example, an offender is placed in a safe and secure environment as opposed to a violent environment, they will adapt accordingly.

Within South African prisons, there is a phenomenon known as prison gangs. The most popular being the numbers gang namely the 26's, 27's and 28's. The 26's and 28's don't see eye to eye. The 28's are the most violent and the 27's are usually used as a medium of communication between the 26's and 28's. Gang members are sometimes marked with tattoos that symbolize different "accomplishments." Gang members also have their own language to communicate in. This prevents the prison officials from knowing what the prisoners are usually planning (Steinberg, 2004).

The population of correctional centres would also drastically decrease as awaiting trial detainees would be released sooner if they are found not guilty, hence there will be more space in prisons and less wastage of valuable resources of the South African government, the SAPS and Department of

Correctional Services and possibly a reduction in the number of gangs in prisons. It would also create more space in correctional facilities, hence reducing incidents of sexual assaults in these facilities. Major reasons for sexual assault within correctional centres include awaiting trial offenders sharing cells with long term offenders as well as housing juvenile offenders with adult offenders due to a shortage of space. Another disadvantage of housing offenders in this manner is that short term detainees and children, also known as juveniles, are negatively influenced by hardened criminals which causes recidivism when they are released. (Naguran, 2011). As the population of correctional centres are reduced, it will be easier for officials to reclassify and rehabilitate offenders so that they can, hopefully, go back to leading better lives sooner than expected as well as be reintegrated into society as better citizens when they are eventually released from the correctional centres.

## **5.9. Conclusion**

This chapter has provided a discussion on the findings of the research in the form of a thematic analysis. There were many themes that have surfaced and discussions into each theme were provided. Themes that were prevalent in this research included limited facilities in forensic laboratories, a lack of skills and training of officials that work in forensic laboratories and the relevance of forensic laboratories to the criminal justice system of South Africa. The role as well as the relevance of forensic laboratories in South Africa were discussed. The forensic laboratories of South Africa play a major role in assisting the police in concluding the investigation of cases of crime.

Answers to the research questions posed in chapter 1 of this study on the relevance of forensic laboratories in assisting with fighting and solving crime in South Africa were answered. It was inferred that the presence or establishment of more forensic laboratories around South Africa would be extremely beneficial to all stakeholder that are involved in the investigation of crime and the criminal justice system. The investigative process would be concluded faster, more jobs would be created resulting in reduced unemployment rates, greater job satisfaction and possibly a reduction in the rate of crime. The population of offender awaiting trial in correctional facilities would also be drastically reduced, resulting in justice being served accordingly.

## **Chapter 6**

### **6. A Conclusion of the Research**

#### **6.1. Introduction**

Although crime scenes vary from case to case, careful and thorough planning and execution is required even before the onset of an investigation. Being properly equipped and well prepared for an unexpected situation plays an important role in the conclusion and resolution of a case. Valuable physical evidence will be properly collected, labelled and transported accordingly without wasting time and additional resources that could result in the loss of information that is vital to the conclusion of a crime and sentencing of an offender to an appropriate treatment and rehabilitation facility or release of an innocent awaiting trial inmate.

This chapter provides a conclusion to the research as well as makes recommendations for possible future studies on the topic. This chapter provides an overall discussion on the topic of the relevance of forensic laboratories in assisting with fighting and solving crime in South Africa. An overview of the objectives of the research are discussed and the research questions of this research are also answered in this chapter. Recommendations are proposed for future considerations on the current research topic, for practitioners within this field of study and further research on this topic.

#### **6.2. Objectives Relative to the Research**

The aim of this research was to highlight the importance of forensic laboratories in assisting with fighting and solving crime in South Africa as well as aiming to predict the possible effect of the presence of more forensic laboratories in South Africa. The pros seem to have outweighed the cons. It has been discovered that forensic laboratories play a major role in assisting with the investigation of crime, however, in many instances, the state of forensic laboratories hinder its own policies and procedures as there is no proper system to keep records in place. This results in evidence being strewn all over the laboratory rather than being stored and worked with in an

orderly manner. If a system was properly implemented, working through evidence and samples at the forensic laboratories would be a lot easier and quicker.

Forensic laboratories in South Africa have some of the best and most advanced technologies in place, such as the Automated Fingerprint Identification System (AFIS) however, staff are not adequately trained to use this technology, while relevant departments do not provide training or staff are afraid to use new methods and rather stick to older and trusted methods of work. In some instances, the turnaround time for cases being investigated in South Africa seems faster than other countries. Forensic laboratories in South Africa, therefore, meet, if not, exceed international standards of forensic laboratories.

The establishment and presence of more forensic laboratories, satellite laboratories or contracting cases to private laboratories would assist in rapidly speeding up the conclusion of the investigation of cases of crime as there will be more people working at the same time. Jobs will be created resulting in greater job satisfaction, creation of job, decrease in unemployment and possibly a reduction in the rate of crime that is being committed. The population of correctional centers will also decrease rapidly as justice will be meted out faster resulting in the number of awaiting trial offenders being decreased and innocent people being freed. This will also assist in conducting a reassessment of the population of offenders currently being housed in correctional facilities, which will also make it easier to rehabilitate inmates and reintegrate them into society when their sentences have been concluded or they have been granted parole.

### **6.3. Conclusions Drawn From the Secondary Data**

From this research, it can be concluded that, universally, forensic laboratories are understaffed and under resourced. There is a major backlog of cases that need to be attended to. South Africa is, therefore, not the only country that is experiencing the problem of backlogs at forensic laboratories, it is experienced by first world countries as well. There are shortcomings to various types of forensic investigations because staff do not hold the relevant qualifications or have not been properly trained (Pyrek, 2007).

The Criminal Justice System comprises of the police, crime control, courts and corrections. The South Africa's Criminal Justice System is currently in a state of crisis. Cases are backlogged, the awaiting trial population is extremely high, and correctional facilities are unnecessarily overcrowded. All these factors place an enormous amount of strain on the South African government and the criminal justice system (Kotze. n/d).

DNA testing and analysis seems to be overtaking the use of forensic science methods of analysing evidence obtained from crime scenes. This could be an indication that methods are constantly changing and developing (McEwen, 1995). Many States in America have established DNA data banks. A DNA data bank consists of DNA samples from criminals that have been collected and will be analyzed and stored for a long period of time. The aim of the bank is to assist investigators in linking perpetrators to crimes where biological evidence is present. A program was implemented where banks in different states share information and leads that may lead to the rapid conclusion of cases (McEwen, 1995). DNA is a very reliable source of information because each person's DNA is unique and is therefore able to link a perpetrator to a crime or a crime scene (Di Fonzo, 2005), however, it has been argued that this method is an invasion of privacy (Gianelli, 2006).

The SAPS possesses a modern fingerprinting database as well as a world first automated DNA database and DNA processing system (Hodgskiss, 2004). The Criminal Record Centre documents the crime scene and collects physical evidence. In 2002, this unit established an Automated Fingerprint Identification System (AFIS) that is used to identify criminals (Omar, 2008a). A consideration should be that the AFIS should be able to gain access to the Department of Home Affairs database in order to have access to fingerprints be able to identify suspects. Fingerprints are taken when an individual applies for an identity document. This would assist in speeding up the process of identifying suspects based on fingerprints as a source of evidence.

As a suggestion to move forward, if the government is unable to establish more forensic laboratories, the private sector should be brought in to assist with the current backlog of cases in forensic laboratories (Minnaar, 2005). No matter what measures are used to move forward, changes need to be implemented gradually in order for them to be successful (Yesufu, 2013).

Forensic laboratories in South Africa have state of the art equipment and modern technology at its disposal. Some methods have also been exported and are being implemented internationally, yet

there are still major backlogs prevalent in forensic laboratories. This backlog is due to improper storage systems and methods rather than actual testing process that need to be administered.

Forensic laboratories have received a lot of media attention for having poor standards, mismanagement and errors. Due to the delays within forensic laboratories, currently, it takes months and sometimes even years to obtain DNA results (Stephens, 2007). Many forensic laboratories have employed staff that are not properly trained, and facilities cannot afford to train them, which results in a poor work ethic, which in turn causes staff to not be interested in properly completing their work. This is a serious cause for concern as it may decrease the validity of results obtained from tests that have been conducted, for example, staff may mix up or contaminate evidence, merely because they have a lack of interest in their work (Di Fonzo, 2005).

There are some cases where forensic scientists can make errors which lead to wrongful arrests, convictions or even death, in countries where the death penalty still exists. Some forensic laboratories failures include, misidentification, incompetence, sloppy procedures, forged fingerprints, fake autopsies, false laboratory reports, perjured testimonies and even fraud. A lot of fraudulent activity may go undetected for many years (Gianelli, 2007).

Many forensic laboratories do not have proper facilities and often suffer from frequent power surges, which result in freezers to not work properly, therefore samples for DNA testing cannot be properly stored and preserved. In some instances, buildings have poor infrastructure where the use of additional appliances cannot be used as the electrical load will to be handled resulting in additional power surges and water leaks often damage infrastructure and sometimes even samples. Forensic laboratories are also face with a lack of storage space resulting in there being no space to safely store crucial evidence such as guns and rifles.

#### **6.4. The Improvement of the State of Forensic Laboratories in South Africa**

Moving forward, South Africa seems to be taking a step in the right direction. In 2005, the Forensic Science Laboratory developed a forensic automation system for DNA evidence analysis. It is called the Genetic Sample Processing System (GSPS). This system seeks to improve the capacity

to process DNA related evidence. A sample is fed into the system; the robotic features direct the sample through a series of tests. There is no room for contamination of a sample or human error. A DNA profile is then presented and is compared to DNA profiles on an available database. The process is not yet functioning at its full capacity. The system first became operational in March 2007.

Since February 2008, stored cases are being run through this system. Due to reasons such as no court date or no arrest being made, the results are fed into a DNA database to be used in future cases. Some cases are still currently being processed manually. This seems to be a step in the right direction, the system is anticipated to eventually eliminate human error and decrease turnaround time of cases that are referred to the laboratory. Given the high crime in South Africa, an offender database would be ideal in assisting the SAPS, find matches sooner and prevent or reduce recidivism, however it is viewed as a violation of human rights and therefore not permissible (Omar, 2008a).

In 2007 a proposal was made that security guards could possibly be tasked with securing crime scenes, reporting suspect vehicles and listening in to police crime alerts. This design was imported from the UK as a plan to fight terrorism this pilot project is being implemented and tested in Johannesburg and Cape Town (Marks, et al, 2009). If security guards are able to secure crime scene and collect and document evidence, it would be of great assistance as security guards are usually based at a crime scene, they would be able to collect evidence before it is destroyed or loses its integrity.

The DNA project is a non- profit organization that aims to create awareness on the importance of DNA evidence present at a crime scene. The dedicated team at this organization were successful in convincing the South African Government to make changes to a law that governs DNA evidence, the Criminal Law (Forensic Procedures) Amendment Bill, also known as the DNA Act was passes in January 2014, and 10 years after negotiations and pleas began.

This act makes it compulsory for DNA samples to be collected from all accused arrested and convicted for schedule 8 offences, e.g. treason, culpable homicide, murder, rape, trafficking, robbery, theft, kidnapping, arson and public violence. The samples are then added to the National DNA Database. This also assists in preventing recidivism of offenders. This project may take some

time to be implemented nationwide, however, police have already begun receiving training on how to collect DNA samples from offenders and so on. It is important for all processes to be properly put in place in order for this initiative to run smoothly. A similar system has been implemented, in America, and seems to be working quite efficiently (Bell, 2014).

A reporter from the Cape Argus newspaper was afforded the privilege of touring the newly opened SAPS Forensic Science Laboratory situated in Platteklouf, Cape Town. According to Witten (2016), this laboratory is one of the most advanced police forensic laboratories in the country. During his visit, he was shown around by Brigadier Deon Meintjes, who runs the facility. Meintjes explained that the lab has been designed with safety and security in mind. There is a rail cart system in operation that transports evidence, in locked biometrically accessible safe-boxes, from one part of the laboratory to another. This is to eliminate theft, the contamination and the tampering of evidence in forensic laboratories (Witten, 2016).

This state of the art facility that is located in Platteklouf was commissioned in November 2011 and officially opened in July 2012. This laboratory has employed SAPS officials who are regularly trained, tested, retrained and retested. Meintjes joked to Witten about the reality of the CSI effect. He further explained that he acknowledges that journalists regularly blame forensics for delays in case proceedings. It was also explained that processes take time to be completed. Forensic laboratories are faced with targets that need to be achieved without rushing their work, while continuously receiving more evidence that needs to be analyzed. Work in the laboratory is broken down into three categories, simple processing, which is routine work; non-routine work, which requires some research and intelligence work, which is not always guaranteed to go to court, but still needs to be completed (Witten, 2016).

This new facility is said to be handling approximately two-thirds of DNA sampling. Meintjes also enlightened Witten on some time frames of processes that take place within the laboratory, these include ballistics takes approximately a week to process a single cartridge of evidence. The average turnaround for ballistics is usually 13- 15 days, biology, including DNA testing, 29- 60 days, chemistry is 30- 50 days, document analysis, including forgery and handwriting analysis is 7 days and image analysis is approximately 20 days (Witten, 2016).

## **6.5. Recommendations**

This research has contributed to identifying processes that take place and the procedures that are followed from the time that evidence has been collected and documented at a crime scene. It describes how forensic laboratories in South Africa, as well as internationally, operate as well as the challenges that are faced by this institution that plays a very important role in the investigation of crime and the criminal justice system. Forensic laboratories not only assist with the investigation of crime, but also indirectly contribute towards the reduction and prevention of crime and improvement of methods that are currently being used to investigate crime.

Throughout the course of this research, several features were identified that could be addressed by further research and implementation by various sectors pertaining to the research. Further research can also be conducted when suggestions that have been made, have been implemented. This will assist forensic laboratories with continuously assessing, developing and improving policies and procedures that are in place which in turn will grow and develop forensic laboratories and the criminal justice system. The sections that recommendations are made for include recommendations for improving the research, recommendations for practitioners within the field of criminology and forensic sciences as well as the criminal justice system and recommendations for further research on the topic.

### **6.5.1. Recommendations for Future Consideration**

The following recommendations are offered for improving this study:

1. Due to time constraints, a desktop research method was applied. This study could be improved by performing field research on the topic as opposed to desktop research as available information is limited. If field research is conducted, the researcher will be able to observe, first hand, the occurrences in a forensic laboratory in South Africa. More information would be gathered as various methods of data collection can be applied, these include, but are not limited to observations, interviews, questionnaires and focus groups. More information would be gathered, and from a number of various sources, hence, increasing the reliability of information, as opposed to what has been gathered from

existing secondary sources. Information gathered first hand will also be most recent and well- developed.

2. Due to the nature of the study, a desktop study, some available information may have been obtained from older sources, newer sources, when available, may offer updated information. Older sources of data holds high value and importance to the research community as it sets a starting point for observation and development of ideas and information, while this is important, research aims to reveal the most recent findings, therefore older sources can be referred to, however, should be substantiated by newer most recent sources of information to increase the reliability and validity of data as well as to triangulate sources of data.

### **6.5.2. Recommendations for Practitioners**

The following recommendations are offered for practitioners in the field of forensic science:

1. It is recommended that practitioners within the field of forensic science, publish updated information regularly in order for academic scholars to have access to updated information. Scholars are continuously in search of concurrent information, regularly updating and publishing information will greatly assist scholars, academics as well as the public to be up to date with occurrences and developments within a field of interest.
2. Practitioners should offer scholars and academics the opportunity to observe the processes that take place at a crime scene, in forensic laboratories as well as in court. This will allow scholars and academics to have a more realistic and better understanding of what the intended field of study entails. Many scholars have unrealistic expectations when choosing a possible career path and are later faced by a rude awakening which leads to many problems such as low job satisfaction. Having practical experience will also assist scholars when it comes to job hunting.
3. It is recommended that a criminologist be allocated to every police station in order to assist the police in the developing strategies that will prevent crime in the community as well as assist in conducting investigations of crime. A criminologist has a theoretical background

to what the police do. Being able to plan ahead and put measures in place will greatly assist in preventing crime. There are many scholars who hold the relevant qualifications, however, cannot find appropriate jobs within their field of study.

### **6.5.3. Recommendations for Research**

The following recommendations are offered for future research

1. It is recommended that systems currently in place such as AFIS and the DNA databank be studied in detail in order to gain a better understanding of the systems in place. An increase in knowledge will lead to an increase in job satisfaction and people who are properly trained in a field can provide training to others which will create jobs and assist with decreasing the crime rate.
2. Other components of the criminal justice system could also be studied, which would assist in identifying other reasons for backlogs in the processes of the criminal justice system. Components of the criminal justice system, such as the courts or correctional centres could be studied in greater detail, in addition to forensic laboratories. There could possibly be a backlog in other components of the criminal justice that pose as an obstacles in the investigation of crime.

### **6.6. Conclusion**

The forensic division of the SAPS plays a major role in the solving of crime in South Africa. Its development is influenced by a number of factors such as international standards and practices. Service delivery is dependent on the capacity and availability of trained crime scene technicians and staff. Career development and retention of staff also play a role in improving the overall effectiveness of forensic laboratories (Green paper on policing, 2013).

Based on this research, it can be concluded that the investigative process within forensic laboratories in South Africa is hindered due to factors such as staff not being properly trained as well as samples of evidence not being properly stored. In some instances forensic laboratories in

South Africa have exceeded that of those internationally. The establishment of more forensic laboratories in South Africa would be welcomed as this will have many positive aspects on various sectors of the economy and the criminal justice system.

It has been established, from this research that forensic laboratories in South Africa play a major role in assisting with fighting and solving crime in various ways. There are methods and equipment in place to assist this process. This study began with an introduction to the topic as well as definitions used throughout the research in chapter one. Chapter two provided a review of the literature on the topic while chapter three presented a theoretical framework to the research. Chapter four was a discussion of the methodology of the research and chapter five provided a discussion of the findings of the research in the form of a thematic analysis. Chapter six has provided a conclusion of the research as well as made recommendations for consideration for future research on this topic.

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