

**EVALUATING DEOXYRIBONUCLEIC ACID EVIDENCE TO LINK SUSPECTS WITH
RAPE CRIME SCENES IN PRETORIA**

By

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DECLARATION

I, Joyce Nkaatha Maffa, student number 44968558, hereby declare that this dissertation **“EVALUATING DEOXYRIBONUCLEIC ACID TO LINK SUSPECTS WITH RAPE CRIME SCENES IN PRETORIA”** is my own work and that all the sources I have used or quoted have been indicated and acknowledged by means of complete references.

I further declare that I have not previously submitted this work at University of South Africa (UNISA) for another qualification.



Joyce Nkaatha Maffa

Signature

November 2, 2020

Date

ABSTRACT

This dissertation reflects the evaluation of Deoxyribonucleic Acid (DNA) evidence to connect the suspects with rape crime scenes in Pretoria. DNA evidence discovered at the scene of incident can be utilised to identify the perpetrator, individualise the suspect and to link the criminals to the alleged rape scene. In most cases of sexual related and rape offences there are no witnesses, DNA evidence remains as the crucial tool that can be used to solve the cases. Therefore, it is necessary for South African Police Service Local Criminal Record Centre (SAPS LCRC) fieldworkers to attend the crime scenes with intend to collect physical evidence, DNA evidence and ensure that gathered evidence are not contaminated because there will be used to connect the perpetrator to the scene of crime. In this study researcher used qualitative research approach and applied case study a type of research design. To collect data international and national sources were consulted, interviews were conducted using semi structure method interviews with SAPS LCRC fieldworkers from Ga-Rankuwa LCRC and Lyttelton LCRC. Bairagi and Munot, (2019:37) indicated that this type of interview method is advantageous because it combines both structured and unstructured types of interviews. The findings of this study show that participants lack knowledge on the different types of DNA evidence that can be identified in a rape crime scene, the various types of crime scenes in a rape case and the significance of DNA evidence collected from rape scene.

The researcher recommends that refresher courses must be conducted annually to assist the fieldworkers and crime scene investigators (CSI) to improve their knowledge about Locard principle, the significance of DNA evidence collected from rape scene, the individualisation and identification of rape suspects, types of DNA evidence that can be collected at the rape and sexual related crime scenes, and how to utilise such evidence to link suspects with crime scene.

KEYWORDS: Crime scene; Deoxyribonucleic Acid; Evidence; Identification; Rape; Suspect; Chain of evidence

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ABBREVIATIONS AND ACRONYMS

CAS	:	Crime Administration System
CSI	:	Crime Scene Investigator
DNA	:	Deoxyribonucleic Acid
FSL	:	Forensic Science Laboratory
LCRC	:	Local Criminal Record Centre
NCVS	:	National Crime Victimization Survey
PPE	:	Personal Protective Equipment
ROC	:	Resolving of Crime
SAPS	:	South African Police Service
SOP	:	Standard Operating Procedure
UNISA	:	University of South Africa

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CHAPTER ONE: GENERAL ORIENTATION

1.1 INTRODUCTION

Rape is the most serious problem in South Africa. The use of DNA evidence for solving rape cases can be a solution. Through the DNA evidence collected from rape scenes, the suspect can be identified, individualised and linked to crime scenes. Crime scene is a proof that a crime has been committed and it serves as the initial point of an investigation of crime which contains evidence linking the suspects with the crime scenes, (Palmiotto, 2013:97). The conviction of rape cases depends on the success of DNA evidence, which is found at the scene, the condition of evidence, proper collection of evidence and management of physical evidence. Van Der Watt (2015:163) outlined the importance of proper management of evidence from the initial stage of the collection until the moment is presented in court. This study is focused on the important of DNA evidence that can be collected from rape scenes and used to identify and link suspects to rape crime scenes. In the conclusion of this study, the researcher will outline the findings and recommendations for implementation.

1.2 PROBLEM STATEMENT

De Vos, Strydom, Fouche and Delpont (2011:108), suggests that the researcher should formulate a good problem statement because without it there will be no research. Leedy and Ormrod (2010:44), described the problem as the axis which the whole research rotates around it. At first the problem statement must be explained with the utmost precision; thereafter it must be divided into manageable sub-problems. The research problem gives guidance on the preparation of the research, (Brynard, Hanekom & Brynard, 2014:18). Brynard *et al.*, (2014:18) further indicated that research problems need a short, yet detailed description which, in its shortness should still tell the maximum amount about the research topic.

Rape offences are the most serious challenge in South Africa. Rape statistics falls within the category of sexual offences and are presented by SAPS national crime statistics. SAPS crime statistics (2022:4), shows that between April 2021 and June

2022, 12 702 cases were reported. This shows that cases have increased by 5406 compared to a previous annual crime statistic. Pretoria cluster is one of the areas that had the highest rate of reported rape cases, Tembisa SAPS opened 49 cases and Loate SAPS opened 39 cases, (SAPS, 2022:59). The researcher perused the diaries of the said dockets of rape that were withdrawn from court and concluded that the reasons that led to less convictions was insufficient of evidence and some cases were reported late to LCRC. The delayed reporting of rape cases to LCRC fieldworkers resulted in contamination and loss of valuable evidence. National instruction 5/2003 (SAPS, 2003), states that once a sexually related case is reported to the police, LCRC members must be activated immediately. Gardner and Krouskup (2019:55), states that it is essential that first responding officers in a rape scene to make every effort to preserve evidence.

According to statistics it is evident that Pretoria cluster is experiencing a high rate of sexual related crimes with reference to rape. Rape is a contact crime. Sex offenders normally leave behind track made of biological fluids containing DNA from which the investigators can make a sure claim of the perpetrator`s guilt. Gardner (2012:8), states that DNA evidence never lies – physical evidence creates a platform of objective knowledge that will lead and support the investigators about the general understanding of the crime being investigated. Shaler (2012:355), emphasises that if DNA evidence can be attended rapidly and scene of crime managed properly, perpetrators can be identified through the analysis of DNA and others removed to reduce suspected people on the list. Due to the lack of DNA evidence to individualise suspects, the investigators are unable to identify or to establish a connection between the rape suspects and scene of crime.

1.3 RESEARCH AIM

According to Denscombe (2012:49), research aim provides guidance in which the study is going and leads to target of the research. Leedy and Ormrod (2010:48) and Flick (2011:89), emphasise that the aims of the research are formulated to develop new knowledge. In this study, the aim is to evaluate DNA evidence to link the suspects with rape crime scenes in Pretoria.

1.4 RESEARCH QUESTIONS

Denscombe (2012:82), believe that research questions explain the process of how to put research into practice and to state exactly what factors and relationships that can be investigated to provide data that will be useful in handling the aims of the research. The researcher is advised to follow a logical sequence and to limit the number of research questions, (Flick, 2011:90). Research questions provide guidance and focus on a study to develop perception into the research problem, (Leedy & Ormrod, 2013:54).

To understand the problem of the research, the researcher created the listed research questions:

- What are the different types of DNA evidence that can be identified in the rape crime scenes?
- What is the value of DNA evidence to link suspects with rape crimes in Pretoria?

1.5 RESEARCH OBJECTIVES

Withrow (2014:25), mentioned the overall objectives of research process as, to answer a set of research questions, to resolve differences between the researchers, to close the gaps within the body of knowledge, and the final objective is to manifest more research questions. Kumar (2011:50), explicates that the objectives are the goals set out to be achieved in the study. These objectives notify the reader of what the researcher wants to attain through the study, it is crucial that they are worded plainly and specifically. The following objectives are used as a guide:

- To evaluate the importance of DNA evidence in the identification of the rape suspect.
- To assess the existing strategies utilised to determine the value of DNA as evidence to identify and associate the rape suspect to a crime scene.
- To empower the researcher and the SAPS LCRC fieldworkers with the outcome of this study.

1.6 RESEARCH PURPOSE

According to Bairagi and Munot (2019:3), the purpose is to get solutions to unsolved problems and to find out a hidden and undiscovered truth. Leavy (2017:62) supports Creswell (2014:124), that the purpose of the research generally includes information about the central circumstances such as research problem and participants data which have been explored in the study. Denscombe (2010:8), indicated that there are about six possible purposes of doing research. Researcher focused on four, namely exploration, evaluation, empowerment and development of good practice as purposes of this research:

- **Exploration:** Denscombe (2010:26), asserts that is how things are, rather than how they will be. In this instance, the researcher interviewed members of the LCRC fieldworkers. The researcher reviewed journals, dissertations and academic books from national and international libraries on how DNA evidence such as specimen, urine, semen, blood, saliva and hair, could be utilised to identify and link suspects of rape with crime scenes. Moreover, the researcher had to peruse the SAPS manuals and read extensively to discover information that can be used to deal with the problem under investigation.
- **Evaluation:** Denscombe (2010:26), states that the researcher should investigate certain programs or policies with the purpose of assessing their weaknesses and strengthens, in view of how things can be upgraded. The researcher aimed to evaluate the existing procedures followed by members of the LCRC fieldworker in the utilisation of DNA evidence to identify and link the criminals to the committed crime, with the intent to establish the advantages and disadvantages, and how that procedure can be upgraded.
- **Empowerment:** The aim is to empower the fieldworkers on how to use DNA evidence to identify and connect the suspect to crime scenes. This could be achieved through organisational workshops.
- **Develop good practice:** The researcher made use of findings and recommendations that could add value in identifying and linking suspects to the crime scenes using the DNA evidence. Denscombe (2010:27), indicates that the aim of the research, particularly in the organisations and work environment, is

about the recommendations for the best method that will address the problem or improve the performance of the individual and organisation by making adjustment of the procedures and rules.

1.7 KEY THEORETICAL CONCEPTS

Leedy and Ormrod (2013:39), refers the key concepts as the interpretation of the term that is used in term in relation to the research. According to Creswell (2013: 143), the reason for researchers to clarify terms is to provide the readers with their exact meaning, especially where the readers does not have enough within the area of study. The topic and questions of this study were examined by the researcher and the upcoming concepts were identified:

1.7.1 Crime scene

Lochner and Zinn (2015:10), crime scene is defined as a location where traces and physical evidence are discovered that will lead the investigation forward.

1.7.2 Deoxyribonucleic Acid

DNA is defined as bio-chemical molecule discovered in the human cells and makes and that makes each species to be exclusive, (SAPS, 2015:126).

1.7.3 Evidence

Gardner (2012:7), defines evidence as everything that can be used to validate certainty in dispute. Hess and Orthman (2010:122), illustrated that evidence is anything real that can be visible, invisible, tasted and smelled that helps to establish the fact of the case for correlating, arresting and convicting suspected perpetrators.

1.7.4 Identification

Osterburg and Ward (2014:36), described identification as a procedure followed whereby persons and items are put in a predetermined class or category, based upon the similar features.

1.7.5 Rape

The National Crime Victimization Survey (NCVS) defines rape as unlawful penetration of a person against the will of the victim, with use or threatened use of force, or attempting such an act. Rape includes psychological coercion and physical force, and

forced sexual intercourse means vaginal, anal, or oral penetration by the offender, (Burkey, Bensel & Walker, 2014:7).

1.7.6 Suspect

Grobler and Naicker (2008:55), state that is any humans who are engaged in commission of crime as possible offenders are referred to as suspects.

1.7.7 Chain of evidence

Harris and Lee (2019:43), requires that someone must be able to show that each item being brought as evidence in court is the exact same object that was collected from the victim, suspect or crime scene.

1.8 VALUE OF THE RESEARCH

According to Withrow (2014:34), research is about creating procedure that will be followed when collecting data and analyse it to respond to questions. The research should be utilised for practical purposes, and it must contribute to proficiency, (De Vos *et al.*, 2011:103). Brynard *et al.*, (2014:28), state that during any study, a researcher is forced to think through the details of the plan of action to be able to convince reviewers of their sincerity. The value, the goal and objective of any research are to solve the research problem by answering the research questions, (Creswell, 2013:111-113).

The outcome of this study will contribute to proficiency and knowledge of the investigators about the significance of DNA as evidence to identify and link suspects to crime scenes. This knowledge will also benefit academia UNISA by being available to the students, staff and other researchers for referral purposes. Clients reference to independent forensic investigators will also benefit from the outcome of the information contained in this study. The participants, LCRC fieldworkers, will enhance their investigations by using DNA evidence, and they can be able to measure their current performance and practice against the research findings. On the other hand, the law enforcement industry will benefit, as this will help to achieve the high rate of convictions. The society of South African, community at large will also benefit from this study through positively identifying and linking offenders to the crime scene, and when those offenders are successfully prosecuted.

1.9 RESEARCH DESIGN AND APPROACH

1.9.1 Research design

According to David and Sutton (2011:204), the motive of this design is to provide a framework for the collection and analysis of the data. It also furnishes the structure upon which the research is conducted and helps the researcher to collect evidence that will permit the research question to be addressed. Dantzer and Hunter (2012:83) further states that the research design allows the researcher to orderly and objectively rebuild the past, this is acquired through the gathering, verification, evaluation and synthesis of information, mostly secondary data already a defensive conclusion relating to the hypothesis. Bairagi and Munot (2019: 70), It is the overall plan that deals with the aspects of complete designs from the study type, data collection approaches, experimental designs, and statistical approaches for data samples.

The researcher applied case study design in this study. According to Bairagi and Munot (2019:74-75), this design allows the researcher to go with detailed online data collection, questionnaire and to use any method that is found to be appropriate to get the analysis. The main reason why the researcher chose to use this design, is because this study is established on the skills, experience and observation of the participants and CSI members, (Singleton & Straits, 2010:11). The rationale of using this design was that the researcher wanted to achieve accurate information from the participants by conducting interviews with them. The researcher regarded case study design to be suitable for this study because it helped in providing the answers of a research aim and questions comprehending the problem of the research through the conducted and the review of the literature. This includes the study of the literature and the researcher's practical experience working with DNA related cases daily.

1.9.2 Research approach

Creswell (2014:3), points out that research approach entails the plan and procedures for research, which span the steps from broad assumptions to detailed methods of data collection, analysis and interpretation. The researcher used a qualitative approach in this study. De Vos *et al.*, (2011:74), described qualitative research as a non-statistical method that is concerned with understanding. Qualitative cross-sectional research

design may be used to gather data using self-managed questionnaires to accomplish the objectives of the proposed study, (Leedy & Ormrod, 2010:135). The researcher found it advantageous to utilise a qualitative approach because is permitted for the use of in-depth interviews. Unlike the quantitative approach, qualitative researchers cannot use a diversity of methods and techniques to collect data, involving numerical data and experimental designs. Moreover, Maharaj (2013:3) says qualitative research gives participants the opportunity to narrate their stories in their own words and understanding, in a natural setting. The researcher conducted interviews with members of LCRC (fieldworkers) and participants were requested to reflect and share their perspectives on the use of DNA as evidence to identify and link the suspects with crime scenes as they experience it in their daily operations.

1.10 TARGET POPULATION AND SAMPLING

1.10.1 Target population

Walker (2010:22), says association of individuals you want to get to a conclusion about, and mostly individuals are referred to people, animals, organisations or events. According to Welman, Kruger and Mitchell (2011:52) and Walker (2010:22), a population includes groups, individuals, institutions, human products, and situations to which they are exposed. Population is defined as a totality of the entire participants who reached the requirements for a particular research project says (Leedy & Ormrod, 2013:97). In this study, the target population focussed on the SAPS LCRC fieldworkers in Pretoria – based on their experience and their expertise in the utilisation of DNA as evidence to identify and connecting of suspects with the rape crime scenes.

1.10.2 Sampling

Kumar (2011:193), defines sampling as the process of selecting a few (a sample) from a bigger group (the sampling population) to become the basis for estimating or predicting the prevalence of an unknown piece of information, situation or outcome regarding the bigger group. Sampling includes the selection of a small group of cases from the population, (Walliman, 2011:93). According to Babbie (2010:191-200), there is two various categories of sampling, namely probability and non-probability sampling. Probability sampling is based on randomisation and each person or sample unit in the population has the probability of being selected. Simple random sampling is a subset

of a larger population created in such a way that each element of the population has an equal probability of being selected to the subset, (Chambliss & Schutt, 2012:86). Leedy and Ormrod (2015:179), state that in simple random sampling each member of the population must have the same and equal chance of being included in the sample, and that each sample must have an equal chance of being chosen.

The researcher used the simple random sampling method to select the participants. Sample "A" Ga-Rankuwa LCRC, the researcher used the alphabetical name list of all 23 fieldworkers (crime scene investigators) by writing each of their names on small sheets of paper which were then placed in a bowl and randomly selected individually until 10 members were selected. Sample "B" Lyttelton LCRC, the researcher used the alphabetical name list of all 20 fieldworkers by writing each of their names on the sheets of papers, were then placed in a bowl and randomly select individually until 10 members were selected.

1.11 DATA COLLECTIONS

Dantzker and Hunter (2012:16), asserts that data collection is a key element, it is consisting of four primary data collection techniques, namely survey, interview, observation, and unobtrusive means (previously existing data). According to Polit and Beck (2012:725), data collection is the gathering of information to address a research problem. The process in the research evaluation depends on the method or methods chosen by the researcher to collect data (Withrow, 2014:336). Flick (2011:119, 122), De Vos *et al.*, (2011:328, 341, 376) and Leedy and Ormrod (2010:146), mentioned that documentation, observation, interviews, literature studies and case studies are data collection methods. Denscombe (2010:189), suggests that it is necessary for researcher to use the guide that contains a list of questions during an interview with participants. The researcher used this guide to ensure that she does not deviate from the research topic. Leedy and Ormrod (2013:59), state that primary data is original data collected by the researcher, for the purpose of their own study at hand, whereas secondary data is information collected by individuals, or agencies and institutions, other than the researcher themselves. In this study, the following sources, primary and secondary sources were used during the collection of data.

1.11.1 Primary sources and Interview method

Primary data is regarded as the most valid form of data, as it is the most truth manifesting, (Leedy & Ormrod, 2013:95). De Vos *et al.*, (2011:331), categorises primary data as a collected data, analysed data and reported by the researcher. Primary data results from direct contact between the researcher and the source of the data. The researcher used primary data at Ga-Rankuwa LCRC and Lyttelton LCRC.

The researcher used semi-structure interview method to collect data that was utilised to address the research aim and to answer the research questions of this study. Semi-structured interviews have list of key questions but allow the interviewer to explore more depending on the previous answers and knowledge of the interviewers, (Bairagi & Munot, 2019:37). Maree (2012:87), asserts that interview is a two-way conversation in which the interviewer (researcher) asks the participant questions with the purpose of gathering the facts and collecting data. Using a semi-structured interview schedule allowed the researcher to select a specific set of questions in advance and to clarify points highlighted by the participants during the interview, (Leedy & Ormrod, 2015:147-149). The researcher used the same interview schedules for the different samples (see Annexures A). The researcher used the research aim and the research questions to create the interview schedule questions.

1.11.2 Secondary sources

Books from the UNISA Library, the SAPS crime statistics, DNA study guide of the SAPS Academy, published dissertations and the SAPS journals were used as secondary sources.

1.12 DATA ANALYSIS

Boeijie (2010:76), indicated that data analysis is the process of systematically searching and arranging the interview scripts, field notes, and other materials that the researcher has accumulated to increase his own understanding of them, to enable the researcher to present what they have discovered to others. The process of data analysis entails making sense of text and image data and preparing the data for analysis, moving deeper into understanding the data, representing the data, and interpreting the large amount of data, (Creswell, 2014:199). Leedy and Ormond

(2013:158), state that data analysis is a spiral method, and it includes five components, namely data organisation or management, reading, description, classification and interpretation of data, and representing and visualising the data:

- Organization or management of data: researcher started by preparing questionnaires for interview and typing of interviews scripts before the interviews were conducted.
- Reading of data: to know what the data contained, researcher had to read the responses of the participants and summarized them.

Lastly researcher, interpreted all the gathered data from the responses of the participants and categories them according to their themes.

1.13 METHODS TO ENSURE TRUSTWORTHINESS

Wagner, Kawulich, and Garner (2012:137), state that the term trustworthiness is used for validity and reliability in qualitative research. Kumar (2011:184), categorised indicators as credibility, transferability, dependability and conformability, and these indicators reflect validity and reliability in qualitative research. Creswell (2014:201) agrees with Leedy and Ormrod (2013:105), that the terms including 'verification,' 'trustworthiness,' and 'authenticity,' are used to describe the idea of validity. Gray (2014:185-186), indicates that to ensure trustworthiness in qualitative research, certain strategies must be followed to meet the afore-mentioned criteria.

1.13.1 Credibility

Kumar (2015:184), emphasise that arguments should be created when writing assignments and evidence that you give will come from the sources you have read. Credibility corresponds roughly with the positivist concept of internal validity. Kumar (2011:185) quotes Trochim and Donnelley (2007), who indicated that credibility involves establishing if the results of qualitative research are credible or believable from the perspective of the participant in the research. In this study, the researcher used various sources of information to agree and argue with views from journals, books, articles, case laws, theses, dissertations, and training material of the SAPS.

1.13.2 Transferability

Transferability needs the researcher to furnish detailed descriptions of the situation in which the data was collected, about the researcher as a person, and about the relationship between the participants and the researcher, (Bless, Higson-Smith & Sithole, 2013:237). Kumar (2011:172) quotes Trochim and Donnelly (2007) described transferability as the level of which the outcome of the qualitative research can be transferred to the other contexts. To ensure transferability the researcher described simple random sampling as the method used to select the participants and to collect data, and researcher indicated the target population as the members from LCRC Ga-Rankuwa and LCRC Lyttelton.

1.13.3 Dependability

Kumar (2011:185), reveals that dependability occurs when one obtains the same results after observing the same thing twice. Brink, Van der Walt and Van Rensburg (2012:172), state that dependability refers to the providing of evidence like if it were to be repeated with the same participants in the same situation, its findings would be similar. Dependability concerns the stability and consistency over a period of time of the research design, data collection methods and instruments to produce consistent results under the same situations and in the same context (Dantzker & Hunter, 2012:188; Bouma & Ling, 2010:83). The researcher is confident that if the same research is undertaken in future within South Africa, it will yield the same results as contained at the end of the research.

1.13.4 Conformability

Conformability is described as the degree to which the outcome could be confirmed by others, (Marilyn, 2014:387). Kumar (2011:185), defines conformability as the level in which others could be able to confirm the results. To ensure conformability, the detailed record of all literatures that were reviewed in order to signify that the findings are coherent.

1.14 ETHICAL CONSIDERATIONS

Dantzker and Hunter (2012:190), indicate that ethical consideration in research narrates what is ethical and legally right when conducting research. Maxfield and Babbie (2012:53), emphasise that ethical consideration is required in every phase of

the research process. Bryman, Bell, Hirschsohn, Santos, Masenge, Van Aardt and Wagner (2017:120) agrees with Leedy and Ormrod (2015:120), that ethical consideration can be categorised into to four areas: protection from harm, informed consent, the right to privacy and honesty to professional colleagues. The researcher adhered with the UNISA Policy on Research Ethics (2016:5-12) at all times. Researcher maintained ethical standards and requirements to the ethical issues during research, listed below as:

- **Protection of the participants from harm**
 - Interviews between the participants and the interviewer were conducted online, where there is privacy;
 - No one of the participants was exposed to any psychological or physical harm; and
 - Participants were given permission by management to participate in the interviews.
- **Obtain informed consent from the participants and SAPS**
 - In this study, participation was voluntary.
 - The researcher obtained a written consent to conduct research in the SAPS in terms of its research policy, and to interview the SAPS fieldworkers in the LCRC as per Annexure B.
 - The researcher also applied for ethical clearance from UNISA attached as per Annexure C.
- **Right to privacy and confidentiality should be respected**
 - Neither particulars nor identity of any member who took part this study is mentioned; instead, they were named participant 01, participant 02, participant 03, and so on.
- **Honesty with professional colleagues**
 - The researcher acknowledged all sources that were utilised throughout the research process to avoid plagiarism.

1.15 SUMMARY

Chapter one presented a general overview of the research. The researcher started by discussing problem statement; followed by research objectives and research purpose.

The researcher then defined/ described key theoretical concepts; followed by the value of the research; then research design and approach; target population and sampling; data collection and analysis; methods to ensure trustworthiness. Finally, ethical consideration was presented. The next chapter two presents literature review on evaluating DNA evidence to link suspects with rape crime scenes.

CHAPTER TWO: LITERATURE REVIEW ON EVALUATING DEOXYRIBONUCLEIC ACID EVIDENCE TO LINK SUSPECTS WITH RAPE CRIME SCENES

2.1 INTRODUCTION

Sexual related crimes such as rape and sexual assault, are the most traumatic types of crimes that has physical, emotional and psychological effects on the victim. Anderson (2013:174-175), asserts that when the incident occurs, the suspect may either transfer or pick up anything from the scene. This clues and trace evidence can be examined to connect the suspect with the victim and with the location where the incident occurred and assist in the identification of the suspect or remove the innocent suspect. DNA evidence can help in the identification of the perpetrators, in the conviction of criminals that are found guilty, and exonerate those who are innocent (National Institute of Justice, 2002: v). Burkey *et al.*, (2014:52), indicated that DNA is the fundamental building block for individual`s entire genetic makeup, and has become an increasingly powerful tool for solving sex crimes over the past several years. This part of the study endeavoured to respond the first research question (“What are the different types of DNA evidence that can be identified in the rape crime scenes?”) shown in chapter one, paragraph 1.4. This section will also discuss the role of first responder officer at a rape crime scene, evidence, DNA analysis, the different types of DNA evidence that can be identified in a rape crime scene, the importance of chain of evidence collected from rape scene, and contamination of evidence.

2.2 THE ROLE OF FIRST RESPONDER OFFICERS AT THE RAPE CRIME SCENE

According to Gardner and Krouskup (2019:51), the role of initial responding officer is important, first responding officer does not process the scene, but the CSI or crime scene technicians` reference to LCRC fieldworkers accomplishes processing. Their objectives are to bring the site under control and coordinate resources. Savino and Turvey (2011:98), outlined the duties of the first responder as follows: (1) to help the victims and render aid assistant if is required, (2) notify the appropriate agencies per departmental guidelines, (3) make certain to ensure that crime scene is safe and free from danger, (4) secure the crime scene, identify restricted areas and the officer need

to maintain a log book of persons entering and existing the scene, restrict access to authorities only, (5) write down the names of persons at the scene when the first responder arrive, (6) write down the description on any vehicle parked in or leaving the crime scene, if time allows they should be photographed, (7) note down the names of the witnesses and other persons who are known to have entered the scene. Note their clothing and footwear, (8) Establish the basic known facts, but avoid any lengthy or detailed interviews or interrogations, (9) keep suspects and witnesses separately, (10) instruct witnesses not to discuss with each other, (11) Do not discuss the crime with witnesses or bystanders, (12) listen attentively but not obtrusively to ambient conversation, (13) protect evidence that is in danger of being destroyed, lastly (14) provide all gathered information to investigators. Baxter (2015:4), indicates that actions the first officers take or choose not to take at the scene may affect the outcome of the case in many ways. Obviously, an officer`s lack of action will have a very negative effect on the case. Jackson and Jackson (2017:27), confirms that the actions of the first officer attending crime scene are significant in maintaining the value of any physical evidence that may be present.

Gardner (2012:72), emphasised that they should take into consideration primary focal point, natural entry and exit point, and secondary scene. The officer should look for natural entry and exit point and include them in the controlled area. Ogle and Plotkin (2018:35) agree with Gardner (2012:72), by stating that it`s the duty of the first responder officer to establish a pathway for those individuals entering and leaving the crime scene, such as emergency medical personnel, detectives, CSI, and SAPS LCRC fieldworkers, this pathway will help to reduce the possibility of evidence destruction and will establish orderly crime scene search. Fisher and Fisher (2012:329), indicate that officer is required to make certain that fragile physical evidence that may be lost during the medical examination or by the victim are collected and preserved. According to Gardner (2012:72), the significant problem of the first responding officers is to overlook secondary scenes. The authors are of the view that first responder officers at the rape cases should find that training in crisis counselling, it will help them to assist the victim in dealing with trauma. Rape investigation is different from many other major crimes.

They must be knowledgeable about the type of evidence generally found at the rape crime scenes, (Fisher & Fisher, 2012:329). Savino and Turvey (2011:99) supports Fisher and Fisher (2012:329), by stating that first responding officer to rape and sexual assault complaints must be trained properly to deal with victims of sex crimes. Palmiotto (2013:143), says the description of events relayed by the victim to the responding officer can become valuable evidence which can help in the successful conclusion of a rape investigation.

2.3 THE MEANING OF EVIDENCE

Evidence is anything that tends to prove or disprove a fact in contention, (Gardner & Krouskup, 2019:6). Lyle (2012: 21), says it can determine whether crime has been committed, link a suspect to a crime scene, corroborate or refute alibis and witness statements, identify a perpetrator or victims, exonerate the innocent, induce confessions and direct further investigations. Brandl (2014:340), asserts that investigators should collect the evidence – especially when they are uncertain about the evidential value of physical evidence found on a rape crime scene. Shaler (2012:20), indicates that such proof is used to support or reject speculations or hypotheses. Osterburg and Ward (2014:360) agree with Gardner (2012:7), that it can be anything a magistrate can accept in court to prove the facts of the questions at dispute. It is categorised as testimonial, real, or demonstrative.

According to Bellengere and Palmer (2013:3), is referred to any information that is officially accepted by court, either in a criminal case, civil proceedings, at administrative or judicial hearings. Evidence has legal importance and is one of the most considered methods to convince courts, (Lushbaugh & Weston, 2012:5). Information can be regarded as evidence once it has been presented in a court of law, has been subjected to cross-examination by the accused or their legal representative and accepted as being admissible, relevant and carrying evidential weight (value) (Alexander, Rogers, Smith, Van Rooyen, Victor-Zietsman & Zinn, 2010:112). Lochner and Zinn (2015:39), further add that evidence could be verbal or substantial information that is presented before magistrate in court, and whereupon the presiding officer must make his or her finding. Meanwhile, Lochner and Zinn (2015:39) agree with Osterburg and Ward (2014:360), that evidence discovered at a crime scene could be in these three forms,

namely testimonial, real and demonstrative evidence. Gilbert (2010:52), is of the opinion that it serves two various and significant functions and refers to inculpatory evidence which is described as incrementing evidence and exculpatory as evidence that eliminate innocent person from legal guilt. Hess and Orthman (2010:122), reveals that evidence is anything real that can be visible or invisible – that helps to establish the fact of the case for identifying, apprehending and convicting suspected offenders.

2.4 THE MEANING OF DEOXYRIBONUCLEIC ACID ANALYSIS

Houck and Siegel (2011:257), asserts that DNA can be found in two regions in a cell, namely the nucleus and mitochondria, and they can also be utilised in DNA typing. Motsepa (2014:41), indicates that DNA analysis is a powerful technique in proving an individuals' guilt and is admitted as a standard forensic technique for the investigation and detection of all crime types from small crimes to serious and major crimes.

SAPS Training Manual, "Forensic Biology: Body Fluid Detection" DNA samples are taken from the suspect or possible suspect (i.e., control sample) and matched to the sample found at the crime scene, (SAPS, 2010:56). DNA will be the same, regardless of where in the body it is taken from. Butler (2010:7), states that the DNA database is of great value in tracing possible perpetrators of crimes such as rape since many offenders committing these violent crimes are repeat offenders. The use of a forensic DNA database is a powerful tool to provide investigative leads to identification suspects in cases where DNA related evidence such as blood has been found at the scene of an incident. The precise value of a forensic DNA database is determined by the rapid growth of the size of the database, (Smith & Zinn, 2015:405).

2.5 DIFFERENT TYPES OF DEOXYRIBONUCLEIC ACID EVIDENCE THAT CAN BE IDENTIFIED IN A RAPE CRIME SCENES

2.5.1 Serological evidence that can be found in a rape scene

According to Zinn and Dintwe (2015:97), serological evidence is described as a bodily substance such as semen, saliva and sweats, this evidence can help to identify perpetrators during the investigation of civil and criminal cases and may also play a critical role in the prosecution. Baxter (2015:230), says there are different types of biological evidence within a rape scene includes blood, saliva, touch DNA and semen.

Fish, Miller, Braswell and Wallace (2011:141), asserts that biological stains such as blood, seminal fluid, vaginal secretions, urine and faeces are the most common DNA evidence found on the rape scene and that DNA evidence can also be obtained from blood, hair, seminal fluid, vaginal or rectal cells and teeth. According to Burkey et al., (2014:52), DNA can be extracted from various sources such as hair, saliva, bone, blood, and teeth.

Fisher and Fisher (2012:211), DNA testing can be used to detect and recover any quantity of DNA that can be swabbed from weapons, cable ties, any object which were used or touched by the suspect. Ogle and Plotkin (2018:167) agrees with Baxter (2015:230), by stating that semen, saliva and blood are often found in cases of rape as evidence. Houck and Siegel (2010:244), suggest that body fluids, sweats, semen, saliva and urine, can identify an individual because they have DNA. Palmiotto (2013:109), refers bodily fluids and blood as critical evidence, this may include besides bloodstains, semen, vaginal fluids, urine, perspiration, pus, and human milk. Osterburg and Ward (2010:438), are of the opinion that investigators and crime scene examiners should search for evidence at the scene; fingernail scrapings- the victims often scratch or resist the assailant therefore some vital evidence might be trapped underneath the victim's nails (e.g., hair, fibres, blood or tissue). If necessary, the nails can be clipped and packed appropriately to serve as evidence.

2.5.2 Semen evidence at a rape scene

Baxter (2015:232), state that semen evidence is commonly found in sexually assaults and rape cases. In support of this notion, Gilbert (2010:272), says is the most often tested substance found in rape crimes. It is the central evidence in rape cases as the sperm cell in the semen contains actual DNA. Ogle (2012:314) agrees with Gilbert (2010:272), and both regarded semen as biological evidence that is mostly found at rape scenes. Ogle (2012:314), further indicated that it may play significant role in several crimes, mostly in cases involving sexual related crimes such as sexual assaults and rape crimes. Girard (2011:330), believed that semen found at the crime scene provides a direct connection to the suspect. Fisher and Fisher (2012:207), consider the presence of semen at a scene as one of the most probative pieces of evidence in a

rape case. The authors further revealed that this evidence may be found from the body of the victims, clothes of the victims, the place where the crime was committed, or bedding such as sheets, blankets and comforters. Moreover, Ogle (2012:316-317), emphasise that semen evidence can be used as a powerful tool in the identification of the suspects of rape crimes and can assist in the elimination of the suspects who has been falsely accused of rape.

Ogle (2012:316-317) support Gilbert (2010:305), that the seminal fluid that comes from semen evidence can be of importance in the identification of a suspect. The author further stated that semen analysis involving DNA may be utilised to link perpetrator to place where the crime occurred and the victim of the crime. Osterburg and Ward (2010:440), offer hints on the collection of blood and semen from the rape crime scene. Semen is normally collected by the examining medical practitioner by using “rape kits.” The investigator on the scene must collect clothing of the victim and suspect, if possible, and all items must be properly packaged apart from each other as piece of evidence and labelled accordingly.

Jackson and Jackson (2017:165), asserts that in cases of sexual abuse and rape, the presence of semen at the crime scene provide highly important forensic evidence, most of this evidence is recovered from the body of the victim, bedding, used condoms, furniture and carpets. A number of high-profile cases throughout the United States have demonstrated that semen evidence is also a powerful tool for eliminating suspect who have been falsely accused of a sexual assault or a rape homicide, (Ogle & Plotkin, 2018:268).

2.5.3 Bloodstain evidence

According to Savino and Turvey (2011:320), is a key source of evidence by stating that DNA testing may be used to confirm the ownership of the cells collected from swabs taken during the sexual assault and rape examination. Ogle and Plotkin (2018:168), indicate that it may be encountered as physical evidence in a variety of crimes. The identification and typing of bloodstains can help in determining elements of the crime and elimination of suspect, and also used to corroborate or dispute the statements of

principals. Fish, Miller, Michael, Wallace, Wallace, and Anderson (2014:162), submitted that blood is one of the most regularly found matter at the crime scene, it's value must not be undermined. Fisher and Fisher (2012:194), state that is commonly present at crime scenes, especially crimes of violence such as rape and murder. Swanson, Chamelin, Territo and Taylor, (2019:119), blood trajectories and patterns can provide key information in crime scene reconstruction. The author further indicated that because of frequently blood uncounted and the fact that DNA analysis can provide individual identification, officers need to be alert to collecting and protecting this type of evidence. Jackson and Jackson (2017:155) agrees with Fisher and Fisher (2012:194), that blood evidence is a form of physical evidence commonly found at violent crime scenes and may provide valuable information about what happened during the course of a crime, and the order in which these events took place.

Ogle (2012:320), states that the blood from the victim, and suspects need to be collected for comparison with any bloodstains evidence collected from the scene. The author agrees with Ogle and Plotkin (2018:168), that bloodstains can assist the investigator in establishing the elements of a committed crime. Osterburg and Ward (2010:440), offer the following hints on the collection of blood and semen from the rape crime scene: the collection of blood samples must be done properly, thus investigators or forensic experts have to ensure that there is no mixing of blood because it may belong to either the victim or suspect.

2.5.4 Hair evidence

Saferstein (2015:250), hair evidence is encountered as physical evidence mostly found in a wide variety of crimes. The author further indicated that hair from the offender may be left at the scene by naturally falling from their head, the victim could forcibly pull the hair of a perpetrator during the commission of crime and the hair root that is found at the end of the hair is rich in DNA. Fisher and Fisher (2012:185), state that this type of evidence may be collected at the area where the incident happened, on the body of the victim, on the clothes of the perpetrator or even attached to a weapon used in the commission of an offence. Baxter (2015:232), the suspect's simple removal (partially or completely) of their clothing prior to a rape may result in body hairs falling off the

clothing and onto some close items in the scene. Goodwill, Linacre and Hadi (2011:22), asserts that hairs are naturally shed, and are usually pulled out during the commission of crime and may be found from the scenes of crime. The authors indicate that through hair the ethnic group and race can be identified.

According to Osterburg and Ward (2010:69), hair that is pulled out with roots intact is suitable for DNA analysis and can be used to identify the racial origin of a person. This is done by comparing hair of unknown origin to a possible known source. Manamela, Smith and Mokwena (Zinn & Dintwe, 2015:76), emphasised the significance of accumulating hair as evidence at the area of crimes. Palmiotto (2013:111-112), asserts that it can be useful in criminal cases. In rape cases, pubic hairs from the victim on the body of the suspect or clothing or those of the suspect on the victim help to substantiate that an assault occurred. Investigators, CSI and SAPS LCRC members should look for the following evidence at the crime scene: Head hair or pubic hair and must be collected from both the victim and the suspect, and be packed separately, (Osterburg & Ward, 2010:438).

2.5.5 Saliva evidence

Ogle and Plotkin (2019:268), submit that saliva stains occur on the body of the victim as a result of biting, licking, or sucking activities. These stains may yield adequate DNA for successful DNA profiling and comparison with the suspect's DNA profile. The investigators should not overlook the items such as cigarettes, cigars, chewing gum, and the like, which may contain DNA evidence from the suspect. Jackson and Jackson (2017:164), mentioned that saliva produces necessary lubrication to cleanse the mouth. Always when objects get into contact with the mouth, like cigarette butts and chewing gum are feasible to carry saliva. Houck and Siegel (2010:244), are of the opinion that saliva can be evidence in a number of crime scenes – it can be found on bite marks, licked adhesives, and on eating and drink surfaces. Even expectoration (spitting) can yield important DNA evidence because saliva has large amounts of skin cells (epithelial cells) from the internal cheek walls. Baxter (2015:232), there may be circumstances where the suspect may perform some oral copulation on the victim, spit

the victim, or lick on the victim or in the scene, this form of evidence contains valuable DNA.

2.6 THE IMPORTANCE OF CHAIN OF EVIDENCE COLLECTED FROM RAPE SCENE

Chain of evidence is also referred to as the 'continuity possession', 'chain of custody' or 'chain of possession'. Continuity possession is the chronological history of the evidence. It will provide prove on who had contact with the evidence, at what time, under what circumstances, and if changes were made to the evidence, (Lochner & Zinn, 2015:25-26). According to Mozayani and Fisher (2018:53), chain of custody documents each person who had access to the evidence. Van der Watt (2015:117), holds that is a record of each person or agency who has controlled or taken custody of examined or tested evidence or had any other kind of contact with evidence from its discovery to the present day.

Savino and Turvey (2011:148), explains chain of evidence as the safekeeping of the object from time it was collected from the scene of incident until it was presented as exhibit in court. It will provide a chronological timeline that accurately depicts the journey of the evidence during the life of the case, (Fish *et al.*, 2014:23). Bertino (2012:22), is of the view that is the identification and continued safekeeping of objective evidence such as semen evidence or pubic hair, from the time it has been found at the rape scene until presented as evidence in court. The main purpose of sustaining the chain of evidence is to make sure that the collected evidence stays undamaged until is presented in court in the same state as it was found from the scene. If evidence is properly preserved, it was never tampered with, (James, Nordby & Bell, 2014:566).

Van der Watt (2015:163), indicates that a systematic, planned and organised approach to investigation is the most effective defence against evidence contamination and the proper way to maintain the chain of evidence. From the time evidence is collected from the scene until the moment is presented in court hearing, every effort should be made to protect and preserve that evidence and to prevent it from contamination, (James *et al.*, 2014:54). Ogle and Plotkin (2018:273), legal requirement for forensic evidence is

that each individual or entity having possession of an evidence object from the time it is collected until the time it is introduced into evidence at a court proceeding must be identified.

2.7 CONTAMINATION OF EVIDENCE

Contamination is defined as the introduction of something new to a scene that was not originally there. This means that some substances are added to the scene after the crime has been performed, (Singh & Sharma, 2021:4). According to Goodwin et al., (2011:23), biological materials are seen more often in violent crimes. The authors emphasise that appropriate care to be taken before handling biological evidence, such as maintaining the integrity of the scene and wearing protective clothing before handling bodily fluid exhibits, because improper handling of the evidence may have negative effects – the evidence can be contamination, the sample may lose evidential value, and confuse the interpretation. Singh and Sharma (2021:4), further listed the following as the anticontamination measurements that need to be taken into consideration:

- Wearing gauntlet and over-shoe covers
- Utilising of a single of entry point when passing through the scene
- Avoiding the utilisation of any services in the scene
- Maintaining a strategy of not moving anything or anyone at the scene, except in need and that should be reported.

Lochner and Zinn (2015:20), uncontrolled activities such as weather (sunny, rain and windy) are considered as conditions that may cause contamination at the scenes. It is important to recall that the collected evidence must be stored and transported in a manner that will prevent it from contamination. Van der Watt (2015:117) and Dutelle (2011:225), strongly advise investigators not to smoke, drink, or do anything else at the scene of incident that might compromise the scene or the evidence. Singh and Sharma (2021:4), support the above authors by stating that the first responding officer or any person including the witness or victim, should not eat, drink, smoke inside the scene. Harris and Lee (2012:230), have the different view, by stating that it is important to emphasise that contamination is not an important issue in many cases-those that have

a large quantity of biological evidence, in comparison with the quantities of any contaminant that only the results from the evidence are observed.

2.8 SUMMARY

Rape scenes contains a great deal of DNA evidence like serological evidence, semen, bloodstains, hair and saliva, that can be utilised to link perpetrators with the crime scenes. This chapter furnished a literature review that highlighted the kinds of DNA evidence which may be identified at the rape scenes, the meaning of evidence and the importance of chain of evidence and emphasised the significant of wearing protective clothing when handling bodily fluid exhibits or any exhibits containing DNA evidence, and to protect evidence collected from rape scene from contamination. Swanson, Chamelin, Territo and Taylor (2012:281), asserts that keeping records of the chain of custody of the evidence and protecting the evidence from contamination is very crucial, both for preserving the sample itself so that it can be analysed and for ensuring that conclusions drawn from the examination of the sample cannot be challenged in court. The next chapter three will present the value of DNA as evidence to link the suspects with rape crimes in Pretoria.

CHAPTER THREE: THE VALUE OF DEOXYRIBONUCLEIC ACID AS EVIDENCE TO LINK THE SUSPECTS WITH RAPE CRIME SCENES IN PRETORIA

3.1 INTRODUCTION

Crime scene may involve any other place or location where physical clues regarding the crime may be located. According to Lochner and Zinn (2015:38), scene of incident is the most vital stage in the investigation of crime. At the scene, it is important that LCRC members concentrate on the search and seizure of physical evidence, because all crime scenes contain clues and traceable evidence, which can either be invisible or visible to the naked eyes. Locard Exchange Principle is vital in the investigation of rape, because during the commission of rape there is a physical contact, therefore the collected DNA evidence can be used to link the suspects to the victims and/ or locations, (Burkey *et al.*, 2014:48). This section of the research will answer this research question (“What is the value of DNA evidence to link suspects with rape crimes in Pretoria?”) as mentioned in paragraph 1.4 of Chapter one. This section of the study will define a scene of crime, discuss the value of the crime scene, name the different types of crime scenes in a rape case, physical evidence, Locard Principle, definition of rape and elements of crime, definition of suspect, the identification and individualisation of the suspect of rape.

3.2 DEFINITION OF A CRIME SCENE

A rape activity can have several crime scenes. This may lead to a situation whereby CSI and LCRC fieldworker will have to deal with several scenes which are related to a one committed offence. Swanson *et al.*, (2019:57), reveals that is a location where evidence (indirect and direct evidence) of allegedly committed crime may be located. Scene of incident points to an area where the crime incident took place. According to Van der Watt (2015:162), it can be anything, area or location where the investigations are required. Anderson, Rondinelli and Watkins (2013:31), describe a scene of crime as location where an incident took place. Anderson *et al.*, (2013:31), further indicated that is area where evidence can be found, even if it can be far from the primary scene.

Palmiotto (2013:98) and Stelfox (2013:126), describe crime scene as any place or area where events related to an offence happens but is not the place where the incident occurred. Lochner and Zinn (2015:10), believe that the scene of incident is the “engine room” of any investigation. It is the area where traces and clues of evidence that can assist to lead the investigation forward are discovered. Brandl (2014:340), says a site where actual evidence can be spotted, collected, packaged and marked is referred to crime scene. According to Dutelle (2011:13), crime scene is any area where physical evidence which can help to describe the events is located. Osterburg and Ward (2010:91) argue that it surrounds all areas where the performers in the scene (victim, offender and witness) moved when the crime was committed. According to the SAPS national instruction (2015:2), is the area and the surrounding, where the suspected crime took place or where objects with potential evidential value can be located.

3.3 THE VALUE OF A RAPE CRIME SCENE

Crime scene is the most significant part of any investigation, (Lochner & Zinn, 2015:32). Houck and Siegel (2011:32), described the scene of incident as the centre of the forensic world where everything begins and is the basis upon which all subsequent examinations are based. Gilbert (2010:95), indicates that a crime scene can be staged, and incongruity and contradictions become evident during crime scene processing. Gilbert (2010:148), explains crime scene as the important value that provide the investigator with suspect-tracing information. Bertino (2012:22), Dutelle (2011:4-5), Osterburg and Ward (2010:91-92), emphasise that is the location where crucial information and evidence concerning a committed crime may be located. Gardner (2012:79), says the purpose of crime scene is to collect as much information and evidence as possible, in as pristine a condition as possible. This evidence will serve to develop conclusions regarding how the crime transpired, who was involved, and perhaps the “why” of the crime. The researcher agrees with all the above authors as the crime scene holds important clues to resolving, restructuring and tracing of suspects. Proper handling of the rape crime scenes can result in collection of critical evidence, and it will also tell if the scene is staged or not.

3.4 DIFFERENT TYPES OF CRIME SCENES IN A RAPE CASES

Harris and Lee (2019:57), believe that categorisation of crime scenes may provide a guide to the investigation on how to proceed with the crime scene proceedings, on types of evidence are likely to be found in that type of cases. According to Palmiotto (2013:98), a crime scene starts where the criminal initiated the action of the crime and follows through to the escape route and places where the criminal may have gotten rid of any evidence. It serves as the initial point of a criminal investigation and contains evidence that connects suspects with the crime. Harris and Lee (2019:58), further indicated that the original locations at which crimes are committed are known as primary scene and secondary scene. Dutelle (2011:13) and Van Der Watt (2015:162) asserts that different types of scenes are primary crime scene and secondary scene. The place where most actions occurred or where most of the physical evidence is located is referred to as primary scene.

According to Lyle (2012:28) and Van der Watt (2015:162), crime scenes can be classified as primary scene, secondary, extended, microscopic and macroscopic. Lochner and Zinn (2015:32), state that microscopic scene can be any precise or small items or fine piece of evidence that is not visible to the naked eye and that is collected at a scene by using special techniques such as pipetting or vacuuming. A macroscopic scene can include the body of a rape victim. This involves a place where a criminal activity took place or another place where the perpetrator may have had contact, leaving objective evidence that will need to be analysed for leads. Osterburg and Ward (2010:432) also assert that the body of the victim establishes crime scene that possibly contains evidence that has been transferred from the perpetrator. Dutelle (2011:13), Osterburg and Ward (2010:432) and Van Der Watt (2015:162), believes that rape crimes might take place in more than two crime scenes.

Stelfox (2013:126), describe scene of crime as area where the important activity related to unlawful act takes place. The location where the criminal activity took place is not confined, scene of crime is any of the following: **(1)** Locations or initial place where crime was planned; **(2)** areas where the suspect and the victim meet; **(3)** area where the

victim was attacked by the perpetrator; (4) area where the victim was detained by the perpetrator; (5) vehicles or other forms of conveyance used in the crime; (6) body deposition site, in the case of homicide; (7) weapons; (8) weapon deposition sites; (9) places used to clean, or discard material used in or obtained during the offence; (10) ways to and from any scene; and (11) people who have come into contact with a perpetrator or a scene, including witnesses, victims and perpetrators and their homes, workplaces and vehicles.

3.4.1 Primary crime scene

Swanson *et al.*, (2019:59), defines primary scene as the area where the initial offense took place. Lochner and Zinn (2015:39), outlined primary scene as the place or area in the immediately vicinity of the occurrence or incident and where the majority of physical evidence (proving the elements of the crime under investigation) would be found. Maloney and Housman (2014:131), says primary scene includes the physical location of the assault or rape as well as the body and the clothing of the victim and suspect. Maloney and Housman (2014:132), further indicated that generally the physical location where the incident occurred; the body of the victim and the body of the perpetrator are referred as a primary scene because there may contain trace, fibre, biological or friction ridge evidence. Lyle (2012:28), referred primary scene as the place where original crime actually occurred. Palmiotto (2013:164), indicated that is a spot where criminal activity took place.

3.4.2 Secondary crime scene

According to Lochner and Zinn (2015:34), any location(s) which is different to the primary scene is referred to secondary scene. Turvey (2012:291), says is a site where some of the encounters between the offender and the victim took place but is not the area where the original crime happened. Swanson *et al.*, (2019:59), refers secondary scene as the locations of all subsequent connected events. Singh and Sharma (2021:2), state that is when we do not know where the crime originally took place (it is not where the actual crime took place). Crime Scene Forensics (2017) refers to a secondary crime scene as any other area(s) which is not the same as the primary scene. Lyle (2012:28), is of the view that any other related crime scene where the crime was not committed is deemed a secondary crime scene. Maloney and Housman

(2014:132), state that secondary scene include, but not limited to: (1) any area where the suspect may have conducted surveillance to choose the victim, (2) the area of the initial ambush if the victim was moved prior to the sexual assault or rape, (3) any location where the perpetrator or victim cleaned up after the sexual assault or rape, (4) the residence of the suspect where he or she might have secret tools, weapons or souvenirs associated with the sexual assault or rape, and lastly (5) any conveyance used by the perpetrator to transport the victim from the ambush site to the site where the crime was committed.

3.4.3 The body of the suspect as a rape crime scene

According to Lyman (2013:363) and (Ogle, 2012:314), potential evidence in sexual assault and rape cases may be located on the bodies of suspects and victims, and at the scene. Crime scene is described as the physical location where an incident has occurred and may also contain evidence, (Van Der Watt, 2015:162). This include the location which is in used by the suspect (Lyman, 2013:366). Lyman (2013:363), reveal that evidence may appear in various forms, such as pubic hair, fibre, bodily fluids evidence (semen and blood) that may be exchanged between the bodies of the suspect and the victim, and scene based on transfer theory during the rape. After the suspect is identified the clothing of the suspect will be collected. Biological evidence will also be collected from the suspect, which may include swabs (saliva), or hair samples which will help in the comparison of any DNA acquired on the victim or at the scene, (Burkey et al., 2014:55).

3.4.4 The body of the victim as a rape crime scene

Ogle (2012:314) agrees with Savino and Turvey (2011:120) by saying the victim`s body form part of a crime scene, but it was not classified as a primary or secondary scene. Van Graan and Budhram (2015:162), state that the medical examination of the body of the victim is the basis on which a rape investigation is built. The nature of rape dictates the body of the victim as the prime focus of the preliminary investigation process, because the body will have evidence of sexual assault reference to rape such as bodily fluids and genital injuries, (Osterburg & Ward, 2010:432). Brandl (2014:340), asserts that rape cases have many crime scenes where the incident happened and these includes the place where the victim was approached, attacked, the place where the

victim was disposed of, and where the offender fled after the commission of crime. Ogle (2012:314-315), emphasised that when processing rape cases, the body of the victim should be approached in an organised method. In this point, the investigators must mention exactly what they are searching for as evidence on the victim's body. Palmiotto (2013:143), after the incident of rape, DNA evidence can be retrieved from the victim's body, so care should be taken to try to preserve that evidence.

3.5 PHYSICAL EVIDENCE

Physical evidence may tell a story. Physical evidence-documented properly, collected properly, analysed properly, and interpreted properly-may determine the factual circumstance at the time of a commission of crime, (Chisum & Turvey, 2011:45). Ogle and Plotkin (2018:4), analysis and interpretation of the physical evidence may assist in the investigation of a crime or tort in a number of ways. Orthman and Hess (2013:137), asserts that is only usefulness if etiquette is properly adhered to ensure that the evidence is helpful during a trial. Bartler (2015:221), says physical evidence is all the means by which any alleged matter of fact whose truth is investigated at judicial trial is established or disproved. Thus, evidence is essentially anything that is admitted into court or court preceding that can aid in proving or disproving some aspects of crime or incident.

Fish *et al.*, (2011:15) state that when physical evidence is accurately identified, gathered, and preserved, it can connect the suspect to the scene of crime, a weapon or to other physical evidence. Tillstone, Hastrup and Hald (2013:3), indicates that physical evidence refers to object and material that can be felt, invisible and visible and touchable such as murder weapon, semen stains and fingerprints. According to Gardner (2012:25), physical evidence has a greater power and ability than testimonial evidence in defining what happened at the scene. Physical evidence is what it is and it is tangible. However, Robert and Ogle (2012:17) asserts that physical evidence may provide a tangible object for the jury to see. Tillstone *et al.*, (2013:3), asserts that is anything that has been used, left behind at the scene by the perpetrator, removed, touched, or destroyed during the commission of crime. Orthman and Hess further describe that the following procedure should be adhered to ensure the admissibility of

evidence in court: **(1)** identify the evidence that was located at the crime scene; **(2)** describe correctly where it was located; **(3)** establish its custody from discovery to the present; and **(4)** willingly explain any shifts that have occurred in the evidence. Physical evidence must be examined to assist with the identification of the suspect. This evidence may include hair and bodily fluids (such as blood, semen and blood) for DNA analysis and databank comparison, (Burkey *et al.*, 2014:72).

3.6 LOCARD PRINCIPLE

According to Swanson *et al.*, (2019:10) all the crime scenes are on the basis of Locard's exchange principle, which asserts that when suspects come into contact with the scene, they will leave something of themselves and take something from the scene. Pepper (2010:7), indicates that in 1910 Locard published his principle, proposing that when one object comes into contact with another object, something will be exchanged among both objects. Locard's Principle is the core of the transfer and recovery of all forensic evidence. This principle states that "every contact leaves a trace" therefore, any two objects that come into contact with one another will each take something from the other object or leave something behind, (Burkey *et al.*, 2014:48). Lochner and Zinn (2015:12), outlined the Locard Exchange Principle which is based on the theory and stated as follows, "the moment two items come into contact with each other, the one will leave a trace on the other." According to this Locard's Principle, the reciprocal transfer of trace takes place in two ways. The criminal will leave traces on the scene and it is clear that the criminal cannot perform an action without leaving behind some traces or clues. The Locard Principle normally furnish investigators with the leads of investigation, (Fish, Miller & Braswell, 2011:110). Locard verified that any conduct of an individual, and especial violent behaviour and action composing a crime, cannot take place without leaving a trace (Wilding, 2012); therefore, this is widespread mainly in contact crimes like rape, assault with intention to cause grievous bodily harm, murder and kidnapping. Fish *et al.*, (2011:110), further stated that Edmond Locard is credited with recognising the theory of exchange. Locard clearly stated that every contact leaves a trace. Also referred to as "Locard's Theory of Exchange," the concept supports the three statements (Fish *et al.*, 2011:110):

- Traces of the victim and the crime scene will be taken away by the suspect.

- Suspect's traces will remain on the victim, and the victim may leave traces of him or herself on the offender.
- Traces of the offender will be left at the scene.

Jackson and Jackson (2017:19), states that every contact leaves a trace. The suspect of a crime will not only take traces of the crime scene away with him or her but also leave traces of his or her presence behind. Lyle (2012:20), explains the basic premise of this principle as whatever a person comes into contact with an object, place or another person, an exchange of materials takes place. Houck and Siegel (2011:54), indicates that when two things come into contact, information is exchanged.

3.7 DEFINITION OF RAPE AND ELEMENTS OF CRIME

Palmiotto (2013:141), rape involves forcing a sexual act against one's will. Burkey *et al.*, (2014:8), may come in variety of forms such as attempted rape, sexual assault, statutory rape and date rape. Rape is generally defined as a sexual penetration or contact that is forced or coerced, this may include vaginal, anal, or oral penetration, (Maloney & Housman, 2014:131). According to Gilbert (2010:292), is an act of sexual intercourse against another by force or without one's consent. Palmiotto (2013:141) asserts that under common law, rape is committed when a male engages in sexual intercourse with a female (1) by forcible compulsion, (2) who is incapable of giving consent by reason of being physically helpless or mentally incapacitated, and (3) who is less than 12 years old.

Snyman (2014:343), explains that the main purpose of introducing a new Sexual Offence and Related matters Amendment Act 32 of 2007 was to ensure that the various offences would be clearly distinguished from each other, e.g. sexual assault from rape. According to this new Act 32 of 2007, when a person commits an act of sexual penetration, and the act is committed unlawful and intentional with a victim, without his or her permission, that person will be found guilty of rape. The Act also indicated that the victim can be any person irrespective of a gender, either a man or a woman can be the complainant, victim or perpetrator of rape (Government Gazette, 2017:6), and that this crime can be committed to any individual irrespective of the gender. The new Act

additionally categorises several offences, as mentioned by Osterburg and Ward (2010:430), related to sexual crimes in South Africa, namely sexual assault, compelled rape, people with mentally disability, bestiality, and incest (Government Gazette, 2017:6). Snyman (2014:343) and Government Gazette (2017:6) argues with Palmiotto (2013:141), that victims and suspects of this crime can be any person irrespective of a gender.

Swanson *et al.*, (2019:290), define rape as when a person having a sexual relations with another person under the listed circumstances: if the person (1) is a child who is under the age of consent as fixed by statue, (2) is insane, (3) is intoxicated or under the influence of any substance such as alcohol, (4) if it occurs while the victim is unconscious, and (5) if is against the victim`s consent. Burkey et al., (2014:7) agrees with Government Gazette, that now rape is considered to be sexual intercourse and/ or contact without the consent of the alleged victim, wherein the act the act involves violence or forces, duress, or fear of harm. This definition now entails penetration against both males and females, and also includes other types of penetration such as oral, digital, and anal.

According to Palmiotto (2013:142), the two basic elements which are required to establish rape. firstly, the sexual intercourse must be without the female`s consent-the consent is not valid if she acts under duress, force or threat, or if she is underage, mentally incapacitated, intoxicated. Secondly, there must be a carnal knowledge of the female-that is the penis penetrate the vaginal. Burchell (2013:595), listed elements of rape as sexual penetration, between a person and a complainant, without the complainant`s consent, unlawfulness, and intention. Snyman (2014:343) agrees with Burchell (2013:142), mentioned the elements of crime as follows: (a) Unlawful, (b) Intentional, (c) Sexually violates, and (d) Without his or her consent.

3.8 SUSPECT

Snyman (2014:252), a person is a perpetrator or suspect if (a) his conduct, the circumstances in which it takes place and the culpability in which it is carried out are such that he satisfies all the requirements for liability contained in the definition of the crime, or (b) if he acted together with one or more persons and the conduct required

for a conviction is imputed to him by virtue of the principles relating to the common purpose. Bennett and Hess (2004:336), reveal that a suspect can be an individual regarded to be directly or indirectly involved in a crime, either by overt act or by planning and/or directing it. Moreover, a suspect can be any individual who has committed a crime, but still not connected to that offence although they have been identified. Snyman (2014:253), reveals that a suspect may include accomplices and accessories who helped in the execution of crime.

3.8.1 Identification of a rape suspect

According to Osterburg and Ward (2010:8), identification may take various forms such as physical evidence from the scene (hair, property, fibres,); physical identification (tattoos, deformities, physical descriptors such as height, shape); and eyewitness descriptions, although these can be unreliable when the suspect is not known to the victims or witnesses. Identification is defined as the classification process by which an entity, person or object is placed in a predefined class or category, based on shared or similar features or characteristics, (Osterburg & Ward, 2014:36). Houck and Siegel (2011:57), identification is defined as the examination of the chemical and physical properties of an object and categorising the object as a member of a group, which is then called a “class.”

Benson et al., (2015:47), define identification as a classification system when objects with similar characteristics are classified in one category and a name is then allocated to such category. According to Ogle and Plotkin (2019:268), DNA typing from semen may furnish the important information that leads to successful identification and prosecuting of suspect. Once the suspect is identified, biological evidence such as saliva (mouth swabs) or hair samples will be collected from the suspect and will be matched with DNA acquired from the scene or victim, (Maloney & Housman, 2014:55). Ogle (2012:9) holds that identification has to do with gathering identical features that share similar characteristics with the item, a person that is identifiable. Evidence from the victim may assist in the identification of a suspect or may rebut a defense of consent at trial, such evidence from the victim that serves to identify the suspect includes semen stains, saliva stains, and trace evidence transferred to the victim from the suspect's

body or clothing, (Ogle & Plotkin, 2019:270). Identification needs to go through the process of individualisation, during which the unique identity of the suspect is determined by means of relevant evidence that was collected from the scene and used to connect him/ her to the offence, distinguishing the suspect from all other persons as the suspect of the crime, (Van Graan & Budhram, 2015:47-64).

3.8.2 Individualisation of a rape suspect

Harris and Lee (2019:232), asserts that individualisation is the DNA typing of biological evidence to try to show that it is almost certainly came from a particular individual, or that it did not come from that individual. Chisum and Turvey (2011:107), described individualisation as the presentation that a certain sample is unique, even among the related family members. Girard (2011:15) agrees with Chisum and Turvey (2011:107) by stating that is the process of proving that a particular unknown sample is unique, even between members of the same category. Ogle (2012:9), indicates that individualisation encompasses the comparison of disputed objects that are discovered at a scene of incident with the ones of known origin. According to Makin and Miller (2014:33-34), DNA is a universally accepted scientific means of identification. The ability of DNA to uniquely identify a person relies upon key differences as contained within a segment of DNA.

3.9 THE SIGNIFICANCE OF DEOXYRIBONUCLEIC ACID AS EVIDENCE TO IDENTIFIED AT THE RAPE CRIME SCENE

DNA technology provide a powerful tool to assist in solving difficult cases, (Palmiotto, 2013:134). DNA techniques can be used in a number of cases, including murder and rape. Ogle and Plotkin (2019:268), states that with the advent of DNA profiling by forensic scientists, semen evidence is virtually equivalent to latent fingerprints for identifying the perpetrator of sexual assault or rape crimes. Dutelle (2014:24), believes that DNA is the most important investigative tool that can be used to identify the suspect because no two or more people have the same DNA except of identical twins. It is further elaborated by (Burkey *et al.*, (2014:52-53), that DNA is a powerful tool for law enforcement investigations because each person's DNA is different from another person. DNA can be acquired from sources such as saliva, bone, teeth, and blood. In the cases where the suspect is unknown, biological evidence from the crime scene can

be analysed and compared to offender profiles contained in existing DNA database to assist in identifying the suspect, and in a case where the suspect is known, samples of the person`s DNA can be compared with the biological evidence found at the scene of crime.

According to Zinn and Dintwe (2015:97), the evidential value that can be derived from serological evidence varies depending on the types of tests that are performed. Developments in DNA analysis have greatly enhanced the evidential value of serological evidence. Before the advent of technology that permitted the use of DNA for identification, forensic examines had to rely on less distinguishing features such as the blood group or enzyme group in the bodily substance to establish the identity. Heathfield (2014:01), holds is a technique that is used to assist in identifying suspects and to connect scenes of crime to each other. Hess and Orthman (2010:142), mentioned that can provide conclusive evidence in most cases. The authors further reported that DNA evidence can even indicate the race, gender, eye colour as well as the hair colour of the person in question.

CASE 1 – STATE v NDZIWENI LAWRENCE ZAMILE, CASE NO: ss149/2015

[1] Mr Ndziweni has been arraigned on four (4) counts of rape and he pleaded not guilty to any of the cases.

[2] The first case occurred on December 25, 2012, at Graceland complex, unit 74-5th avenue in Norwood Randburg.

[3] The second case took place at President Fouché Street in the district of Johannesburg, the accused gang raped a 31-year-old victim without her permission, on 27th of June 2013.

[4] The third case occurred on December 16, 2013, at the same place were the second complainant was victimised a 21-year-old female victim was raped without her permission.

[5] The fourth case occurred on February 28, 2014, at or near President Fouche Street in the district of Johannesburg, the accused unlawfully and intentionally committed an act of sexual penetration with a 29-year-old victim without her consent.

[6] Vaginal swabs were taken from three victims and cervical swabs from another victim.

[7] Mr Ndziweni was arrested on 24 June 2014, and his buccal samples were taken to be matched with the crime samples attained from the victims.

[8] Mr Ndziweni's DNA was discovered in the intimate parts of all four victims and he was unable to provide any explanation whatsoever for the presence of his DNA found within the bodies of the four victims who do not know him.

[9] Mr Ndziweni was found guilty on all counts of rape.

Case 2 – STATE v SANDISILE MAKHAKHA, CASE NO: ss41/2012

The accused faced six (6) charges:

Charge 1 – rape

Charge 2 – murder

Charge 3 – robbery

Charge 4 – attempted murder

Charge 5 – rape

Charge 6 – murder

Charges 1 and 2 – the victim was a female person known as Nozukile Ntshoze, who was raped and killed by the accused on 18 October 2007 at Brown Street, Masakhane in the bushes.

Charges 5 and 6 – the incident took place between 4 and 6 July 2011, were a female known as victim Azavela Ziwele. The accused intentional raped and killed her at the same place near the Balasi grazing fields, Bisho, Eastern Cape.

The accused pleaded not guilty to all charges against him.

The underwear's that were worn by the bodies of victim1 and victim2 during the post-mortem examination were accurately packaged inside the sexual assault evidence collection kit.

The swabs were also taken from the vaginal vault and cervix of the body of deceased 1, and the DNA results from underwear's of the victims matched the reference sample of male donor L Masengana, the name accused used interchangeably with his official name, Sandisile Makhakha.

Charges 5 and 6 for – the cervical, vulva, vestibule and vaginal vault swabs were properly taken from deceased 2 and possible semen were discovered in relation of all the swabs as well as on the underwear of the second victim (deceased 2). The outcome of DNA samples, S Makhakha, was read into the mixture DNA from the panty.

The accused was found guilty on charges of charges 1 and 2, and charges 5 and 6.

3.10 SUMMARY

Crime scene is a place where a suspected criminal offence has taken place. Researcher notes that there are many different crime scenes in rape cases, which could be useful to the investigation of the events. These crime scenes were outlined as primary, secondary, the body of the victim, and body of the perpetrator. Processing the crime scene is commonly one of the most crucial stages of the investigation. Therefore, First responding officers, CSI and LCRC fieldworkers' members are encouraged to concentrates on the search for physical evidence at the scenes. The physical evidence may be visible and invisible to the naked eye or may be microscopic. The significance of the Locard exchange principle is that it links suspects to victims or locations where criminal activity took place. Since, rape is considered as a contact crime, it is obvious that objective evidence will always be transferred between the suspect, the victim and the scene of crime, (Hess & Orthman, 2010:326). The researcher concludes that when physical evidence such as blood, semen, and hair has been collected, then the process of identification and individualisation of a suspect is initiated, and that could be done by taking collected DNA samples which were collected as tangible evidence (like saliva, body fluid, semen, and pubic hair) and compare them to the samples taken from the suspect. The next chapter four in this study is the presentation and interpretation.

CHAPTER FOUR: PRESENTATION AND INTERPRETATION

4.1 INTRODUCTION

In this section of the study, the collected data is analysed and interpreted, thereby providing insights for the recommendations to be provided in the last chapter of this study. Themes were designed in order of priority and with the aim to obtain the objectives as mentioned in paragraph 1.5 of chapter one of this study. In this chapter, Interviews were carried out in the form of semi-structured method and using interview schedule questions attached as Annexure A. Interview schedule questions were extracted from paragraph 1.3 research aim and paragraph 1.4 research questions of chapter one in this study. Participants provided responses that addressed the questions during the interviews. Themes emerged as a result of participants' responses during interviews and will be discussed in this chapter.

This chapter focuses on the research findings, which are based on the interview responses of sample A and sample B, and national and international sources. It is necessary to note that the literature review also made a major contribution to the outcome of this study. The researcher's experience in the field also contributed on regards of enhancing the quality of the study.

4.2 FINDINGS RELATING TO THE STUDY AIM

4.2.1 The aim is to evaluate DNA evidence to link the suspects with rape crime scenes in Pretoria

4.3 FINDINGS BASED ON THE RESEARCH QUESTIONS

4.3.1 What are the different types of DNA evidence that can be identified in the rape crime scenes?

What is the value of DNA evidence to link suspects with rape crimes in Pretoria?

4.4 FINDINGS ON THE STUDY OBJECTIVES

4.4.1 To evaluate the importance of DNA evidence in the identification of the rape suspect

4.4.2 To assess the existing strategies used to determine the value of DNA as evidence to identify and associate the rape suspect to a crime scene.

4.4.3 To empower the researcher, the SAPS LCRC fieldworkers and first officers with the outcome of this study. The following section presents themes which emanated from interviews with participants.

4.5 EMERGING THEMES

4.5.1 Theme 1: The role of first responders at the rape crime scene

Question 1: According to your understanding, what is the role of the first responder officers at the rape crime scenes?

Responses by the participants from sample A:

“The responsibility of the first responder officers is to cordon the crime scene, mark and preserve visible physical evidence until the crime scene technicians arrive at the scene” (Participants 1, 3 & 4). “To secure the crime scene, attend to injured person and summon the relevant stakeholders at the scene, such as medical emergency services, LCRC members and dog units’ team which can assist to search for suspects” (Participants 2, 6 &7). “To control the onlookers at the scene, preserve evidence, provide assistant to injured and summon the CSI and LCRC members to the scene” (Participants 8 &9). “To ensure that the victim get medical attention, secure the crime scene and obtain statements from witnesses and arrest suspects if they are at the scene and protect evidence from being destroyed by the bystanders” (Participant 10).

Responses by the participants from sample B:

“The duties of the first responder are to cordon the scene of crime using police cordon-tape”, (Participant 1 & 2). “To help injured complainant or victims, mark physical evidence found at scene, to identify the entry and exit point that will be utilised by the stakeholders to enter and exit the scene, this will minimise the

possibility of contamination of physical evidence identified at the rape scene” (Participants 3, 4, 5 & 6). “The role of first responder includes to secure the crime scene, ensure that victims get medical attention, identify physical evidence such as used condoms, weapon used and call all relevant individuals such as detectives, and LCRC fieldworkers” (Participants 7, 8,9 & 10). Researcher observed the responses, its clearly that all participants from both samples A and B understood the question. Paragraph 2.2 of chapter two of this study confirms this finding as stated by Ogle and Plotkin (2019) and Gardner (2012), by indicating that the duties of the first responder officer as to establish a pathway for those individuals entering and leaving the crime scene, such as emergency medical personnel, detectives, CSI, and SAPS LCRC fieldworkers, this pathway will help to reduce the possibility of evidence destruction and will establish orderly crime scene search.

4.5.2 Theme 2: The meaning of evidence

Question 2: What do you know about the term evidence?

Responses by the participants from sample A:

“Evidence is any exhibit that can be used as testimony in court” (Participant 1). “Any object that was found at the crime scene that might be used, touched or damaged by the suspect during the commission of crime” (Participant 2). “Anything that is admissible in court and that will connect a suspect with a scene of incident; it can be a direct evidence or tangible evidence” (Participant 3). “Evidence is any object that can be discovered at the commission of crime and may be utilised to connect the culprits to the scene” (Participants 4 & 5). “Can be anything used to identify the suspect” (Participant 6). “Anything tangible in nature” (Participant 7). “Evidence can be anything that one can see, touch, feel or smell and at the same time be able to prove the statement in question” (Participant 8). “Any clue that can be used to prove a crime e.g. fingerprints” (Participant 9). “Anything presented in support of an assertion,” (Participant 10).

Responses by the participants from sample B:

“Every trace left by suspect at a crime scene” (Participant 1). “The truth which confirms that a specific belief or proposition is valid” (Participant 2 and 10). “Something to shows that this belongs to a particular person... something that you can prove” (Participant 3). “Something that can be utilised to link suspect with a scene” (Participant 4). “Any object tends to prove or disprove something” (Participants 5, 6 and 7), “It is any object that can be located the commission of crime and can link the perpetrator to the scene” (Participant 8). “Evidence can be anything that was used by the culprits or left at the location where the incident occurred” (Participant 9).

The responses indicate that the participants had different views about the meaning of evidence. Paragraph 2.3 of chapter two in this study stated by Hess and Orthman (2010), agree with participant 8 of sample A, by stating that evidence is anything real that can be visible or invisible – that helps to establish the fact of the case for identifying, apprehending and convicting suspected offenders.

4.5.3 Theme 3: The meaning of Deoxyribonucleic Acid

Question 3: Based on your experience, what is your understanding about DNA?

Sample A-participants responses were:

“DNA evidence is a cell that hereditary and can be compared with any human fluid for genealogy” (Participants 1 and 6). “DNA evidence is body fluids that contain an individual’s genetics” (Participants 2 and 8). “DNA evidence is anything that connects with bodily fluids – it can be blood, sweat, semen, and roots of the hair” (Participant 3). “DNA evidence is bodily fluids evidence that could be collected from the scene of crime” (Participant 4). “Bodily fluids that can be found from the suspect and victim that had contact during the commission of crime (rape incident)” (Participant 5). “DNA evidence is the most crucial item that can be used to identify the suspect” (Participant 7). “DNA evidence is a biological genetic of a living organism (human being)” (Participant 9). “Analysis DNA evidence found at the scene like specimen, bodily fluid such as blood and

semen, and establish whether it can be matched to DNA taken from a specific individual” (Participant 10). Sample B-participants responses were:

“DNA is the material found in cells that determine characteristic such as hair, eye and skin colour – every individual’s DNA is different except for identical twins” (Participant 1). “Deoxyribonucleic Acid” (Participant 2). “We can use DNA to identify suspects or link the suspects to a crime – it is unique and it is passed from parents to children” (Participant 3). “DNA evidence is a form of biological evidence” (Participant 4). “DNA evidence is made up of biological samples that can assist to connect suspects to the scene of incident” (Participant 5). “DNA discovered in physical evidence namely blood, hair, saliva, and semen” (Participant 6). “Deoxyribonucleic acid” (Participant 7). “Any biological evidence that can be located from any spot where the incident happened.” (Participant 8). “It contains genetics of individuals or of a person. In most cases, it is made of bodily fluids” (Participant 9). “It is a process of proving or showing the individual DNA characteristics of a human or animal” (Participant 10).

The participants from both samples gave varied responses. The researcher observed the responses and notes that DNA is bodily fluid that contains human genetics, and it is unique, through the DNA, we can be able to identify the suspect and the victim.

4.5.4 Theme 4: Deoxyribonucleic Acid evidence which can be identified and collected at rape crime scenes

Question 4: Name different types of DNA evidence that can be identified in rape scenes, and discuss how such evidence can be used to identify and link the suspect with the rape scene?

Responses by the participants from sample A:

“Specimen, semen and touch DNA. Samples may be taken to FSL for DNA comparison” (Participant 1). “Blood, hair roots, and semen can be collected by means of a towel or tissue which was used to wipe. It will be collected and sent to a forensic science laboratory” (Participant 3). “Semen, saliva, used condoms and touching DNA such as specimen” (Participants 2, 4, 5, 6 and 9). “Saliva from cigarettes butts and pubic hair” (Participant 7). “Used condoms can be swabbing

from inside and outside, panty or underwear of the victim, blanket that was used at the incident, and towel used by the suspect to wipe his semen” (Participant 10).

Responses by the participants from sample B:

“Epithelia cell-by analysing with referral samples, touch DNA – same applies by analysing the touch DNA with referral samples from the suspect” (Participant 2). “If the suspect is identified we can compare the semen found from the scene of incident and the one from the offender” (Participant 3). “Blood, semen, saliva – these can all prove that the suspect had contact with the victim” (Participant 4). “Specimen, blood, semen, and saliva” (Participant 5). “Public hair, semen, and saliva when matched with DNA found from the suspected person” (Participants 7, 8 and 9). “Blood, saliva, and semen evidence collected from the scene will be matched and analysed with the collected directly from and individual” (Participants 6 & 10).

The responses indicate that participants understood the question. This expressed views by the participants reads with paragraph 2.5 of chapter two of this study, when Baxter (2015) says there are different types of biological evidence within a rape scene includes blood, saliva, touch DNA and semen. Only two participants did not answer the question.

4.5.5 Theme 5: The importance of chain of evidence collected from rape crime scenes

Question 5: Briefly discuss the importance of chain of evidence, from the moment is collected from a rape crime scene?

Responses by the participants from sample A:

“To trace and clarify to the court that nothing was omitted nor contaminated during the process” (Participant 1). “It is to keep proper record of evidence that was found at the scene until it was represented in court” (Participants 2, 6 and 7). “To make sure that the evidence is not contaminated after its collection from the scene” (Participant 3). “The investigator must account for evidence, starting

from the point where it was collected until it was presented at the court” (Participant 4). “To make sure that evidence is not tampered with until the moment is presented in a court of law” (Participant 5). “It is able to trace whom and how the exhibit or evidence was handled” (Participant 8). “To able to trace the custodian who handled the evidence to conduct limitation in case of contamination” (Participant 9). “The admissibility of physical evidence in criminal cases is an important part of crime investigation and should never be underestimated” (Participant 10).

The responses of sample B participants were as follows:

“The integrity of evidence to ensure that its value is not compromised along the process” (Participant 2). “Time and date, sequence, to keep record of who collected the evidence, and who sent, it so that we can prove the integrity of the evidence” (Participant 3). “That evidence stays in the SAPS possession and that there is no chance of someone tampering with it” (Participant 4). “To make sure that since the evidence was collected until it reaches court, there is tracking reference of who handled it and how it was kept” (Participant 5). “It is to preserve the integrity of evidence and prevent it from decontamination” (Participants 6 and 7). “It is to assure that collected physical evidence were not tampered with from the moment it was gathered from the scene” (Participants 8 and 9). “To ensure that proper channels were followed to preserve evidence” (Participant 10).

The researcher noted that a chain of evidence has considerable value in determine the basis of evidence when it is presented in court. The participants provided practical responses and they had different views, overall indicated that they are knowledgeable about what chain of evidence entails. Only one participant from sample B did not give respond. This expressed views by the participants reads with paragraph 2.6 of chapter two of this study, when Ogle and Plotkin (2018), reveals that the requirement for chain of evidence is that each individual or entity having possession of an evidence object from the time it is collected from rape scene until the time it is introduced into evidence at a court proceeding must be identified.

4.5.6 Theme 6: Contamination of evidence

Question 6: According to your understanding, what is the contamination of evidence? and what can be done to prevent contamination of evidence at the rape scenes?

Sample A-participants responses were as follows:

“The contamination of evidence is when the actual crime scene evidence comes in contact with non-actual crime scene evidence” (Participant 1). “It is to tamper with physical evidence gathered from the scene” (Participants 2 & 7). “It is when you collect evidence with bare hands without gloves or PPE” (Participant 3). “Contamination of evidence is when evidence come into contact with a foreign object, substance or subject that was not originally found on the crime scene” (Participants 6, 8 and 9). “It occurs when the original condition of the forensic exhibit material is altered or if something is removed” (Participants 4 & 10).

Responses by the participants from sample B:

“Not to tamper with evidence and not to put/transfer foreign or new evidence next to evidence found on crime scene” (Participant 2). “Touching where suspects touched without wearing hand gloves” (Participant 3). “It is when a known or unknown person tamper with evidence to cause confusion” (Participant 4). “Any foreign material introduced to the evidence after it has been collected from the scene” (Participant 6). “When actual crime scene evidence come into contact with non-actual crime scene evidence” (Participants 7& 8). “Tampering with or destroying visible or tangible evidence” (Participants 9 & 10).

Participants showed that they understood what the contamination of evidence is. However, one participant from sample A and two participants from sample B did not provide answers of the asked question. Paragraph 2.7 of chapter two in this study confirms the findings as stated by Goodwin *et al.*, (2011) and, Singh and Sharma (2021), by emphasising the necessity of wearing protective clothing when processing crime scene containing blood exhibits. Meanwhile, Lochner and Zinn (2015) in paragraph two of chapter two, mentioned that is necessity to recall that the collected

evidence must be managed and transported in a proper way to ensure that is not contaminated.

4.5.7 Theme 7: Crime scene

Question 7: What is a crime scene?

Responses by the participants from sample A:

“The crime scene is area where physical evidence has been left and transferred during the occurrence of a crime” (Participant 7). “It a spot where an unlawful act of crime was committed, and where possible clues of evidence can be collected to link the perpetrator with the scene” (Participants 1, 2, 3, 4, 5, 6, 8, 9 and 10).

Responses by the participants from sample B:

“Is a location where the offence occurred and foreign evidence was collected... refers to the place where crime-related incidents occurred... where the objects with potential value (evidence) can be collected” (Participants 1, 2, 3, 4, 5, 6, 7, 9 and 10). “Is a site where invisible and visible evidence may be discovered” (Participant 8).

The responses indicate that the participants understood what a crime scene is. This expressed views by the participants reads with paragraph 3.2 of chapter three of this study, when National Instruction 1 (SAPS, 2015), states that is a location, encompasses areas, where an alleged crime was committed and the place where items and objects with evidential value can be found.

4.5.8 Theme 8: The value of a crime scene

Question 8: Based on your experience, discuss the value of rape crime scene.

Responses by the participants from sample A:

“To uncover the truth behind the crime and to help the judicial system with the trial if proper procedure was followed” (Participant 1). “Crime scenes contain valuable information or evidence regarding the investigation of a committed crime” (Participant 2). “A place where exhibits or evidence that can lead to the investigation can be found” (Participants 3 & 8). “Crucial evidence that can lead

the investigation to the suspect can be found from the scene of crime” (Participant 4). “The crime of incident is the foundation for investigation therefore it is valuable” (Participant 5). “It contains evidence that can assist in the investigation or lead the investigation to the suspect” (Participants 6 & 7). “The scene of crime is an important place where evidence and clues can be discovered in order to resolve the crime” (Participant 9). “A place where valuable information and evidence to lead the investigation can be found” (Participant 10).

Responses by the participants from sample B:

“Condoning/protecting the area where crime was committed to maintain the integrity of evidence)” (Participants 1,2 & 9). “To help police officers and court to know what happened on the crime scene” (Participant 3). “Almost all-important evidence will be found there” (Participant 4). “A place where evidence can be gathered” (Participants 5 & 8). “It contains physical evidence that aids in a criminal investigation” (Participants 6 & 10). “It contains important information/evidence that can lead the investigation to the apprehending of suspects” (Participant 7).

The researcher noted that the participants understand the asked question. This expressed views by the participants reads with paragraph 3.3 of chapter three of this study, when Lochner and Zinn (2015) stated that crime scene is the most important part of any investigation. And observed as of important value in furnishing the investigator with regarding the information required to trace the suspects (Gilbert, 2010:148). All participants from both samples A and B answered of the question.

4.5.9 Theme 9: Types of crime scenes in the investigation of rape cases

Question 9: What are the various types of crime scenes in a rape case?

Responses by the participants from sample A:

“Outdoor, indoor and conveyance crime scenes” (Participants 1, 4, 5, 6 and 10). “Primary crime scene, secondary scene and the body of the complainant” (Participants 2 & 7). “It may either be at the suspect’s place or a victim’s place” (Participant 3).

Responses by the participants from sample B:

“Outdoor crime scene” (Participant 3). “Body of the victim and place where crime was committed” (Participant 6). “Location where incident occurred, body of victim, and body of suspect” (Participant 7). “Place where evidence was collected e.g., indoor and outdoor crime scene” (Participant 8). “Place where illegal act took place, including the bodies of the victim and suspect” (Participant 9). “Location and environment e.g., motor vehicle or building and/or premises” (Participant 10).

Participants from both samples gave varied responses which corresponded with the literature. This expressed views by the participants reads with paragraph 3.4 of chapter three of this study, when Harris and Lee (2019) agree with five participants of sample A, by stating that the original locations at which crimes are committed are known as primary scene and secondary scene. Paragraph 3.4 of chapter three of this study, when Lyman (2013) and (Ogle, 2012) supports the responses of three participants of B Sample, by stating that potential evidence in sexual assault and rape cases may be located on the bodies of suspects and victims, and at the scene. Two participants from sample A and four participants from sample B did not give responses.

4.5.10 Theme 10: Physical evidence

Question 10: What is physical evidence? Participants responded as follows:

Responses by the participants from sample A:

“Can be any exhibit collected at the crime that is acceptable before the court” (Participant 1). “Any object that can take place in any form, shape or size that can bring information that steers the investigation to the apprehending of the suspect” (Participants 2 and 7). “Anything or any kind of object that is tangible” (Participants 3 and 9). “Any object found on the crime scene that can provide more valid details about what occurred at the scene” (Participant 4). “Any object found on the crime scene that can provide a court with useful information regarding the alleged crime” (Participants 5 and 6). “Anything that anyone can touch” (Participant 8). “It can be any object or item found at the scene and that plays some role in a judicial proceeding such as a trial to prove facts in issues” (Participant 10).

Responses by the participants from sample B:

“Traces left on the crime scene by the suspects” (Participant 1). “Anything that was handled, altered or tampered with it at a crime scene” (Participant 2). “Physical evidence is evidence that you can see which can connect the suspects to the crime scene” (Participant 3). “Evidence that can be seen or touched (even through a microscopic)” (Participant 4). “Physical evidence is any object or material left at place where crime is committed, that can help to solve or prove a point” (Participant 5). “Material objects collected at the crime scene” (Participant 6). “Any object or visible and invisible evidence discovered at the scene that may be used to connect the culprit to the scene” (Participant 7). “It is any tangible evidence discovered at the scene that could be used to identify the suspect” (Participants 8 and 10). “Physical evidence is anything which may furnish helpful information in the investigation to solve crime cases” (Participant 9).

The participants shared mixed views of what physical evidence is, and some of the responses indicated that the evidence can be invisible. Paragraph 3.5 of chapter three in this study confirms the findings as stated by Bartler (2015) by indicating anything that is admitted into court that can aid in proving or disproving some aspects of crime or incident. Researcher encourages the first responders, LCRC fieldworkers and CSI members to search not only for biological evidence at the rape scene but even the used condom or condom covers are referred to as physical evidence.

4.5.11 Theme 11: Locard Principle

Question 11: what do you understand by the term Locard Principle in rape cases?

Responses by participants from sample A:

(It is when two items come together in contact with each other, and they leave a mark e.g., victim and subject or suspect and object and the major role of Locard Principle is to confirm that indeed the suspect had a physical contact with the victim” (Participants 2 & 8). “It is a science of Poroscopy, the identification of sweat pores, every contact leaves a trace” (Participant 3). “Every trace leave

contact (evidence), perpetrators can drop traceable evidence before they flee the scene e.g., DNA, latent printing, hair and fibres” (Participants 9 &10).

Responses by the participants from sample B:

“The suspect always transfers and carry anything from place where the crime happened and that may be used as forensic evidence” (Participant 1). “It is when more than one items come into contact and leaves traces” (Participants 5, 8 & 10).

Only nine participants from both samples indicated that they understood the term Locard Principle and eleven participants did not provide the answers. This expressed views by the participants reads with paragraph 3.6 of chapter three of this study, when Swanson et al., (2019) indicated that all the crime scenes are on the basis of Locard exchange principle, which asserts that when suspects come into contact with the scene, they will leave something of themselves and take something from the scene.

4.5.12 Theme 12: Rape

Question 12: Define and discuss the elements of rape.

Responses by the participants from sample A:

“Rape comes in different forms, can be statutory rape, date rape and attempted rape or forcing a victim to perform sexual acts with the complainant without the permission of the complainant. The element are as follows: forcing, intentional, and act” (Participant 1). “Unlawful and intentional performing act of penetration to another person without her consent” (Participants 2, 3, 4 & 10). “Unlawfulness and intentional having sexual intercourse, with a victim without her consent, if the victim give consent while underage, then that consent is not valid. and elements are extracted from the definition of crime” (Participant 5). “Rape occurs when the offender has sexual penetration with another person, without the permission, the act must be performed intentional and unlawful” (Participant 6). “Act, intention and unlawfulness” (Participant 8). “Rape is unlawful, intention,

commission, and penetrating (or touching) the genital organ of one without consent” (Participants 7 & 9).

Responses by the participants from sample B:

“Rape is defined as unlawful and intentional having sexual intercourse with the victim without his or her permission, the perpetrator uses force or violence, if permission is given by the victim, consent will only be valid if the victim or complainant was in good state of mind (not mental-ill), victim was not intoxicated and according to children`s act victim is not underage during the commission of crime. elements of this crime are established from the definition as unlawful, intentional, having sexual intercourse with a woman and without her permission” (participant 1,2,3 & 4). “it takes place when the suspect is having sexual penetration with the victim without her permission, the act must be conducted intentional and unlawful” (participants 5 & 6). “Unlawful and intentional, sexually penetration with the victim without their consent, victim can be a female, a child or someone who is mental-ill” (participant 7,8,9 & 10).

All participants from both samples A and B answered the question. The elements of crime were outlined as follows: unlawfulness, intentional, sexually violates a victim without her consent. Swanson *et al.*, (2019) in paragraph 3.7 of chapter three, confirms that consent need to be valid, and consent will be considered invalid if the person or the victim is a child who is under the age of consent as fixed by statute; is mental-ill; is intoxicated or under the influence of any substance such as alcohol; if it occurs while the victim is unconscious; and if is against the victim`s consent.

4.5.13 Theme 13: Suspect

Question 13: What is a suspect?

Responses by the participants from sample A:

“Can be any person who is suspected that she/he committed a criminal act that is punishable by law” (Participants 1,6 and 7). “Any person who commits a crime” (Participant 2, 3, 5, 8 and 9). “Any individual who was involved in a commission

of crime” (Participant 4). “A person alleged to be guilty of a crime” (Participant 10).

Responses by the participants from sample B:

(“Every person suspected of committing a crime and not yet found guilty by the court is a suspect” (Participant 1). “A known person accused or suspected of committing a crime” (Participants 2 and 6). “An individual who is involved in a commission of crime” (Participants 3, 4, 5, 7 and 10). “Any person who committed an act that is punishable by the state” (Participant 8).

The researcher agrees with views of participants saying is any individual who is suspected of committing a crime which is punishable by state. Paragraph 3.8 of chapter three in this study confirms the findings as stated by Snyman (2014), reveals that a suspect may include accomplices and accessories who helped in the execution of crime.

4.5.14 Theme 14: Identification of a rape suspect

Question 14: Describe the term identification of a rape suspect.

Responses by participants from sample A:

“When a suspect is identified through fingerprints or DNA” (Participant 1). “It might be ID parade or identification in terms of fingerprints” (Participant 8). “It can be identified through imprint and origin” (Participant 9). “A positive identification of the culprit may be utilised to place the suspect under arrest and the act of the identification may also be used later as evidence in the court” (Participant 10).

Responses by the participants from sample B:

“To identify suspect on the ID paraded by the victims” (Participants 1 and 8). “Known by certain characteristics such as fingerprints for identification” (Participant 2). “Identification of suspect is to connect the perpetrator to the scene” (Participant 3). “When you have identified a person through some form of evidence to a crime”

(Participant 4). “Any tool that can help to prove that a person has committed a crime, either by photos or fingerprint and DNA” (Participant 5). “Procedures used by the police to obtain evidence or information against the suspect” (Participant 10).

Six participants from sample A and three participants from sample B did not responses to this question. What is clear from the answers provided by the respondents did not comprehend what the identification of a suspect entails. The consulted literature in paragraph 3.8.1 of chapter three in this study, Van Graan and Budhram (2015) indicated that the identity of a suspect can be determined by evidence that was collected to link him/her to the scene.

4.5.15 Theme 15: Individualisation of a rape suspect

Question 15: What is individualisation of a suspect in a case of rape?

Responses by participants from sample A:

“Individualisation of a suspect is the establishment of the uniqueness of suspected person from others” (Participant 7). “A suspect can be individualised with fingerprints or DNA as each person has unique characteristics” (Participants 1 and 9).

Responses by the participants from sample B:

“Uniqueness of the suspects – each individual is unique e.g. they have their own DNA, own fingerprints – nobody has the same fingerprints across the world, which can individualise the person by identifying their fingerprints” (Participant 2). “Ensuring that it is the correct suspect” (Participant 3). “Form of identifying a person through their fingerprint and DNA” (Participants 4 & 5). “The uniqueness of the suspected person from others e.g., can be done by a permanent scar” (Participants 8 & 9). “Proving or indicating the uniqueness of a suspect amongst others” (Participant 10).

The researcher believes that this are the outcomes of a lack of knowledge about individualisation of the suspect, because seven participants from sample A and five from sample B, do not know the answer. In accordance to responses provided, it is

clear that participants who answered this question understood what the individualisation of a suspect entails. Paragraph 3.8.2 of chapter three in this study confirms the findings as stated by Girard (2011:15), by describing individualisation as the process of proving that a particular unknown sample is unique, even between members of the same category.

4.5.16 Theme 16: The significance of Deoxyribonucleic Acid that can be found in rape crime scenes

Question 16: What is the significance of DNA evidence collected at the rape scenes?

Responses by the participants from sample A:

“A DNA is critical to identifying a suspect for fair trial – a DNA must be performed in order for a court to rule fairly” (Participant 1). “To individualise and connect the culprits to the scene” (Participants 2 and 3). “Evidence from the scene must be matched with the control sample to determine the custodian of the DNA” (Participant 9).

Responses by the participants from sample B:

“To connect suspects to crime scenes, and to establish or exclude the suspects to crime scenes” (Participant 2). “It helps to solve the crime” (Participant 3). “DNA evidence is more accurate than fingerprints in identifying a person” (Participant 4). “It can be used to solve old crimes that occurred years ago by the development of DNA testing” (Participant 10).

The participants' responses show that they have different understandings about the significance of using DNA as evidence. Paragraph 3.9 of chapter three in this study confirms the findings as stated by Hess and Orthman (2010), by indicating that DNA evidence could provide conclusive evidence in most cases – it can even indicate the race, gender, eye colour as well as the hair colour of the person in question. Twelve participants did not provide the answer. In closing the researcher believed that participants do not fully understand the significance of DNA in the gathering of data to link the suspect to a crime scene.

4.6 SUMMARY

This chapter furnished the presentation of data and the explanation of the findings that were collected from the responses of the participants and literature review. The participant's responses were quoted verbatim and at times interpreted, supported by available literature where appropriate. The researcher noted that some of the questions were not answered and to comply with the ethics of the research, participants cannot be forced to give responses to the asked questions. The lack of adequate answers in pertinent areas indicates a gap which requires further research. The coming chapter (five) of this study will present the summary, conclusions and recommendations.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

This chapter will present the summary, conclusion and recommendations of this study. The critical findings of this study were interpreted, and recommendations are made on the basis of these findings. These recommendations could contribute to the objective of empowering CSI members, LCRC fieldworkers and first responder officers about the evaluation of the importance of DNA evidence in the identification of the rape suspect. The researcher further suggested future research to be conducted.

5.2 SUMMARY

Chapter one of this study presented general orientation. This chapter provided the clarity of theoretical terminology that were used in this study. The methodology that was applied in this study, this include introduction, the problem statement, the aim of this study, which was achieved, the research questions of this study which were answered, key concepts, research approach and design, data collection and data analysis, target population and sampling, methods to ensure trustworthiness and ethical consideration.

Chapter two in this study presented literature review on evaluating DNA evidence to link suspects with rape crime scenes. This chapter furnished a literature review that highlighted the duties of the first responder at rape crime scene, the various types of DNA evidence which may be identified at the rape scenes, the meaning of evidence and the importance of chain of evidence. This chapter concluded by discussing the contamination of evidence and the authors emphasised the significance of taking precautionary measures to minimise the contamination of DNA evidence such as wearing of protective clothing when handling exhibits, and to protect and preserve evidence. Researcher highlighted that evidence collected in a rape scene may contain a great deal of DNA evidence that can be utilised to link perpetrators with the crime scenes. Chapter three reflected the presentation of the value of DNA evidence to link the suspects with rape crime scenes in Pretoria. Researcher outlined the different types of rape crime scenes which are primary, secondary, the body of the victim, and body of the perpetrator. Since, rape is considered as a contact crime, this chapter

established the significance of the Locard exchange principle, by stating that, transferred evidence during the commission of crime can be used to link the suspect with, the victim and the scene of crime. The researcher concludes that through collected physical evidence and DNA evidence, then the process of identification and individualisation of a suspect is initiated by comparing them to the samples taken from the suspect.

Chapter four provided presentation and interpretation. This chapter furnished the presentation of data and the explanation of the findings that were collected from the participants` experience responses and views, and literature review. The participant`s responses were quoted verbatim and at times interpreted, supported by literature from chapter one to three of this study.

Chapter five summary, conclusions and recommendations. This chapter presents the recommendations regarding the significant of research findings. This chapter also makes suggestions for future research.

5.3 FINDINGS AND CONCLUSIONS

The researcher indicated the following main findings based on the literature used, the interviews conducted with sample A and sample B participants.

5.4 FINDINGS

5.4.1 Research question one: What are the different types of DNA evidence that can be identified in the rape crime scenes?

- According to literature the role of the first responder in a rape crime scene is to secure the crime scene, help the victims, summon the appropriate stakeholders (such as medical personnel, detectives, CSI, LCRC fieldworkers, crime scene technicians) to the scene, to make sure that the crime scene is safe and free from danger. Duties of the first responder includes to establish the pathway that will be utilised by the crime scene stakeholders to enter and leave ta crime scene, this will help to minimize the possibility of evidence destruction. Participants from both samples indicated that they understood what the duties of the first responder officer at the scene of rape entails.

- Literature indicates that different DNA evidence can be collected from a rape scene including saliva, blood, touch DNA, semen, and hair. Authors indicated that this evidence may be found from the body of the victim, body of the suspect, the place where the crime was committed, the bedding such as sheets, blankets, and comforters. Participants from both samples A and B knows types of evidence to be collected at rape scene, but the majority of them focuses more on the semen and saliva evidence. Only three of the participants mentioned pubic hair evidence and four mentioned blood evidence.
- The various authors described chain of evidence as a record of each person who had controlled or taken custody of examined or tested evidence or had any other kind of contact with evidence from the time it was discovered from the scene to the present day. All participants from both samples understood what chain of evidence entails.
- Literature described contamination as an introduction of something new to a scene that was not originally there. Authors emphasized that appropriate care need to be taken be handling of biological evidence found in a rape scene, such as maintaining of integrity of the scene, wearing of protective clothing because improper handling of exhibits may have negative effects-evidence can be contaminated and the sample may loss evidential value. Participants were asked “what is the contamination of evidence? and what can be done to prevent contamination of evidence at the rape scenes?”, the majority of participants understood and answered this question.

5.4.2 Research question two: What is the value of DNA evidence to link suspects with rape crimes in Pretoria?

- Crime scene is described as the place or area or location where criminal activities took place. According to literature is a place where the important information and evidence concerning the committed crime may be located. The main purpose of the crime is to collect as much information and evidence as possible and this will serve to develop conclusion regarding how the crime transpired, who was involved and perhaps the “why” of the crime. Participants

from both samples indicated that they understood the meaning and the value of crime scene.

- Different types of crime scenes within rape case. Brandl (2014:340), indicated that rape cases have many crime scenes where the incident happened and these includes the place where the victim was approached, attacked, the place where the victim was disposed of, and where the offender fled after the commission of crime. The authors confirmed that rape scene is consists of primary scene, secondary scene, the body of the victim and the body of the suspect. Participant's responses indicated that only places where the crime activity occurred and the secondary scene. This finding shows that participants lack knowledge about other types of rape scenes, only two participants mentioned the body of the suspect.
- Literature indicated that criminals always leave traces on the scene and it is clear that the criminal cannot perform an action without leaving behind some traces or clues. The Locard Principle normally furnish investigators with the leads of investigation. Participants were asked "what do you understand by the term Locard Principle in rape cases?" and the majority of participants did not provide answer to this question, only nine did from both samples.
- According to literature a new Sexual Offences and Related matters Act 32 of 2007, when a person commits an act of sexual penetration, and the act is committed unlawful and intentional with a victim, without his or her permission, that person will be found guilty of rape. The Act also indicated that the victim can be any person irrespective of a gender, either a man or a woman can be the complainant, victim or perpetrator of rape. Government Gazette (2017), new Act 32 of 2007, confirms that victim of a crime of rape can be any person irrespective of a gender, either a man or a woman can be the complainant, victim or perpetrator of rape. All participants from both samples A and B, understood and answered the question. The findings indicated that participants are not familiar with the New Amendment Act, that either a man or woman can be a victim of this crime.

- Literature revealed that identity of a suspect can be determined by evidence that was collected to link him/her to the scene. Evidence from the victim may assist in the identification of a suspect or may rebut a defense of consent at trial, such evidence from the victim that serves to identify the suspect includes semen stains, saliva stains, and trace evidence transferred to the victim from the suspect's body or clothing.
- According to literature Individualisation is described as the process of proving that a particular unknown sample is unique, even between members of the same category. Researcher believes that participants lack knowledge about the Individualisation of rape suspect because twelve of the participants did not furnish the answers.
- The significance of DNA evidence that can be found in a rape scene, according to literature DNA is described as a powerful tool for law enforcement investigations because each person's DNA is different from another person. DNA can be acquired from sources such as saliva, bone, teeth, and blood. In the cases where the suspect is unknown, biological evidence from the crime scene can be analysed and compared to offender profiles contained in existing DNA database to assist in identifying the suspect, and in a case where the suspect is known, samples of the person's DNA can be compared with the biological evidence found at the scene of crime. Participants were asked "what is the significance of DNA evidence found at the scene?" and only eight participants answered the question, this means the majority of the participant did not know the answer.

5.5 CONCLUSION

This chapter concludes the study on the evaluation of DNA evidence to link the suspects with rape crime scenes in Pretoria. The research was carried out to determine the objectives of this study listed on paragraph 1.5 of chapter one of this study. Research design and methodology were utilised to answer the research questions. Researcher consulted with national and international literature and conducted interviews with two samples groups (Sample A-Ga Rankuwa LCRC fieldworkers and

Sample B- Lyttelton LCRC fieldworkers). The findings in this study shows that lack of knowledge regarding the types of evidence that can be collected in rape scenes, the types of crime scenes in a rape case and the significance of DNA evidence collected from rape scene. This study has shown that the detection of DNA evidence such as Serological evidence, semen, blood, saliva, and pubic hair evidence are important to link the suspect to the crime scene. Researcher believes that if recommendations are properly applied and ensure that all officers, CSI members and LCRC fieldworkers who processes rape scenes are well-trained, that will assist to reduce statistics rates on rape cases and sexual related crimes in South Africa. The researcher gained more knowledge and believed this study report will also empower fieldworkers, crime scene investigators and the researcher's fellow students.

5.6 RECOMMENDATIONS

5.6.1 The recommendations related to research question one: What are the different types of DNA evidence that can be identified in the rape crime scenes?

The researcher recommends the inclusion of the value of a scene of crime, the significance of DNA evidence, physical evidence, and contamination of evidence in the basic-training course because first responders officers arrive first at the crime scene before the LCRC fieldworkers are summoned. Therefore, it is necessary for them to know how to secure and safeguard the crime scenes and ensure that evidence is not contaminated. Researcher recommends that first responders must be trained properly to deal with the victims of rape. Researcher recommends that LCRC fieldworkers and CSI members familiarise themselves with the crime scene investigation Standard Operating Procedures (SOPs) and policies that furnish clear guidance on how to expertly manage, investigate and process rape scenes.

In addition, researcher recommends that LCRC fieldworkers and CSI need to enhance their knowledge about the following:

- The purpose of processing the crime scenes.
- Their responsibilities and ensuring that the crime scenes are processed thoroughly.

- How to approach the crime scene, as outlined by the responses of the participants and literature on the value of the crime scene that contains valuable information.

The researcher also recommends that in-service training should be conducted quarterly in the offices by the training officers the address the following:

- The different types of DNA evidence that can be collected from rape and other sexual related crime scenes.
- Procedure to be followed before handling any biological or bodily fluid evidence at rape scene.
- How to package and to preserve the integrity of the evidence, to ensure that is not tampered with.
- The LCRC's should emphasis the important on the attendance of training and awareness interventions on the value of the crime scenes and the significance of DNA evidence compulsory to the newly recruited crime scene investigators and fieldworkers.

5.6.2 Recommendations related to research question two: What is the value of DNA evidence to link suspects with rape crimes in Pretoria?

Researcher recommends that fieldworkers should familiarise themselves with the Locard`s Principle because there is always contact between the victims, suspects and place where sexual related crimes and rape crimes are committed. It is recommended that LCRC fieldworkers should attend annual get refresher workshops.

The researcher recommends the addition of the following modules in the advanced crime scene course:

- The different types of crime scenes in rape case
- Identification of the suspect
- Individualisation of a rape suspect
- The significance of DNA evidence collected from sexual related crime scenes

5.7 FUTURE RESEARCH STUDIES

Researcher suggests that further research should be done, and the following could be considered, the procedure of collecting and packing DNA evidence from rape scenes.

LIST OF REFERENCES

- Alexander, N., Rogers, C., Smith, E., Van Rooyen, H., Victor-Zietsman, M. & Zinn, R. 2010. Corporate Investigation 1: *Only study guide for SEP131C*. Pretoria: UNISA.
- Anderson, G. 2013. Crime labs and the role of science in investigations. In Watkins, K., Anderson, G. & Rondinelli, V. 2013. *Evidence and Investigation: From the crime scene to the Court Room*. Florida: Edmond Montgomery.
- Babbie, E. 2010. The practice of social research. 12th ed. Wadsworth: Cengage.
- Bairagi, V. & Munot, M.V. 2019. *Research Methodology: A practical and scientific approach*. New York: Taylor & Francis group.
- Baxter Jr, E. 2015. *Complete Crime scene investigation handbook*. Boca Raton: Taylor & Francis group.
- Bellengere, A & Palmer, R. 2013. *The law of evidence in South Africa: Basic principles*. Cape Town: Oxford University press.
- Bennett, W.W. & Hess, K.M. 2004. *Criminal Investigation*. 7th ed. Belmont: Wadsworth.
- Benson, B.C., Jones, G. & Horne, J.S. 2015. Forensic investigations of crime, Irregularities and transgressions. In Zinn, R.J. & Dintwe, S. 2015. *Forensic Investigation: Legislative Principles and Investigative practices*. Cape Town: Juta.
- Bertino, A.J. 2012. *Forensic Science: Fundamentals and Investigation*. California: Cengage.
- Bless, C., Higson-Smith, C. & Sithole, L. 2013. Fundamentals of social research methods: *An African perspective*. 5th ed. Kenwyn: Juta.
- Boeijie, H.2010. *Analysis in qualitative research*. London: sage.

- Bouma, G.D. & Ling, R. 2010. *The research processes*. 5th ed. Melbourne: Oxford.
- Brandl, S.G. 2014. *Criminal Investigation*. London: Sage.
- Brink, H., Van der Walt, H. & Van Rensburg, G. 2012. *Fundamentals of research methodology for health professionals*. 3rd ed. Cape Town: Juta and company.
- Bryman, A., Bell, E., Hirschsohn, P., Santos, A.D., Du Toit, J., Masenge, A., Van Aardt, I. & Wagner, C. 2014. *Research Methodology: Business and Management contexts*. Oxford University: Cape Town.
- Brynard, D.J., Hanekom, S.X. & Brynard, P.A. 2014. *Introduction to research*. Pretoria: Van Schaik publishers.
- Burchell, J. 2013. *Principles of Criminal Law*. 4th ed. Cape Town: Juta.
- Burkey, C. R., Bensel, T.T. & Walker, J.T. 2014. *Forensic Investigation of sex crimes and sexual offenders*. Waltham: Anderson publishing.
- Butler, J.M. 2010. *Fundamentals of forensic DNA typing*. London. Academic press publications.
- Chambliss, D.F. & Schutt, R.K. 2012. *Making sense of the social world: Methods of investigation*. 4th ed. Thousand Oaks: Sage.
- Chisum, W. J. & Turvey, B.E. 2011. *Crime Reconstruction*. 2nd ed. London: Elsevier Inc.
- Creswell, J.W. 2013. *Research design: Qualitative, quantitative, and mixed methods approaches*. 3rd ed. Thousand Oaks, CA: Sage publications, Inc.
- Creswell, J.W. 2014. *Research design: Qualitative, quantitative, and mixed methods approaches*. 3rd ed. London: Sage publications, Inc.
- Crime Scene Forensics. 2017. Available from: <https://medium.com> (Accessed: 4 January 2020).

- Dantzker, M.L. & Hunter, R.D. 2012. *Research methods for criminology and criminal Justice*. 3rd ed. Sudbury, MA: Jones & Bartlett.
- David, M. & Sutton, C.D. 2011. *Social Research: an introduction*. 2nd ed. London: Sage.
- De Vos, A.S., Strydom, H., Fouche, C.B. & Delport, C.SL. 2011. *Research at grass roots for the social sciences and human services professionals*. 3rd ed. Pretoria: Van Schaik Publishers.
- De Wet, S., Oosthuizen, H. & Visser, J. 2011. DNA profiling and the law in South Africa. *PER / PELJ*, 14(4), 171-207.
- Denscombe, M. 2010. *Ground rules for social research: Guidelines for good practice*. 2nd ed. New York: Open Press.
- Denscombe, M. 2012. *The good research guide for small-scale social research Projects*. Philadelphia: Open University Press.
- Dutelle, A.W. 2011. *An introduction to crime scene investigation*. Canada: Jones and Bartlett Publishers.
- Dutelle, A.W. 2014. *An introduction to crime scene investigation*. 2nd ed. Burlington: Jones and Bartlett learning.
- Fish, J.T., Miller, L.S., Braswell, M.C. & Wallace Jr. E.W. 2011. *Crime scene investigation*. 3rd ed. Waltham: Anderson Publishing.
- Fish, T.J., Miller, L.S. & Braswell, M.C. 2011. *Crime scene investigation*. 2nd ed. Burlington: Elsevier Inc.
- Fish, J.T., Miller, L.S., Michael, C. Wallace, B., Wallace, W.E. & Anderson, J. R. 2014. *Crime Scene Investigation*. 3rd ed. United States of America: Anderson Publishing.

- Fisher, B. A. J. & Fisher, D.R. 2012. *Techniques of Crime scene Investigation*. 8th ed. Boca Raton: Taylor & Francis group.
- Flick, U. 2011. *Research Methodology: A beginner's guide to doing a research project*. London: Sage.
- Gardner, R. M. & Krouskup, D.R. 2019. *Practical crime scene processing and investigation*. 3rd ed. New York: Taylor & Francis group LLC.
- Gardner, R.M. 2012. *Practical crime scene processing and investigation*. 2nd ed. Boca Raton: Taylor & Francis Group.
- Gilbert, J.N. 2010. *Criminal investigation*. 8th ed. New Jersey: Hamilton Printing.
- Girard, J.E. 2011. *Criminalistics: Forensic science, crime & terrorism*. Burlington, Mass: Jones & Bartlett Learning.
- Goodwin, W., Linacre, A. & Hadi, S. 2011. *Introduction to forensic genetics*. 2nd ed. Oxford: John Wiley & Sons, Ltd, Publication.
- Gray, D.E. 2014. *Doing research in the real world*. 3rd ed. London: Sage.
- Grobler, S. & Naicker, S. 2008. *Investigative principle for policing 1: Study guide for OVM1502*. Pretoria: University of South Africa.
- Harris, H.A. & Lee, H.C. 2019. *Introduction to Forensic Science and Criminalistics*. 2nd ed. Boca Raton: Taylor & Francis group.
- Heathfield, L.J. 2014. Policy required for entry of DNA profiles onto the National Forensic DNA Database of South Africa. *South African Journal of Science*, 110(7-8):1-3.
- Hess, K.M. & Orthman, C.H. 2010. *Criminal investigation*. San Diego, California: Elsevier.

- Houck, M.M. & Siegel, J.A. 2010. *Fundamentals of forensic science*. 2nd ed. Oxford: Academic Press.
- Houck, M.M. & Siegel, J.A. 2011. *Fundamentals of forensic science*. 2nd ed. Burlington: Elsevier Inc.
- Jackson, A.R.W & Jackson, J.M. 2017. *Forensic Science*. 4th ed. London: Pearson Education Limited.
- James, S.H., Nordby, J.J. & Bell, S. 2014. *Forensic science: An introduction to scientific and investigative techniques*. 4th ed. Boca Raton, Fla: CRC Press.
- Kumar, R. 2011. *Research methodology: A step-by-step guide for beginners*. 3rd ed. Thousand Oaks: Sage.
- Kumar, R. 2015. *Research methodology: A step-by-step guide for beginners*. 4th ed. Singapore: Sage.
- Laird, N.M. & Lange, C. 2010. *The fundamental of modern statistical genetics*. England: Springer science& business media, Learning Inc.
- Leavy, P. 2017. *Research design: Quantitative, Qualitative, Mixed methods, Art-Based, and Community-Base Participatory Research Approaches*. New York: The Guilford press.
- Leedy, D. & Ormrod, J.E. 2010. *Practical research: Planning and design*. New Jersey: Pearson Educational International.
- Leedy, D. & Ormrod, J.E. 2013. *Practical research: Planning and design*. New Jersey: Pearson Education International.
- Leedy, P.D. & Ormrod, J.E. 2015. *Practical research: Planning and design*. 11th ed. England: Pearson Prentice Hall.
- Lochner, H.T. & Zinn, R.J. 2015. *Crime scene investigation*. Cape Town: Juta.

- Lushbaugh, C.A. & Weston, P.B. 2012. *Criminal investigation*. 12th ed. New York: Pearson Education.
- Lyle, D.P.M.D. 2012. *Forensic science*. United State of America: Bar Association.
- Lyman, M.D. 2013. *Criminal investigation*. Upper Saddle River, NJ: Pearson Education.
- Maharaj, U. 2013. *The importance of DNA as an investigation tool*. Pretoria: UNISA.
- Makin, D.A. 2014. *DNA and Property crime scene investigation: Forensic evidence and Law Enforcement*. Waltham: Elsevier Inc.
- Maloney, M.S. & Housman, D.G. 2014. *Crime scene investigation: Procedural guide*. Boca Raton: Taylor & Francis group.
- Manamela, M.S., Smith, J.H. & Mokwena, R.J. 2015. Serological evidence and DNA Analysis (Pp. 95-119). In R. Zinn and S. Dintwe. (eds). *Forensic investigation. Legislative principles and investigative practice*. Cape Town: Juta.
- Maree, K. 2012. *First steps in research*. Pretoria: Van Schaik.
- Marilyn, L. 2014. *Qualitative research for the social sciences*. United State of America: Sage.
- Maxfield, M.G. & Babbie, E. 2012. *Basics of research methodology for criminal justice and criminology*. 3rd ed. Wadsworth: Cengage Learning.
- Motsepa, L.L. 2014. *Investigation principles for policing 2*. Pretoria: University of South Africa.
- Mozayani, A. & Fisher, C.P. 2018. *Forensic Evidence Management: from the crime scene to the courtroom*. Boca Raton: Taylor & Francis group.
- National Institute of Justice (NIJ). 2002. *Using DNA to solve cold cases*. Washington, D.C: Photo Disc.

- Ogle Jr, R.R. & Plotkin, S.L. 2018. *Crime scene investigation and reconstruction*. 4th ed. United States of America: Pearson.
- Ogle, R.R. 2012. *Crime scene investigation and reconstruction*. 3rd ed. Upper Saddle River, New Jersey: Pearson Prentice Hall.
- Orthman, G.H. & Hess, K.M. 2013. *Criminal investigation*. 10th ed. Delmar: Cengage Learning.
- Osterburg, J. W. & Ward, R.H. 2010. *Criminal investigation: Methods of reconstructing the past*. 6th ed. Upper Saddle River, NJ: Anderson.
- Osterburg, J.N. & Ward, R.H. 2014. *Criminal investigation: A method for reconstructing the past*. 7th ed. Waltham: Anderson Publishing.
- Palmiotto, M. J. 2013. *Criminal investigation*. 4th ed. Boca Raton: Taylor & Francis group.
- Pepper, I.K. 2010. *Crime scene investigation: Methods and procedures*. New York: McGraw Hill Open University Press.
- Polit, D.F. & Beck, C.T. 2012. *Nursing research: Generating and assessing evidence for nursing practice*. 9th ed. Philadelphia: Wolters Kluwer/Lippincott, Williams & Wilkins.
- Robert, R. & Ogle, J.R. 2012. *Crime scene investigation and reconstruction*. 3rd ed. New Jersey. Prentice Hall, copyright.
- Saferstein, R. 2015. *Criminalistics: An introduction to forensic science*. 11th ed. New Jersey: Pearson education limited.
- Savino, J.O. & Turvey, B.E. 2011. *Rape investigation handbook*. 2nd ed. London: Elsevier.
- Shaler, R.C. 2012. *Crime scene forensic: A scientific method approach*. Boca Raton: Taylor & Francis Group CRC Press.

- Singh, J. & Sharma, N. R. 2021. *Crime scene management within forensic science*. Singapore: Springer.
- Singleton, R.A. & Straits, B.C. 2010. *Approach to social research*. 3rd ed. New York: Oxford University Press.
- Smith, J.H. & Zinn, R.J. 2015. *Developments in forensic technology*. In Zinn, R.J. & Dintwe, S.I. (eds) 2015. *Forensic investigation: Legislative Principles and Scientific Practices*. Cape Town: Juta.
- Snyman, C.R. 2014. *Criminal law*. Durban: LexisNexis.
- South African Police Service. 2003. *National instruction 5/2003: Documents on the business of the LCRC*. Pretoria: Criminal Record Centre.
- South African Police Service. 2015a. *SAPS National Instruction 1 of 2015*. Pretoria: SAPS.
- South African Police Service. 2022. *Crime situation in RSA twelve months April 2021 to June 2022 (crime stats 2021/2022 presentation)* at <https://www.saps.gov.za>.
- South African Police Service. Division Human Resource Development. 2010. *Crime Investigation learners guide*. Pretoria: Government Publisher.
- Stelfox, P. 2013. *Criminal investigation: An introduction to principles and practice*. New York, NY: Routledge.
- Swanson, C. M. R., Chamelin, C.N., Territo, L. & Taylor, R.W. 2019. *Criminal investigation*. 12th ed. New York: McGraw-Hill Education.
- Swanson, C.R., Chamelin, N.C., Territo, L. & Taylor, R.W. 2012. *Criminal investigation*. 11th ed. New York: McGraw-Hill.
- Tillstone, W.J., Hastrup, M.L. & Hald, C. 2013. *Fisher`s techniques of crime scene investigation first international edition*. Boca Raton: Taylor & Francis Group.

- Turvey, B.E. & Petherick, W.A. 2010. *An introduction to forensic criminology*. In Petherick, W.A., Turvey, B.E. & Fergusson, C.E. 2010. *Forensic criminology*. USA: Elsevier Academic Press.
- Turvey, B.E. 2012. *Criminal profiling: An introduction to a behavioural evidence analysis*. 4th ed. London: Elsevier Academic Press.
- UNISA. 2016. *Policy on Research Ethics*. Pretoria: University of South Africa.
- Van der Watt, M. 2015. The preliminary investigation phases. In Zinn, R.J. & Dintwe, S.I. (eds). 2015. *Forensic investigation. Legislative and investigative practice*. Claremont: Juta Law.
- Van Graan, J. & Budhram, T. 2015. Principles of evidence. In Zinn, R.J. & Dintwe, S.I. (eds). 2015. *Forensic Investigation: Legislative principles and Investigative practice*. Cape Town: Juta.
- Wagner, C., Kawulich, B. & Garner, M. 2012. *Doing social research: A global context*. London: Sage.
- Walker, I. 2010. *Research methods and statistics: Palgrave insights in psychology*. Eastbourne: Palgrave Macmillan.
- Walliman, N. 2011. *Research methods: The basics*. London: Routledge.
- Welman, J.C. & Kruger, S.J. & Mitchell, B. 2011. *Research methodology*. Southern Africa: Oxford University Press.
- Wilding, S. 2012. *Forensic handbook*. Available from: www.forensichandbook.com/dr-edmondlocard/ (accessed on 1 April 2020).
- Withrow, B.L. 2014. *Research methods in crime and justice*. New York: Routledge Taylor & Francis.
- Zinn, R.J. & Dintwe, S.I. (eds). 2015. *Forensic investigation: Legislative Principles and Investigative Practice*. Cape Town: Juta.

LEGISLATIONS AND COURT CASES

Criminal Law (Sexual Offences and Related Matters) Amendment Act 32 of 2007

S v Ndziweni Lawrence Zamile, Case number: ss149/2015

S v Sandisile Makhakha, Case number: ss41/2012

**ANNEXURE A: INTERVIEW SCHEDULE FOR SAMPLE A AND SAMPLE B
(FORENSIC ANALYSTS)**

TOPIC:

**EVALUATING DEOXYRIBONUCLEIC ACID EVIDENCE TO LINK SUSPECTS
WITH RAPE CRIME SCENES IN PRETORIA**

RESEARCH AIM

The aim of this study is to evaluate DNA evidence to link the suspects with rape crime scenes in Pretoria.

RESEARCH QUESTIONS

- What are the different types of DNA evidence can be identified in the rape crime scenes?
- What is the value of DNA evidence to link suspects with rape crimes in Pretoria?

PART “A”

1. What is your position within Local Criminal Record Centre (LCRC)?
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2. What courses did you attend to improve your skills in your field/occupation?
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.....
3. How many years have you been working as a fieldworker/crime scene investigator?
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.....

PART "B"

1. According to your understanding, what is the role of the first responder officer at the rape crime scenes?

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2. What do you know about the term evidence?

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3. Based on your experience, what is your understanding about DNA evidence?

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4. Name the different types of DNA evidence that can be identified in rape scenes, and discuss how such evidence can be used to identify and link the suspect with rape scene?

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5. Briefly discuss the importance of chain of evidence from the moment is collected from the rape crime scene?

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6. According to your understanding, what is the contamination of evidence? What can be done to prevent contamination of evidence at the rape scenes?

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PART "C"

1. What is a crime scene?

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2. Based on your experience, what is the value of rape crime scene?

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3. Based on your experience, what are the various types of crime scenes in a rape case?

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.....

4. What is physical evidence? Name physical evidences that can be found in rape scenes.

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5. What do you understand by the term Locard Principle?

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6. Define and explain elements of rape

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7. What is suspect?

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8. What do you understand by the term identification of a rape suspect?

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9. What do you understand by the term individualisation of a rape suspect?

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.....

10. What is the significance of DNA as evidence collected at rape scenes?

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.....

ANNEXURE B: SAPS PERMISSION

South African Police Service



South African Police Service

Province: Pretoria	Postal Code: 0001	Fax No.:	(012) 324 1516
Private Bag No.:			

Your reference number is: **37342**

By reference only regarding: **37342**

THE HEAD RESEARCH
SOUTH AFRICAN POLICE SERVICE
PRETORIA
0001

Enquiries should be made to:
Lt Col Joubert
AC Tshepo
(012) 383 3118
JoubertG@saps.gov.za

Ms NJ Maffa
UNIVERSITY OF SOUTH AFRICA

RE: PERMISSION TO CONDUCT RESEARCH IN SAPS: EVALUATING DEOXYRIBONUCLEIC ACID (DNA) EVIDENCE TO LINK SUSPECTS WITH RAPE CRIME SCENE IN PRETORIA: UNIVERSITY OF SOUTH AFRICA: MASTERS DEGREE: RESEARCHER: NJ MAFFA

The above subject matter refers.

You are hereby granted approval for your research study on the above mentioned topic in terms of National Instruction 1 of 2006.

Further arrangements regarding the research study may be made with the following office:

The Divisional Commissioner: Forensic Services

- **Contact Person:** Co. NM Rababalela
- **Contact Details:** (012) 421 0440/082 376 3457
- **Email Address:** RababalelaM@saps.gov.za

Kindly adhere to paragraph 6 of our attached letter signed on the **2020-05-18** with the same above reference number.

MAJOR GENERAL

THE HEAD: RESEARCH
DR PR VUMA (Act)

DATE: 2020-06-12

ANNEXURE C: SAPS PERMISSION TO CONDUCT RESEARCH

SUID-AFRIKAANSE POLISIEDIENS



SOUTH AFRICAN POLICE SERVICE

Private sak/Private Bag X 94

Verwysing/Reference:	3/34/2
Navrae/Enquiries:	Lt Col Joubert AC Thenga
Telefoon/Telephone:	(012) 393 3118
Email Address:	Joubert3@saps.gov.za

THE HEAD: RESEARCH
SOUTH AFRICAN POLICE SERVICE
PRETORIA
0001

The Division Commissioner
FORENSIC SERVICES

PERMISSION TO CONDUCT RESEARCH IN SAPS: EVALUATING DEOXYRIBONUCLEIC ACID (DNA) EVIDENCE TO LINK SUSPECTS WITH RAPE CRIME SCENE IN PRETORIA; UNIVERSITY OF SOUTH AFRICA: MASTERS DEGREE; RESEARCHER: NJ MAFFA

1. The above subject matter refers.
2. The researcher, Ms NJ Maffa, is conducting a study with the title: Evaluating Deoxyribonucleic Acid (DNA) Evidence to link suspects with rape crime scene in Pretoria, with the aim to *explore the significance of Deoxyribonucleic Acid (DNA) as evidence to link suspects with rape crime scene.*
3. The researcher is requesting permission to interview ten (10) field workers (crime scene investigators) at Ga-Ranku Local Criminal Record Centre (LCRC) and ten (10) field workers (crime scene investigators) at Lyttelton Local Criminal Record Centre (LCRC).
4. The proposal was perused according to National Instruction 1 of 2008. This office recommends that permission be granted for the research study, subject to the final approval and further arrangements by the office of the Divisional Commissioner: Forensic Services.
5. We hereby request the final approval by your office if you concur with our recommendation. Your office is also at liberty to set terms and conditions to the researcher to ensure that compliance standards are adhered to during the research process and that research has impact to the organisation.
6. If approval is granted by your office, this office will obtain a signed undertaking from researcher prior to the commencement of the research which will include your terms and conditions if there are any and the following:
 - 6.1. The research will be conducted at his/her exclusive cost.

ANNEXURE D: UNISA ETHICAL CLEARANCE FORM



UNISA 2020 ETHICS REVIEW COMMITTEE

Date: 2020:07:15

ERC Reference No. : ST77
Name : JN Maffa

Dear Joyce Nkaatha Maffa

**Decision: Ethics Approval from
2020:07:15 to 2023:07:15**

Researcher: Ms Joyce Nkaatha Maffa

Supervisor: Dr DQ Mabunda

***EVALUATING DEOXYRIBONUCLEIC ACID (DNA) EVIDENCE TO LINK SUSPECTS
WITH THE RAPE CRIME SCENES IN PRETORIA***

Qualification: M-Tech Criminal Justice

Thank you for the application for research ethics clearance by the Unisa 2020 Ethics Review Committee for the above mentioned research. Ethics approval is granted for 3 years.

The Low risk application was reviewed by the CLAW Ethics Review Committee on 15 July 2020 in compliance with the Unisa Policy on Research Ethics and the Standard Operating Procedure on Research Ethics Risk Assessment.

The proposed research may now commence with the provisions that:

- 1. The researcher will ensure that the research project adheres to the relevant guidelines set out in the Unisa Covid-19 position statement on research ethics attached.**
- 2. The researcher(s) will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.**



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ANNEXURE E: TURNITIN REPORT



Digital Receipt

This receipt acknowledges that Turnitin received your paper. Below you will find the receipt information regarding your submission.

The first page of your submissions is displayed below.

Submission author: **Joyce Nkaatha MAFFA**
Assignment title: **Revision 3**
Submission title: **Evaluating DNA evidence to link sus...**
File name: **NKHATHA_JOYCE_MAFFA_2021-0...**
File size: **850.03K**
Page count: **96**
Word count: **24,981**
Character count: **137,593**
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