EXPLORING THE SIGNIFICANCE OF BLOODSTAIN PATTERN ANALYSIS IN MURDER CASES IN PRETORIA

By

MALEHO FRANCINAH PILUSHA

Submitted in accordance with the requirements

for the degree

MAGISTER TECHNOLOGIAE: FORENSIC INVESTIGATIONS

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CRIMINAL JUSTICE

at the

UNIVERSITY OF SOUTH AFRICA

SUPERVISOR: DR. D Q MABUNDA

DECLARATION

I, Maleho Francinah Pilusha with student number 51610078, declare that the dissertation titled: “Exploring the significance of bloodstain pattern analysis in murder cases in Pretoria” is my own original work and also vouch that I have acknowledged all sources consulted where required and that this dissertation has not been submitted to any institution previously.

_____ 1 AUGUST 2022

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ABSTRACT

This research was aimed at exploring the importance of bloodstain pattern analysis as another mechanism or a technique used during a murder investigation. The emphasis in this research was more on the blood found at the crime scene as it may lead to solving the crime. Research shows that resolving of crime begins at the scene and how evidence found at these scenes are analysed, maintaining the chain of possession.

The researcher adopted a qualitative approach, with the assistance of participants who are knowledgeable and experts in this regard. Furthermore, literature study on the subject matter was used in order to ensure comprehensive research with the aim of capacitating investigators of serious crime in South Africa. In order to do this, two critical questions were used as a benchmark, namely: “What are the objectives of murder investigations?” and “What is the significance of bloodstain pattern found in the murder crime scene?” The qualitative approach was used to collect data from the participants who constantly investigate the crime scene where blood is found, including case study and literature review. The researcher wanted to bring to the attention of the crime scene investigators that blood found at the crime scene carries more valuable evidence that is acceptable in court. The bloodstain found at the scene gives the entire movement and direction of both victim and perpetrator.

The researcher recommends that the crime scene analysts and examiners be trained on the bloodstain pattern analysis as a technique in investigation. The researcher discovered that many members are not trained on the BPA; and also recommends that refresher courses be offered to those who have completed the course.

Key words: Crime, murder, crime scene, bloodstain pattern, bloodstain pattern analysis, DNA, Locard principles, contamination of evidence.

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ABBREVIATIONS AND ACRONYMS

BPA	**:**	Bloodstain Pattern Analysis
CAS	**:**	Crime Administration System
CSM	**:**	Crime Scene Management
DNA	**:**	Deoxyribonucleic Acid
FS	**:**	Forensic Science
FSL	**:**	Forensic Science Laboratory
FSA	**:**	Forensic Science Analysts
LCRC	**:**	Local Criminal Record Centre
SA	**:**	South Africa
SAPS	**:**	South African Police Services
SOP	**:**	Standard Operational Procedure

LIST OF FIGURES

EDITOR'S REPORT

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DECLARATION OF PROOFREADING AND LANGUAGE EDITING

To whom it may concern

I herewith declare that I did the proofreading and editing on **MALEHO FRANCINAH PILUSHA'S** dissertation submitted in accordance with the requirements for the degree

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and that I made suggestions for corrections regarding language, grammar, style and syntax, which were communicated to the student.

Please feel free to contact me should any additional information be required.

Sincerely

Ronel Davis

BA (Hons) UP

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CHAPTER ONE: GENERAL ORIENTATION

1.1 INTRODUCTION

The scene of incident is the place where evidence is found. If the murder crime scene is not properly examined or approached with a broad mindset, perpetrators will never be arrested or there will not be any convictions. There is a huge responsibility on the investigator to make sure that the evidence on the scene is found (Lochner and Zinn, 2015: 108). The investigating officers need to know that there is always evidence at the crime scene, no matter how small the movement was. The actions taken on the scene will be vigorously tested in court.

Not only statements and photos are required from a murder crime scene, but bloodstain spatters also play a major key role in solving violent crimes such as murder. According to Singh et al., (2021:2) bloodstain pattern distributed at the crime scene can be used for the reconstruction of the event. By analysing bloodstain patterns, investigators can often determine the movements of the victim and the attacker.

1.2 PROBLEM STATEMENT

Researchers should continuously strive to find solutions to the myriad of problems and challenges which society grapple with on a daily basis. This stance is supported by authors such as Berg and Lune (2012: 38) who argue that research problems emanate from challenges faced by societies. This means that before a researcher embarks on a research journey, there must be distinct research problems which were identified. In addition, De Vos, Strydom, Fouche, Delport (2011: 108), are of the opinion that researchers are required to undertake an extensive endeavour to analyse and formulate a proper research problem before research ‘proper’ begins.

Brynard, Hanekom and Brynard (2014: 18) believe that the research problem gives guidance during the preparation of the research. The researcher is of the view that a scene of crime is where a story begins and ends, therefore a missing piece of the puzzle will render the story inconclusive. Bloodstain Pattern Analysis (BPA) assist investigators to put all puzzles together and ensure successful convictions (Gardner 2012: 331). The researcher in her line of duty as a crime scene examiner at Ga-Rankuwa (Local Criminal

Record Centres) LCRC observed that murder cases are being investigated at the four LCRC's of Tshwane North Cluster, which includes: Ga-Rankuwa, Pretoria Central, Pretoria North and Lyttleton. The researcher also noticed that some of these cases being investigated, especially where blood was shed, are often closed as unsolvable because crime scene examiners are not trained in bloodstain pattern analysis nor have any knowledge thereon. It was further discovered that some of the crime scene examiners have no skills, no experience and no relevant qualifications to carry out their duties accordingly. Gardner (2012: 331) further states that although the crime scene technician may not be trained in depth in bloodstain pattern analysis, it is imperative that he or she be able to recognise critical classification of stains and knows how to properly document bloodstained scenes.

According to the SAPS, Gauteng Annual Crime Statistics for the 2016/2017 financial year which were presented to the community safety committee in the provincial legislature show that the numbers of contact crimes are on the increase. Murder increased by 6.7% with 4101 murders compared to 3842 murders in 2015/2016. From the statistics, it is evident that the Tshwane North Cluster is experiencing a rise in murder crimes. The majority of these murder crimes occurred due to stabbing or shooting with a firearm. Nevertheless, murder cases that appeared before court end up without conviction, some as a result of insufficient evidence obtained from crime scenes, unidentified perpetrators, an inability to link perpetrators to the crime scene, forensic analysts' inability to use bloodstain patterns found at the murder crime scene as an investigation technique and procedures not followed when collecting bloodstains on the scene of murder or even to detect if the blood found at the crime scene is indeed human blood. Ga-Rankuwa SAPS (CAS, 212/05/2018) explains a murder investigation case where violence was involved, and the crime scene examiner could not find blood at the crime scene until it was later revealed that the blood was mopped up by the perpetrator. The crime scene examiner discovered that when she revisited the crime scene for the second time after she had been advised to do so by a retired crime scene expect.

The table below illustrates the Tshwane North Cluster murder crime statistics.

Table 1.1 Tshwane North Cluster 2016/2017 murder crime financial year statistics

	Stations held	Cases attended	Cases went to court
Pretoria Central LCRC	19	363	201
Pretoria North LCRC	7	151	87
Ga-Rankuwa LCRC	5	143	100
Lyttleton LCRC	5	117	63

With verbal approval from the operational commander at the Ga-Rankuwa LCRC, the researcher got an opportunity to peruse some of the murder dockets to check if bloodstain was indicated on the checklist and interpreted in a photo album statement. However there was no evidence pertaining to bloodstain since the relevant training was never provided to them.

1.3 RESEARCH AIM AND OBJECTIVES

Saunders et al., (2019: 44) define the aim of research as a brief statement of the purpose of the research project. De Vos et al., (2011: 94) posit that, the aim of research should be explained as something that one plans or does. The aim of this study is to explore the importance of BPA as an investigating technique during a murder investigation in Pretoria.

Research objectives of this research are:

- To establish the significance of bloodstain pattern found at the murder crime scene.
- To identify correct procedures to be followed when collecting bloodstain patterns at a murder crime scene.

- To identify the importance of bloodstain pattern analysis as an investigative tool in the murder cases.

1.4 PURPOSE OF THE RESEARCH

Popper and Karl (2018:3) explain the purpose of research as an attempt to get closer to reality by attempting to build knowledge about it. According to Babbie (2010: 92) social research can serve the following purpose: exploration, description and explanation. In other words, the purpose of the research is to substantiate why and what researchers aim to achieve. De Vos et al., (2011: 95) indicate that there are numerous possible purposes for conducting research. For this study, the purpose was to accomplish the following:

- Evaluation of the situation: The researcher evaluated the guidelines that the crime scene examiner used for the murder investigation, with the intention of ensuring that crime scenes are thoroughly processed, accurately documented and that the integrity of items with potential evidential value is unquestionable.
- Empowerment of those being researched: This study aimed to empower the crime scene examiner with skills to be able to investigate a murder crime scene by using BPA.
- Applied research: The study aimed to apply the acquired knowledge from the findings by using the correct procedure on the identification, collection and documentation of bloodstain patterns in murder crime scenes in Pretoria.
- Exploration: The researcher explored the value of bloodstain pattern analysis as an investigation technique in murder cases.

1.5 RESEARCH QUESTIONS

Creswell (2014: 139) argues that researcher must design research questions in such a manner that questions result in finding solutions to existing research problems. For this reason, it would be pointless to list a lot of irrelevant questions. In agreement with Creswell and authors Leedy and Ormrod (2010: 56) posit that research questions provide guidance for the kinds of data the researcher should collect and suggest how the researcher should analyse and interpret those data. In addition, research question must be able to speak to the research topic as outlined by Bless et al., (2013: 21). This being

a qualitative study, the research questions could be formulated briefly as follows regarding the topic under investigation:

- What are the objectives of murder investigations?
- What is the significance of bloodstain pattern found at the murder crime scene?

1.6 DEMARCATION OF THE STUDY

This study will be limited to Forensic Science Laboratory (FSL) and the crime scene examiners attached to the four LCRC's of the Tshwane North Cluster, which includes: Ga-Rankuwa, Pretoria Central, Pretoria North and Lyttleton. These crime scene examiners are responsible for analysing bloodstain pattern analysis in murder crime scenes in Pretoria.

1.7 KEY THEORETICAL CONCEPTS

Silverman (2013: 336) argues that approximately half a dozen concepts could be sufficient, particularly when the study undertaken is of limited scope. This means that researchers should carefully select those concepts which will make a contribution to those which researchers are conducting. Readers would easily gain interest to read a dissertation which has concepts, as it will give them clear vision of the dissertation. In this study, the following theoretical concepts were chosen:

1.7.1 Murder

Murder is defined by Stuart (2014: 109) as the death of another human being which was caused unlawfully and intentionally. In a murder case, if one element of crime is missing, suspects may not be found guilty.

1.7.2 Crime Scene

According to Dutelle (2011: 13), a crime scene is a location where a crime is alleged to have been perpetrated from. However, it is important to bear in mind that a crime scene may not be necessarily confined to one geographic location (it is not static), but may consist of numerous locations, depending on the circumstances. There are debates as to whether a vehicle which was found abandoned a distance from the original crime scene, or the body of the victim or suspect can also qualify as a crime scene.

1.7.3 Crime

Joubert (2018: 48) defines an offense as an unlawful and blameworthy conduct that is defined by law as a crime and for which punishment is required.

1.7.4 Bloodstain Pattern

Gardner (2012: 332) defines bloodstain pattern as the blood mass that comes under external force, and recurring patterns are produced. Different mechanisms produce different patterns with different class characteristics. These basic mechanisms are not specifically crime-orientated, for example, a beating mechanism does not produce a beating-specific pattern. The pattern produced by beating is the same as a pattern produced when static blood is impacted by any external forces.

1.7.5 Blood Pattern Analysis (BPA)

Singh et al., (2021: 1, 2) describe that BPA aims to reveal the physical event that might have occurred at the crime scene. These bloodstains can be interpreted by their shape, size and distribution. The facts acquired from BPA can help in crime scene reconstruction, corroborating witness statement, for the investigative procedure.

1.7.6 Blood Pattern Analyst

Gardner (2012: 331) describes the blood pattern analyst as the person who evaluates the various mechanisms and collapse mechanics of blood masses with respect to the patterns produced under controlled condition; the person who compares the results against unknown stains found on crime scenes.

1.7.7 Forensic Scientist

According to Dutelle (2012: 93), forensic science is the person who acquired specialist training in the forensic investigation environment. Such specialist training is sufficient to distinguish the skills he/she has with the majority of staff in a particular environment. Such skills are recognised when evidence is presented in a court of law.

1.8 VALUE OF THE RESEARCH

Research undertaken must make a significant contribution in the specific or research environment (Sarantakos, 2013: 12). Moreover, such research should be of a high standard that it produces new knowledge. This view is supported by Creswell (2014: 111-

113) who argues that the value, goal and objectives of any research should aid the researcher to address the research problem by answering the research questions.

Lochner and Zinn (2015: 42) emphasise that it is important to protect and preserve the relevant physical evidence in its original position and condition. It is vital to ensure that no loss occurs in the authenticity of the evidence. Analysts are trained in the collection, packaging as well as proper handling of exhibits which are aimed primarily at preventing contamination, breakage as well as contamination of evidence. Such measures are also aimed to ensure that the value of evidence found at the crime scene is maintained. More importantly, first responders should be adequately trained to preserve crime scenes until specialists arrive to analyse the crime scene. In the forensic investigation environment, crime scenes are treated as shrines. This means that crime scenes can only be accessed by well-trained specialists in order to avoid contamination. As a result, the study strives to:

- Empower or equip forensic analysts with the requisite skills required in forensic investigation.
- Capacitate the crime scene examiners in terms of the interpretation of bloodstain patterns at the crime scene. After a bloodstain is located, it is customary to collect the stains and take them to the crime laboratory.
- Contribute to knowledge regarding the preliminary investigation of bloodstain crimes that should be conducted by crime scene examiner.
- Assist the academic community in terms of exploring new data in conducting an analysis of bloodstain pattern at crime scenes.

1.9 PRELIMINARY LITERATURE REVIEW

Hammond and Wellington (2013: 99) posit that a literature review should be viewed as a basis or an overview in which a particular direction or pattern is undertaken in research. References or sources should be used by researchers to support their arguments. It is common knowledge that some research have been conducted a long time ago and are no longer relevant or applicable. It is, therefore, unacceptable for researchers to solely rely on studies that were conducted previously, unless such references of literature are what are commonly known as seminal sources. In this study, the researcher selected

those literature or sources which could add value to the study being undertaken. Creswell (2009: 24) is of the opinion that researchers should only select literature that speaks to the topic being researched. A literature survey is done in order to find material related to the conceptual focus of the research problem. In this study, the researcher was guided by the aims of the research and the research questions, to search for relevant and appropriate literature.

Library searches on concepts relevant to the study were relied upon and only recent sources were used to ensure that the acquired information is still relevant. Literature dealing with the following concepts was gathered and used:

- Murder
- Crime scene
- Crime
- Bloodstain pattern
- Blood pattern analysis
- Blood pattern analyst
- Forensic scientist

1.10 RESEARCH DESIGN AND APPROACH

Research design is the set of guidelines and instructions to be followed in addressing the research problem (Mouton, 2014: 107). Leedy and Ormrod (2010: 135) opine that researchers should strive to apply qualitative cross-sectional research design that will be used to achieve good results. Research is a way of obtaining answers to professional questions adhering to the conventional expectations of scientific procedures (Kumar, 2015:5). According to Bryman and Bell (2014: 100), research design provides the structure that guides the use of a research method and the analysis of the subsequent data. Research design is described as a comprehensive data collection plan whose purpose is to answer research questions and test research hypotheses (Smith, 2010: 179).

In this study, empirical research design was adopted as this approach affords researchers an opportunity to capture experiences and to observe development when these occur. The researcher made use of interviews and analyses of secondary data sources. As a

fieldworker at the LCRC, the researcher dealt with crime issues on a daily basis. Thomas (2013: 22) describes empirical research or study as something which can be found out or discovered through experience, trial and error or from personal observation. Leedy and Ormrod (2013: 5) also agree that empirical research involves dividing the problem into sub-problems and then collecting data on the sub-problems by means of events and observations. Smith (2010: 179) is supported by Leedy and Ormrod (2015: 20) that empirical research is research that involves the collection and analysis of new data. The researcher also thinks that empirical research focuses on data-based reality. In this study, experience and knowledge was important. The researcher addressed the problem under investigation by exploring the importance of BPA as an investigating technique during a murder investigation. The researcher collected data on the individuals, programmes or events on which research is focused. This data includes observation, interviews, documents (e.g. newspaper articles), and materials like photographs.

The researcher gathered data by means of semi-structured interviews with crime scene examiners and FSL members working in the Tshwane North Cluster. According to Bryman and Bell (2014: 45), qualitative research typically involves the intensive, in- depth study of a small group or of individuals sharing certain characteristics. Moreover, researchers such as Maharaj (2013:3) posit that qualitative research provides researchers with the value of research detail and depth which eventually results in quality outcomes. The researcher considered the qualitative approach to be the best in research study. The researcher also opines that one becomes immersed in the subject under investigation as the research unfolds.

1.11 TARGET POPULATION

Bless et al., (2015:162) opine that the people whom the researcher wants to ascribe some characteristics to be called the population. In this instance, the population consists of the selected and sizeable number of possible candidates who participated in the study. Brink, Van der Walt and Van Rensburg (2012: 27, 137) are of the view that such target population must represent the entire ‘community’. In this study, the researcher chose forensic field workers from Pretoria Local Criminal Record Centers that includes Ga-Rankuwa LCRC, Pretoria North LCRC, Pretoria LCRC and Littleton LCRC as well as FSL

members as the target population for the entire Pretoria to prove if they do indeed understand the importance of BPA in murder crime scenes.

The reason for choosing these populations was because this is the area in which the problem was identified. Furthermore, the researcher lives in Pretoria and worked at Ga-Rankuwa LCRC. The researcher attended murder cases in Pretoria and only a few of those cases where bloodstain pattern was considered.

1.12 SAMPLING

Sampling is the process of selecting units (e.g., individual) from a population so that by studying the sample we may generalise our results to include the population from which they were chosen (Social Research Methodology, 2015: 9). For this reason, the purposive sampling approach was adopted. De Vos et al., (2011: 222) confirms that a population is a term that sets boundaries on the study unit, referring to an individual in the universe who possesses specific characteristics. The researchers carefully considered a number of factors before making her selection as selecting inexperienced participants may result in shallow or inefficient outcomes.

According to Bryman and Bell (2014: 186) purposive sampling considerations often apply to the sampling of the cases in which research will be conducted and then to people within those cases. In this instance, 30 members were selected which included 19 crime scene examiners and 11 FSL Analysts from Pretoria North, Pretoria Central, Ga-Rankuwa and Lyttleton. The researcher obtained a list of names of LCRC members and Laboratory members. The total number of members in all nominated samples working directly with bloodstain on crime scenes was 96. Amongst the 96, the researcher selected 30 members to be participants in the study. The other members were not selected, due to the fact that 35 were not active on crime scenes and 31 lacked experiences in the field of the study. Participants selected were named participant 1 to participant 30. Participants were numbered in sequence upon receipt of an email by the researcher containing the completed interview schedule from the participants. Participants from Sample “A” were participants 1-9, 11-15, 17,18,20,21 and 26, while participants from Sample “B” were participants 10, 16, 19, 22-25 and 27-30. Based on experience in the field and many years in the South African Police Service environment, selected participants were able to

provide vast knowledge about the topic under investigation. These target group participants were requested to provide information about the topic until saturation was reached and it would have been futile to continue asking similar questions to a different group of participants.

1.13 DATA COLLECTION

Data collection is a series of interrelated activities gathered for the purpose of gathering information in order to address research questions (Creswell, 2013: 146). Creswell (2013) goes on to describe data collection as the process of getting permission, gathering information, and using various techniques and strategies such as recording digitally or on paper. It also involves the storage of these data and addressing ethical issues that may arise from gathering or using the data. It is advisable for a researcher who undertakes qualitative research to use more than one data collection method (Leedy & Ormrod, 2010: 99). According to Creswell (2013: 159), there are different types of data collection methods, namely: Observations, Interviews and Documents.

The researcher applied thematic analysis during data collection as suggested by Saunders et al., (2019: 651) stating that this is often thought of as a general approach to analyse data. The essential purpose of this approach is to search for themes, or patterns, that occur across a data set (such as a series of interviews, observations, documents, diaries or websites being analysed). Saunders et al., (2019: 651) further mention that thematic analysis involves a researcher coding her or his qualitative data to identify themes or patterns for further analysis, related to her or his research question. Bryman and Bell (2014: 61) support the statement from Saunders et al., (2019: 651) that one of the most common approaches to qualitative data analysis is undertaking search for themes in transcripts or field notes. The author further explained that a theme is more likely to be identified the more times the phenomenon it denotes, occurs in the process of coding. Coding an open question usually entails reading and rereading transcript of participants' replies and formulating distinct themes in their replies (Bryman and Bell, 2014: 200). The use of numerous sources of data will enrich this research and make it authentic prior to the interviewing of participants. The researcher made use of the following data collection methods:

1.13.1 Literature review

Bryman and Bell (2014: 88) describe the literature as the guide to make judgments about what to include and exclude from your literature review, reading what other researchers have written about your subject, and then writing about it in a way that demonstrate your understanding. Bryman and Bell (2014: 92-93) further state that a competent review affirms that you are knowledgeable in interpreting what others have written. Also, using the existing literature on a topic is a means of developing an argument about the significance of your research and where it leads to. The researcher made use of literature from the library of SAPS Forensic in Pretoria, the library of the University of South Africa (UNISA), LCRC dockets, her own personal experience, internet as well as the national library in Pretoria. Leedy and Ormrod (2015:104) also support the decision of the researcher in using multiple sources of literature with the hope that they will all intersect to answer a specific research question. On the literature side, qualitative content analysis was used to support this research. Some of the figures in chapter three depict real-life pictures of various blood stain patterns as attached as Annexure B.

1.13.2 Semi- structured Interviews

According to Bryman and Bell (2014: 225), in semi-structured interviews, the researcher has a list of questions on fairly specific topics to be covered, often referred to as an interview schedule, but the interviewee has leeway in how to reply. Interviews were conducted with participants from both sample “A” and “B” of the target population using the interview schedule compiled. Sample “A” represents 19 crime scene examiners while Sample "B" represents 11 FSL members. The interview schedule was sent to the participants through email and after answering, the participants emailed back the answered interview schedule to the researcher. Furthermore, the researcher adhered to the UNISA Covid-19 Position Statement on research ethics of social distancing attached as Annexure F.

It is, therefore, important for researcher to obtain permission from participants before deciding on the method of recording research activities, as these may result in some kind of consequences. A request for an interview was made by the researcher by telephone as supported by Bryman and Bell (2014: 227). Furthermore, the researcher mentioned all

the questions she would be asking when requesting permission from participants. Leedy and Ormrod (2015:160) agree with the researcher that the researcher must specify in advance all of the questions that will be asked. In qualitative interviews with managers specific issues are often raised. It can be difficult to gain access to senior level managers and to then arrange a mutually convenient time for a lengthy interview. A request for an interview may be made either by letter, email or telephone as supported by Bryman and Bell (2014: 227). All the participants gave the written consent by signing as per consent statement attached in interview schedule as “Annexure A” to participate in the research.

The participants from Sample “A” and “B” were asked the same questions, in order to address all research questions. In order to answer all research questions understandably, the researcher tested participants from Sample “A” on their own knowledge on the research topic, as they are not experts but are attending to crime scenes with bloodstains patterns. Furthermore, Sample “B” provided fairly correct answers in addressing the research question, as they were experts in the field of the study. Bless et al., (2013: 209) opine those open-ended questions allow participants to freely express their answers in any way they may feel valuable.

The researcher used the following guidelines as supported by Leedy and Ormrod (2015: 282-286) to conduct a productive interview.

- **Identify general interview questions and possible follow-up sub-questions in advance**

  The interview schedule was drawn up in advance stating all related questions to the topic “exploring the significance of bloodstain pattern analysis in murder investigation cases in Pretoria”.

- **Consider how participants cultural backgrounds might influence their responses**

  The research focused only on work related experience and not in their personal and private capacity. Both Sample “A” and ”B” are members of the SAPS and their culture did not influence or affect this research in anyway.

- **Make sure the sample includes people who give the kinds of information you are seeking**

Sampling methods ensured that target populations are presented. The participants of this research were Pretoria SAPS members of LCRC and FSL working directly in BPA.

- **Find a suitable location**

The interviews took place at their own time and in their own places of comfort as the interview schedules were sent to them by email to answer.

- **Get written permission**

The researcher obtained the required permission from participants before deciding on the method of interview, and this was augmented by a written permission from the SAPS Component Research, attached as Annexure D.

- **Establish and maintain rapport**

The researcher introduced herself telephonically and explained the reason for her call before emailing the questionnaires to the participants. Trust plays a significant role in research. The researcher would not like to risk jeopardizing such trust (Creswell, 2014: 183). The researcher also made participants feel free to participate by allowing them not to reveal their identity and promised them to be identified only by numbers.

- **Focus on the actual rather than on the abstract or hypothetical**

The researcher only asked questions related to the research, “exploring the significance of bloodstain pattern analysis in murder investigation cases in Pretoria”.

- **Record responses verbatim**

The researcher did not elaborate on what was said by the participants in their responses on the interview schedule, instead she used the exact answers that were written on the interview schedule sent by participants.

- **Remember that you are not necessarily getting the facts**

The researcher kept in mind that the purpose of the interview is not to obtain facts but to explore what had transpired and their findings thereon.

1.13.3 Perusal of dockets

The researcher had readily access to peruse some of the reported murder case dockets in Ga-Rankuwa LCRC since she was a member of LCRC and also worked as a crime scene examiner. Permission was granted to conduct research in the SAPS as attached in the study as Annexure D. The reported cases were also part of the data collection method. Out of 143 cases that were reported and attended to, 100 managed to go to court. The data that the researcher looked for in the perused dockets were:

- The use of BPA on the murder crime scene.
- The kind of evidence collected at the crime scene and the procedure.
- Analysis of collected evidence and the results of analysis from the laboratory.
- If an arrest was made and the results of convictions

1.13.4 Personal experience

The researcher also used her own personal experience in the field of LCRC to interpret and evaluate the information and data gathered for this research. The researcher has 16 years of experience in the SAPS, of which 10 years were at the Protection and Security Services (PSS) and 6 years at the Forensic Services. In addition, she underwent and successfully completed several SAPS training courses including a Crime Scene Examiner course. The researcher holds a BTech degree in Policing from Tshwane University of Technology, completed a Basic Computer Literacy Course at the University of Pretoria and is currently doing her master's degree in Forensic Investigation. The researcher has gained vast experience and exposure from different angles of crimes.

1.14 DATA ANALYSIS

Barnard and Ryan (2010: 109), describe the data analysis as the search for patterns in the data for ideas that helps explaining why the patterns are there. According to Streubert and Carpenter (2011: 45), the analysis of qualitative data is a practical process in which the researcher becomes deeply engrossed in the data referred to as "dwelling with data".

Creswell (2013: 143) mentions that data analysis is a spiral method which includes four components, namely:

1. Data organisation or management: The researcher will confirm transcriptions of interviews.

2. Reading and memorising: The researcher will spend more time reading and memorising what the participants said in the transcriptions.

3. Description, classification and interpretation of data: The researcher will describe, classify and interpret data received from participants according to themes.

4. Representing and visualising the data: The researcher used themes to present data collected.

Primary data was analysed by the researcher using the thematic analysis for the study. The researcher collected data by means of interviews studying the themes and patterns emerging from the data. After transcribing the interviews, all the information was read thoroughly and analysed by means of coding, looking at the theories, and concepts in relation to the study. The researcher highlighted the groups of words and organised them into codes and themes according to answers from the selected participants. That what had been said and read was then reported in a form of narrative. Data for each participant was analysed. The study was more focused on exploring the significance of bloodstain pattern analysis in murder investigation cases.

1.15 TRUSTWORTHINESS (MEASURES TO ENSURE VALIDITY AND RELIABILITY)

Leedy and Ormrod (2015: 336) opine that in research, the validity of the overall research must include general credibility and trustworthiness. To this end, the extent to which individuals perceive the study findings must be so convincing that it can be worthy and be taken seriously. Moreover, Andres (2012: 115) adds and supports Leedy and Ormrod (2015: 336) that, validity, goodness, trustworthiness and soundness used in the research describe the worth of a research project. In order to ensure that all these are maintained, the researcher should ensure that correct research methods and guidelines are adhered to and also ensure the integrity of obtained data collected. Bryman and Bell (2014: 26) believe that measurement validity is related to reliability. Bryman and Bell (2014: 26)

further mention that if a measure of a concept is unstable and hence unreliable, it cannot be providing a valid measure of the concept.

In other words, the assessment of measurement validity presupposes that a measure is reliable. The researcher used the aim and the research questions as a guideline to compile the interview schedule to gather relevant literature. Interviews were conducted with members with more than 5 years' experience and the commanders. All used literature and collected literature from the internet are related to the study. The researcher double checked the literature and the data collected from participants for validity before recording. The study also reflected the reality as the researcher also has experience in the field of the study. Bryman and Bell (2014: 44) explain that trustworthiness is made up of four equivalent criterion research; credibility, transferability, dependability and confirmability. In this study, the four criteria are discussed as follows.

1.15.1 Credibility

Anney (2014: 276) argues that researchers should ensure that interview questions posed to participants during the interview must be aimed at soliciting answers which address the research objectives. This does not necessarily prevent researchers from posing other probing questions. However, such 'other probing questions' must only be aligned to the major questions in the interview schedule (Bless et al., 2013: 236).

Bryman and Bell (2014: 44) emphasise that multiple accounts of social reality is especially clear in the trustworthiness criterion of credibility. After all, if there can be several possible accounts of an aspect of social reality, it is the feasibility or credibility of the researcher's account that is going to determine its acceptability to others. The establishment of the credibility of findings entails both:

- Ensuring that research is carried out according to the canons of good practice.
- Submitting research findings to the people who were studied to confirm that investigators understood their social world.

The researcher ensured credibility as she remained focused on the questions when searching for relevant literature and also when interviewing the participants. Literature selected pertained to the significance of bloodstain pattern analysis in murder cases. In

this instance, the focus was on bloodstains pattern analysis in the LCRC's in Pretoria, Gauteng Province. The researcher never deviated from the questions she promised to ask. The researcher further ensured that data collected from all sources portrayed the findings of this research as trustworthy and real. The findings of this research can be used for educational purposes.

1.15.2 Transferability

Andres (2012: 121) indicates that good research almost forces researchers to engage in some form of transferability in that what transpires out of particular research must be in such a form that its findings and recommendations may be transferred from one research setting to another similar setting. As a result, Andres recommends that researchers should conduct research through a rigorous review of similar literature patterns as well as related studies. This prompted the researcher to select all LCRC's in Pretoria to see if the modus operandi is either similar or different. Andres further argues that by employing the notion of transferability, the onus for demonstrating generalisability is shifted away from the researcher and his/her related findings and toward those who wish to partly or fully replicate the study. In indicating its transferability, research must show the relationship between the researcher and the participants and how data was collected. The researcher used themes to convey the research findings and described in details the participant's answers to the questions applying verbatim quotations.

1.15.3 Dependability

According to Bryman and Bell (2014: 45), dependability orders the researcher to adopt an 'auditing' approach, in order to establish the merit of research in terms of trustworthiness. To ensure dependability in this research, the researcher kept complete records of all phases of the research process that includes Formulation of a problem, selection of research participants, field work notes, interview transcript, and data analysis decisions in an accessible manner.

1.15.4 Conformability

Bryman and Bell (2014: 45) mention that conformability is concerned with ensuring that, while recognising that complete objectivity is impossible in social research such as business research, the researcher can be shown that she has not knowingly allowed

personal values or theoretical inclinations to influence the research. To ensure dependability, the researcher kept a complete record of the research process to ensure that the findings and recommendations made be reproduced to their sources.

1.16 ETHICAL CONSIDERATIONS

In this study, the research was conducted in compliance with Unisa Ethical Code which outlines processes to be followed when dealing with human beings. For this reason, permission from SAPS Component Research was obtained as recommended by authors such as Bless et al., (2013: 28-29) who explain that it is significant to note that research ethics relates to whether behaviour conforms to the code or a set of standards. Participants in this research were not exposed to any risk as the ethical certificate attached as Annexure E indicates. Moreover, participants were treated in a humane manner and respect as recommended by Denscombe (2010: 76) supported by Leedy and Ormrod (2013: 106-111) that ethical guidelines should be adhered to when conducting a research study. The researcher followed the following guidelines as mentioned by Leedy and Ormrod.

1.16.1 Protection from harm

The researcher ensured she follows a legal and a professional process by requesting permission to conduct research from the SAPS as well as from the participants. During and after participation in this study, the researcher made sure of the following: treating the participants with dignity and respect; the interviews were conducted in a safe environment where the participants felt free and comfortable; participants were never exposed to any kind of harm and their identity remained anonymous.

1.16.2 Informed consent

In all research undertaken, it is important to ensure that informed consent is obtained from participants before such research commences. In this regard, the researcher adhered to the guidelines provided by Webster, Lewis and Brown (2014: 87) that emphasise the essence of informed consent. These authors maintain that participants in research should be given sufficient information to enable them to make informed decisions of whether or not to participate in a study. In this study, consent forms were

given to and signed by the participants as an indication that they agreed voluntarily and that they were not forced by the researcher.

1.16.3 Right to privacy

A participant information sheet was issued to participants explaining the nature of the research, the details of the participants and their involvement in the study. Their right to privacy was respected throughout the study and participants' identities were not revealed as the researcher adopted to use an anonymity approach. Furthermore, the researcher used numbers as references to protect these participants in this study.

1.16.4 Honesty with professional colleagues

The researcher acknowledged all sources that were used during the study and all sources cited in the text were listed in the reference list. Professional language was used in this study and where required; participants were quoted verbatim. Moreover, the researcher ensured she did acknowledge all sources or references in this study, in order to avoid plagiarism.

1.17 SUMMARY

The synopsis in this chapter encapsulates what a general orientation chapter should comprise of, that is, outlining the research methodology, research design, theoretical concepts, ethical considerations as well as the context with regard to murder investigation involving specialised skills. Furthermore, the research problem, the aim and objective of the research, the purpose of the research, the research questions under investigation, the value of the research, preliminary literature study, research design and approach, target population and sampling, data collection, data analysis and trustworthiness were also outlined. The following chapter presents the objectives of murder investigation supported by relevant literature review.

CHAPTER TWO: THE OBJECTIVES OF MURDER INVESTIGATION

2.1 INTRODUCTION

The Constitution of the Republic of South Africa affords citizens various rights, including the right to life. Therefore, perpetrators who violates others' rights should be held accountable and face the consequences of their actions when it comes to crimes they committed. According to Lushbaugh and Weston (2012: 157), criminal homicides, from murder to manslaughter, and common and aggravated assault are major crimes against the person. First the crime scene and then the circumstances of the attack are the focus of investigations of these crimes.

The investigating officer should approach the crime scene with a broad mind that evidence must be found. Although the investigating officer should always look for any kind of evidence, the type of crime that was committed will be a guide for what specific evidence to look for (Lochner and Zinn, 2015: 41-42). The gathering of evidence plays a crucial role in a murder investigation. The crime scene examiner needs to ensure that all physical evidence is identified, properly collected and packaged accordingly. Police investigators have to find answers to questions such as who might have committed the crime, the instrument used to commit the crime as well as determining the kind of crime that was committed.

2.2 MURDER INVESTIGATION

The researcher regards investigation as a tool for finding the truth. Lushbaugh and Weston (2012: 158) state that the police accept sole responsibility for identifying the person responsible for the killing. When a crime has been committed, the investigating officer has a duty to find out how such crime occurred, who committed the crime, and ask victims how these crimes affected them. In addition, Fisher and Fisher (2012: 379) assert that investigators need to be skilful, as society expects them to provide answers to the most difficult questions about crime, as no ordinary citizen is expected to perform such kind of functions. Investigation of a complex crime such as murder requires that investigators be knowledgeable on such crime to ensure that perpetrators are brought to book and society is protected from dangers posed by criminals. More than with most crimes, death investigation requires a team effort. Identifying the time, manner, and cause

of death can involve specialists in addition to the crime scene examiner and pathologist, such as an entomologist, a toxicologist, a radiologist and a firearm expert (Tilstone et al., 2013: 387). For a murder to be considered as murder the killing must have a plan, action and initiation of the plan to take another person's life, e.g., a wife went to the nearest store, bought rat poison and put it in her husband's juice. Meaning the wife had intentions to kill, took time and planned the killing and even acted on the plan.

The researcher is of the view that well-trained investigators are the solution to the increasing and unacceptable levels of crime in the country. For this reason, the researcher took a decision to contribute by this research with the aim of decreasing the levels of crime in South Africa (SA).

2.3 THE IMPORTANCE OF INVESTIGATING MURDER

Murder is an important crime to monitor because unlike other crimes, the number of reported murders is likely to be very close to the actual number of murders committed. The murder rate is regarded as one indicator of a country's stability - the higher it goes, the less stable a country is regarded to be (Crime Statistics SA, 2017).

Pedneault (2009: 159) stated that the following questions must be asked by the investigators: Is there additional evidence to be detected? Are the investigators appointed sufficiently trained, experienced and skilled to discern or identify the murder?

Ndara (2013: 31) is of the opinion that the objectives of investigation are to determine the circumstances contributing to the law regulating the offence. Madinger (2012: 202) states that even though every case is different, the same rules apply to each investigation, and the investigative process in any case is really a series of conclusions came to by the investigator after weighing the evidence.

This is where the investigators were given an actual profile to incorporate into their investigation and help to identify a possible suspect that fits the profile. If there are still no suspects to be found, the profile should be re-assessed. Especially in the case of disorganised killers, or modus operandi fit, what appears to be patterns may be mere coincidences. Alternately, since disorganised killers often have personal symbols; initial interpretation of common psychological relationships may be inaccurate Karagiozis (2005). Berline (2010: 50) highlighted that it is mostly the initial procedures which were

directed towards the collection of physical evidence, the so-called objective findings at the scene of crime.

Kappel (2006: 67) explains that to get information about the location - where the victim was first approached, where the crime occurred and if the crime and death scenes differ, also provide additional data about whether a vehicle was used to transport the victim from the death scene or if the victim died at his/her point of abduction; it is also used to find the murder and to prevent further death and prevent recurrence.

In this case the researcher agrees with Kappel (2006: 67) that the purpose of investigating the crime that was committed is to find out who is the suspect so that the law can take its course.

Madinger (2012: 202) and Ndara (2013: 31) concur with the author, Kappel (2006: 67) that investigation, for this reason, is the ability to analyse, collect and use evidence and to determine the degree of success of the investigation because each and every investigator wants to see the success of a particular crime. The investigators should not focus on what the witnesses are telling them; they must do a thorough investigation which will also assist in other related cases. The researcher is the crime scene examiner of a case at Loate SAPS with a murder CAS, 346/10/2017 with LCRC number 239/10/2017, where the investigators were alerted by an unknown person about the murder and the location of the weapon used. During the investigation, it was discovered that the same suspects were also involved in another case of murder with the same modus operandi. The suspect ended up confessing to both crimes and was convicted. In terms of the Criminal Law Amendment Act, certain cases of murder must be punished with life imprisonment. All other cases of murder are also subject to minimum imprisonment sentences (Joubert, 2018: 139). The researcher agrees with the author that the purpose of murder investigation is to punish the murderer.

2.4 IMPORTANT ASPECTS TO TAKE INTO CONSIDERATION WHEN INVESTIGATING MURDER

According to Joubert (2018: 137), the specific conduct required to constitute murder is ‘causing the death of another human being’; this conduct compromises three elements that each has to be proven beyond a reasonable doubt, namely, ‘causing the death’, ‘of

another', and 'human being'. James et al., (2005: 421) believe that, success will be determined by the manner in which the investigator approaches the crime scene. Basically every individual on the scene and those forming the circle of relatives should be regarded as suspects. This renders such an assistance required in the elimination and narrowing down of suspects.

The researcher agrees with James et al., (2005: 421) that success will be determined by the manner in which the investigator approaches the crime scene. The researcher examining the scene of murder at Ga-Rankuwa (CAS, 212/05/2018) approached the scene with an open mind. The researcher used the Bluestar (the chemical used to detect if the blood is indeed human blood). After applying the Bluestar, it was discovered that the knife pointed out by the suspect, the girlfriend of the deceased, was not the correct knife until blue star was used on all knives in the house. A big knife (weapon used) was discovered to be the weapon used instead of a table knife. The size of the knife was measured against the hole on the body of the victim, and it was confirmed to be the correct weapon.

Lushbaugh and Weston (2012: 158) point out that the body of a victim is the extension of a crime scene. The investigator searching the scene and the evidence technician lack the professional knowledge, skills and experience of the medical examiner, the pathologist, and the toxicologist. Therefore, any examination of the victim in murder cases by the investigator searching the scene must be a superficial one.

2.4.1 Crime scene

The crime scene is the starting point of an investigation. According to Stelfox (2013: 126), the term "crime scene" is used to describe any location where a significant activity related to a crime takes place. Stelfox (2013: 126) explains that a crime scene can be any of the following: places used to plan the crime; places where encounters between a victim and offender took place; places where the offender attacked the victim; places where the offender detained the victim; body; place where the body was found, in the case of homicide; vehicles or other forms of conveyance used in the crime; weapons; place of recovery of weapons; routes to and from one scene to another; people who are involved with a suspect or a scene, witnesses, victims and suspects including their homes,

workplaces and vehicles, and places used to clean, hide or discard material used in or obtained during the offence.

The significant part of a criminal investigation is crime scene management and processing of a crime scene. According to Palmiotto (2013: 97) the crime scene is the proof that a crime has indeed been committed and is the initial point of criminal investigation and contains evidence that would connect the suspect with the crime scene. Crime scene is the location where a suspected criminal offence has occurred, (Gilbert, 2010: 80).

2.4.2 Evidence

Joubert (2018: 403) states that tendering evidence is the means of providing or disproving facts in dispute. Evidence compromises all the information and material submitted to the court by the parties, to enable the presiding officer to judge and settle a dispute. According to Lochner and Zinn (2015: 38), the scene of incident is the place where evidence is found. The search for the evidence must be done in a systematic, organised and planned manner. In most cases there is only one chance of investigating a scene as evidence can be destroyed and will not be found when the investigator returns for a second search. Lochner and Zinn further state that the evidence found on the scene can be so minute that it can only be examined under a microscope. Evidence can also be a train, airplane, house, body, person as well as blood. Evidence can be oral or physical information that is placed before a court of law or during civil proceedings, upon which the presiding officer or facilitator must make his or her findings (Lochner and Zinn (2015: 39). There are different types of evidence at a crime scene that will be discussed.

- Physical evidence: Most investigators are familiar with physical evidence, which is anything one can carry into a courtroom and place on a table in front of the presiding officer. Physical evidence speaks for itself. Photographs can be used to portray the physical evidence.
- Documentary evidence: Much of the evidence an investigator is likely to use in providing a case will be in the form of documentation. This will include reports, log files and the like. Documentary evidence is all the evidence in written or typed form. This kind of evidence cannot stand on its own and must always be authenticated.

According to SAPS Standard Operating Procedure (SOP) in the crime scene photography, SAPS (2017: 1), the photography procedure is applicable in the crime scene examination environment to provide the court with visual representation thereof. Thoroughness is the important factor to consider and remember before you enter into a crime scene. In a murder crime scene, evidence is of crucial importance and if the crime scene is not properly examined, the perpetrator might get away.

2.4.3 Characteristics of physical evidence

According to Lochner and Zinn (2015: 40), the investigator must know what the characteristics of physical evidence are, because such knowledge is vital for making an overall judgement about the scene of incidence. Physical evidence is probably considered superior to testimonial evidence and will often be given great credibility by the presiding officer because it is not subject to human frailties. Physical evidence is often considered the most dependable and the most accurate of all evidence. Physical evidence has unique characteristics that other evidence does not have. When physical evidence is properly identified, collected, protected, preserved and recorded, it can link a suspect to a victim or to the scene.

Lochner and Zinn (2015: 40), further provide examples of physical evidence as:

- Objective: Physical evidence can never be wrong, false or absent. Physical evidence can never lie, forget or be mistaken when properly identified or collected. It is viewable and not dependent on the presence of a witness.
- Analysis: Physical evidence is scientifically collected for the purpose of analysis in a laboratory.
- Tangible: Physical evidence is tangible; it can be touched.
- Microscopic: Sometimes physical evidence cannot be observed with the naked eye but, with the use of scientific process, it can be made visible, described, photographed or illustrated as an object.

The author states that as soon as an investigator arrives at the scene of incident, he or she should begin looking for physical evidence that is related to the crime scene that has been committed and that can be used as evidence. At the murder crime scene, for

example, the investigator is likely to find blood: it is his or her responsibility to identify it as blood and then look for the murder weapon.

2.5 THE ROLE (DUTIES AND FUNCTION) OF THE POLICE FIELD WORKERS IN THE INVESTIGATION OF MURDER CASES

According to Omar (2009: 66), the Crime Scene Examiner/Manager is responsible for the following: to photograph the crime scene before any evidence is removed to be processed; to collect evidence such as trace or Deoxyribonucleic Acid (DNA) evidence; to gather information to perform a reconstruction of the crime scene; to coordinate with the pathologist to arrange for the removal of a body from a crime scene if necessary; if a suspect was arrested to collect DNA samples from him/her for later comparison to unknown samples; to preserve evidence and transport it to the relevant Forensic Science Laboratory Section for processing; and to ensure that a log of the chain of custody with regard to evidence is kept.

According to section 232 of the Criminal Procedure Act (Act 51 of 1977), evidence of photographs is admissible in a court of law and such photograph is a true reflection of what the scene looked like. Photographs illustrate the scene to the court. It brings the scene to the court to enable everybody involved to see exactly what the scene looked like. It is also used to enlighten the testimonies of the witnesses to make it more understandable.

In accordance with section 232 in murder cases the following must be done: cordon off the scene immediately if it has not been done already and remove all bystanders from the scene; if the hands of the deceased are tied, clear photographs of the knots and the material used must be taken; the wounds and the injuries must be photographed in detail during the post-mortem; examine the scene thoroughly to establish whether the murder was actually committed there. Expand the investigation wider than the immediate scene for further clues; drag and/or struggle marks on the ground and in the vegetation are very important and must be photographed; examine wounds on the body of the deceased and search for any instruments on or near the scene that could cause such wounds; photograph any findings. According to Standard Operating Procedure, SAPS (2014)

states that the crime scene examiner should follows objectives during the processing of a crime scene, especially murder. Processing of a crime scene is as follows:

The crime scene examiner shall insure that all crime scene processing methods are considered when processing a crime scene. The nature and type of scene will determine the scope of processing activities. The crime scene examiner shall perform the following activities based on the scope of duties.

- Take a video recording of a crime scene as you received it, that is before processing.
- Photograph the scene as you received it, in other words before processing. The
- scene to be photographed with a SLR camera and/or using a 360-degree camera.
- Zoning in on crime scene and compile a detailed rough sketch.
- Visual examination.
- Identifying, marking and numbering of items/points of evidential value.
- Photograph the marked crime scene with marked and numbered items/points of evidential value.
- Physical processing of the crime scene (in the correct sequence) starting with the tyre impressions.
- Physical processing of the crime scene Trace and DNA and related evidence or DNA.
- Conduct presumptive and confirmatory test.
- Collect, package in a correct evidence seal bag/kit, properly label and photographs in a sealed forensic bag.
- Physical processing of the crime scene for patent and latent fingerprint and transfer marks.
- Physical processing of the crime scene for blood-stain pattern identification.
- Take measurements with the intention of being able to reconstruct every item/point(s) and record such on the scene report.
- Crime scene reconstruction.
- Identification, documentation and collection of tool marks.

Establish from the Detective if he/she requires any further investigation according to the scene report. Conduct a final walk through to determine if all identified activities were performed correctly and nothing was left behind or ignored.

2.6 THE ROLE OF FORENSIC SCIENCE LABORATORY (FSL) IN MURDER INVESTIGATION

According to Lochner and Zinn (2015: 127) the analysis and interpretation of evidence is done by trained experts. They are usually people with specifically relevant academic qualifications and are often attached to FSL. Every action taken by the technician at the scene is done with the specific purpose of capturing data. In effect, the technician captures pieces of the crime scene puzzle in the hope that they might help the investigators understand the true nature of the events that transpired (Gardner, 2012: 413). The authors further state that investigators rely on scientific methods to solve a crime. Whenever violent crimes like murder are investigated, a need for a forensic laboratory is always there, to thoroughly examine evidence found at the scene, such as firearms, dead bodies, questioned documents and the like. The role of the FSL according to the National Instruction 1 (Saps, 2015: 27). Specialised service is needed from FSL at the crime scenes when it is necessary, such as:

(a) Fire origin-and-cause investigations, fire debris analysis and detection of commonly used, ignitable liquids in exhibit material.
(b) Representative sampling for chemical analysis.
(c) Scene where firearms were used and require shot range or distance determination; and
(d) Coordinating clandestine drug scene.

Brown and Davenport (2012:7) state that forensic science begins at the crime scene - the place where an incident took place. This implies that the FSL must be available to provide assistance 24 hours, including telephonic advice. If telephonic guidance can be provided to the Investigating Officer or Crime Scene Examiners, it may not be required for the FSL to attend to the scene. If, however, if it is clear that specific and scientific services are required, the scene will be attended by the forensic expert from the FSL.

2.7 SUMMARY

Murder investigation/justice starts with the first responder at the crime scene by removing perpetrators, cordoning off the crime scene, preserving lives threatened and identifying witnesses according to the procedure expected from them. It is also the responsibility of the rest of role players on the crime scene to ensure that the crime scene remains cordoned off until the last walkthrough.

Physical evidence should be photographed, collected, labelled, packaged and send to FSL. The Standard Operating Procedure (SOP) should be maintained in order to sustain the exhibit's evidential value. Good management skill of the crime scene is the key in murder investigation and also during crime scene management.

The uses of forensic science in murder investigations, as well as the role of crime scene examiners, were also discussed. This reflects that forensic science and criminal investigations have a direct relationship. This chapter explored the processes about handling crime scenes in murder cases and the researcher sought to impart knowledge to crime scene technicians as well as a clear understanding on how to deal with murder investigations. The following chapter shares the significance of BPA in a murder investigation case.

CHAPTER THREE: THE SIGNIFICANCE OF BLOODSTAIN PATTERN FOUND IN THE MURDER CRIME SCENE

3.1 INTRODUCTION

The study explores the significance of bloodstain pattern analysis in the investigation of a murder cases in Pretoria SAPS. BPA is a forensic tool that may be used to better understand what may or may not have occurred during a bloodshed event. Drops of blood can have more valuable information when analysed.

Gardner (2012:79) emphasises that the purpose or processing the 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.

Murder investigation requires a team effort. Identifying the time, manner, and cause of death can involve specialists in addition to the pathologist, such as entomologist, a toxicologist, a radiologist, and a firearm expert, (Tilstone et al., 2013: 387). Crime scene processing is very important during murder investigation. The aim is to bring perpetrators to justice. A proper examining of a crime scene is needed for a successful prosecution, recognising, gathering, documenting, packaging and dispatching of physical evidence for analysis. The courts allow photographs or sketch plans in order to see and understand what was taking place at the crime scene. The crime scene examiner should bear in mind that there is evidence in all crime scenes as it will be discussed in the Locard Principle.

3.2 LOCARD PRINCIPLE

Locard principle is the foundation of contact theory, the recovery and transfer of all forensic evidence. According to Jackson and Jackson (2011: 15), the perpetrator will not only take away something at the crime scene, but also leave behind traces at the crime scene. Locard exchange principle is based on a contact theory, which states that when two objects come into contact with each other, the one will leave a trace on the other (Lochner and Zinn, 2015:12). Fisher and Fisher (2012: 32) repeated the statement that every contact leaves a trace. Fish, Miller and Braswell (2011: 110) described that the Locard principle usually provides leads for the investigators. There is always visible contact at each crime scene, and the crime scene examiner needs to know how to tackle

the collection of exhibits and which methods need to be applied during the process. According to Van Rooyen (2012: 20) the Locard principle is the reciprocal transfer of traces. He again mentions that a clue is usually left behind when two or more objects or people come together or come into contact with each other. Zinn and Dintwe (2015:45) state that Locard's hypothesis assumes that the perpetrator will bring something into the scene, leave something at the scene, and leave with something from the scene, be it physical or electronic. Locard based his argument on the fact that it is impossible for an individual to act without leaving traces of their presence. Petherick and Turvey (2010: 28) emphasise that any action of an individual, moreover the violent action constituting a crime, cannot take place without leaving a mark or evidence. It is impossible for a criminal to commit a crime without leaving indications of his steps. The trace left on the crime scene usually connects with the perpetrator without a doubt. It is the perpetrator's tool, prints, or even stains like blood or DNA.

The first principle that the researcher understood is that when approaching a crime scene, bear in mind that the Locard principle is of utmost importance, same as the main aim and objective when searching the crime scene to find evidence. Lochner and Zinn (2015:13) further mentioned that if traces cannot be found where it is presumed that contact was made at a scene of a crime, it means that there are limitations in the techniques and methods of detection. Technology will make it possible to find traces where no traces could be found in the past. The following is the procedure when collecting BPA.

3.3 THE CORRECT PROCEDURES TO BE FOLLOWED WHEN COLLECTING BLOODSTAIN PATTERN ANALYSIS IN MURDER CRIME SCENE

Lochner and Zinn (2015: 89) indicate that a blood-spatter analyst works on the scene of the incident and must be allowed controlled access. The analyst will be able to determine details from the way blood was spilled at the scene. Blood- spatter analysts can use spatter information to determine the estimated height of the attacker or identify a potential murder weapon, and the number of wounds a victim might have. The analyst can also be asked to match blood types at different scenes when the investigator is trying to link crimes. Crime scene examiners are the first, primary and majority users of information derived from this form of physical evidence. It is a common that new crime scene

examiners prefer to work with an experienced crime scene examiner for them to gain knowledge. Most law enforcement officers prefer to be taught by their seniors, sometimes even specific duty officers for the purpose of better understanding of the crime scene (Wonder, 2007: 219).

The researcher has realised that the laboratory technician/forensic practitioner are the ones handling the BPA as the ordinary police officials have not been trained for such roles.

According to Gardner (2012: 351), if the trained analyst is unavailable to visit the scene and the technician is not trained in BPA, it is important that the crime scene technicians perform a complete documentation of the stain patterns and stains. Every crime scene technician must be able to recognise a discreet pattern within the overall scene. After recognising the discreet patterns, each pattern must be photographed and documented according to pattern alone as well as individual stains within the pattern. Close-up detail is a very critical factor in bloodstain pattern photography as they reveal all activity performed at the crime scene. Photographs taken several feet away are unlikely to allow or show any type of analysis and are actually a waste of effort. The crime scene examiner must ensure that good close-up photographs are taken in any bloodstain photography.

Houck and Siegel (2011: 248) suggest that presumptive tests can be done to determine if the stain in question is indeed a human blood; if it's not a human blood then it's probably not worth the analysis. Bloodstain evidence collection and preservation can be done as follows as illustrated in the SOP (SAPS, 2017: 4).

- Start at the predetermined point on the crime scene and work sequentially through the scene.
- Work from outside inward and from bottom upward.
- When a bloodstain consists of just one individual stain, for example, blood from a hand transferred to a wall, then the specific stain is marked and numbered.
- Road mapping of the identified stains is done by measuring and plotting the vertical and horizontal axis of the position on a crime scene. The identified stains are then photographed with the marking.

- When a bloodstain consists of more than one stain, for example, a couple of drops emanating from a weapon and hitting a wall (cast off), then the whole spatter stains is marked and numbered with one identifying number and the vertical and horizontal position of the whole stain as a unit is documented. A few individual drops pertaining to the spatter pattern are photographed individually by means of macro photography to assist with the trajectory determination and identification.
- Identify impact spatter and determine the area of impact.
- Perform presumptive and confirmatory tests for blood after documenting and before collecting samples.
- Ensure that all the relevant equipment and consumables are decontaminated as per cleaning and decontamination of crime scene equipment and consumable procedure.

Lochner and Zinn (2015: 14) mentioned that preservation of evidence means the deliberate and specific actions taken with the intention of preventing contamination of, damage to or the loss or destruction of any evidence. The preservation process involves: safeguarding the evidence at a fixed location; forwarding the evidence to the laboratory for examination and analysis; obtaining the evidence from the laboratory as well as keeping the evidence safe under lock and key where it cannot be tampered with until it is delivered in court.

The researcher in her line of duty realised that spoiled blood presents many problems for the analysis because of the contaminating effect of bacteria as well as fungi; it may produce misleading or inconclusive testing results. Blood may decompose if not properly packaged. Wet bloodstained articles should not be packaged nor be sealed in airtight plastic bags as it may accumulate moisture. The wet articles should dry up before packaging for better results in analysis. Dried up bloodstained articles should be packaged individually and in clean paper bags (Gardner 2005: 295).

Gardner (2005: 295) further explains that accredited laboratory accepts samples that are packaged individually for analysis. Bloodstain and control areas should not be handled with hands during the collection period as it may contaminate the sample with DNA. The

crime scene examiner must prior to the process, test if the blood found at the scene of murder is indeed human blood. Testing of blood will be discussed.

3.3.1 Testing blood if it is indeed human blood

Lushbaugh and Weston (2012: 78) emphasised that the determination of whether or not the stain is blood, is done by means of a preliminary colour test known as Kastle-Meyer colour test. This test is based on a reaction with the enzymes in the blood which cause the test strip to turn a deep pink colour. Lushbaugh and Weston further said another question that often must be answered is whether blood was present at one time at the crime scene and has since been cleaned up. To answer this question, the crime scene examiner would use another presumptive test known as Luminol, which produces light rather than colour as it reacts with blood. The author explained that after spraying the suspected area with Bluestar, the room is darkened, and any bloodstain present produces a faint blue glow, known as luminescence. The researcher with her experience had an advantage of experiencing the use of a relatively new product, trademark name of Bluestar, which is now available and can be used instead of Luminol. Lushbaugh and Weston also mentioned that Bluestar has the advantage that its reaction with a bloodstain can be observed without having to create complete darkness. The following diagram illustrates the reaction of Bluestar when human blood is present.

3.4 THE BLOODSTAIN PATTERN

Any stain that is created with blood may be pointed out as a bloodstain pattern. According to SAPS Forensic Science Laboratory (SAPS, 2010: 1) it is described that as blood comes in contact with the surface, is referred to as bloodstain pattern. Bloodstain pattern may provide investigative information, on how patterns and the objects/surfaces around relate to each other, and their relative locations may provide an understanding or a reconstruction of the event and its sequence. The study about the stains may lead or direct as to where to start with the collection of the blood evidence.

BPA may sometimes support or disagree with statements issued by victims, perpetrators or witnesses. Bloodstain pattern evidence is found at crime scenes where violence is involved. Fisher (2004: 200) believes that the distribution and shape of blood drops can assist in reconstructing how the crime occurred. It is common course that in most violent

crimes, blood is the most likely anomaly which is noticed and plays a significant role to link suspects to crime scenes. As a result, investigators should approach such crime scenes with caution and ensure that continuity of possession is maintained (Pokupcic, 2017: 4). Bloodstain pattern defines the violent nature of crime and also plays a crucial role in crime investigation. Blood stain pattern and traces which are not visible to the naked eye can be investigated using Luminol and other liquids to determine if traces are of human nature or otherwise. It is noteworthy to understand that not everything which appears to be bloodstain is actually one.

The researcher is of the opinion that well-trained fieldworkers must be properly equipped to deal with scenes in order to ensure successful prosecutions. Blood found at crime scenes are analysed using sophisticated tools and techniques. Bloodstain patterns range from a drop, smear or other forms/patterns and these can tell a story about the perpetration of the crime and assist in linking perpetrators to the crime scene. Bloodstains with different shapes of blood pattern on various kinds of surfaces can also provide information about what actually occurred during the commission of a violent crime. A multi-disciplinary approach must be undertaken to investigate and analyse bloodstain patterns, and this requires special skills/training. The researcher is of the view that experienced experts and well-trained crime scene examiners can accurately interpret bloodstains found at the crime scene and also manage to obtain valuable information about the source of bleeding, impact surface and mechanism which led to the formation of bloodstains, give an indication of circumstances under which a particular criminal offence was committed and also help with its legal qualification (Pokupcic, 2017).

Gardner (2005: 267) states that crime scene technician can obtain valuable information on bloodstains found at the crime scene. The order of BPA reviews the position, shape, size, spread, as well as other physical characteristics of a bloodstain found at the scene, and this provides information concerning the nature of the occasion that created the pattern. Bloodstain pattern tells us “What exactly happened”. This information, when merged with the information obtained from any DNA analysis, it may give the investigator the necessary information, as well as subsequent statements issued by suspects, victim and witnesses (Gardner, 2012: 331). Gardner (2005: 267) agrees with Pokupcic (2017)

that, bloodstain found at the crime scene can supply key information to the crime scene technician.

3.5 DIFFERENT TYPES OF BLOODSTAIN PATTERNS FOUND AT A CRIME SCENE

Houck and Siegel (2011: 245) point out that there are three main classes in bloodstains, mainly being passive, transfer and projected or impact stains. The primary patterns of interest include spatter, flows drip patterns, arterial or projected patterns, castoff stains, swipes, contact pattern transfers, wipes and drip trials, (Gardner, 2005: 310). The FSL emphasises that bloodstain evidence may reveal the following: originality of bloodstain, direction from which blood is impacted, speed which blood left its source, position of victim and assailant, distance of bloodstain from the target, movement of victim as well as assailant and the number of blows/shots. The researcher outlines the purpose of applying measurements on a bloodstain pattern, which is to determine the angle of impact or angle of origin, to find out at which point and direction the blood originated from. In the bloodstain pattern we find low, medium and high velocity blood spatter.

3.5.1 Passive bloodstains

The following are patterns found at the scene under passive patterns according to the South African Forensic Fact File of (SAPS, 2010: 27): drops is the volume of blood that by force exceeds its surface tension and falls free from the mass of blood from which it was created; in free flight drops are a sphere or ball, not a teardrop. SAPS (2010: 27) further describes that the drops do not break up while in motion.

Saferstein (2011: 394) show that flows are made by drops of large amounts of blood flowing by the force of gravity. Flows may be formed by single drops or large volumes of blood coming from an actively bleeding wound or blood deposited on a surface from an arterial spurt. The flow direction may also show movements of objects or bodies while the flow was still in progress or after the blood has dried up, the blood flows from vertical and horizontal, altered by shape, obstacles and often ends in pool. Saferstein (2011: 395) states that pool occurs when blood pile up in a level and not in an undisturbed place. The edges of the blood will start forming an event called skeletonising, considering the drying time in the condition where the pooling takes place. This usually occurs within 50 seconds

after depositing of drops and longer in large volumes of blood. Pooling is actually a large circle volume of undisturbed blood.

3.5.2 Transfer bloodstains

The following are patterns found at the scene under transfer patterns: Houck and Siegel (2011: 245) emphasise that a wipe stain is formed when an object moves through a pre-existing bloodstain. An example would be the stain evolving from a clean cloth being moved through a blood pool on a floor. According to Houck and Siegel (2011: 245) swipes stains are the transfer of blood onto a target by a moving object that itself is blood stained. Blood-soaked clothing being dragged over unstained vinyl flooring would result in a swipe.

A transfer pattern is a bloodstain pattern created when a bloody object comes into contact with a non-bloody object with motion in (SAPS, 2010: 28). It actually involves a wet bloodied object contact a secondary surface, such as, hand to wall, hair to walls or shoe to bedding.

3.5.3 Projected or Impacted bloodstains

The following are patterns found at the scene under projected or impacted bloodstain: Houck and Siegel (2011: 245) mention that spatter is a technical term in BPA that explains a stain that results from hitting a target, such as forward spatter and backward spatter. Splashes are a large central irregular area surrounded by elongated peripheral spatter pattern. Houck and Siegel (2011: 246) state that cast-off stains are the results of blood being flung or projected from a bloody object in motion or one that stops suddenly. Cast off stains are linear and reflect the position of the person moving the bloody object. If a criminal hit the victim with a baseball bat, as the criminal's arm comes back to swing again, any blood on the end of the bat will be projected by centrifugal force in an arc. The cast-off stains can arc directly behind the object and the land.

Gushes can vary due to the pumping action and different pressure of the blood as it exits the wound, producing a zigzag or up and down pattern. The blood flowing through the arteries is under high pressure. When an artery is breached while the heart is pumping, blood will spurt or gush from the wound, Houck and Siegel (2011: 246). At the crime scene there might be between one three bloodstain patterns or a combination of them all. Permission was granted by the SAPS Academy Pretoria Central, SAPS Forensic services

to use their images for demonstrative purpose. All images are attached as Annexure B. Crime scene examiner should take note of the following patterns of bloodstains that can be found at the crime scene as evidence.

3.4 LIST OF FIGURES

Figure 1.1: Hand transfer pattern

Wet bloodied object had contact with a secondary surface and the transfer from hand.

Figure 1.2: Hand transfer and wipe mark

Figure 1.3: Wipe mark

On a wipe, an object moves through a wet blood-stained surface and feathered edge suggests the direction of the object.

Figure 1.4: Low velocity blood spatter

In low velocity blood spatter, the drip pattern has big drops of blood formed by an object that is used.

Figure 1.5: Medium velocity blood spatter

In medium velocity blood spatter, is where an object is used, and the blood drops become smaller.

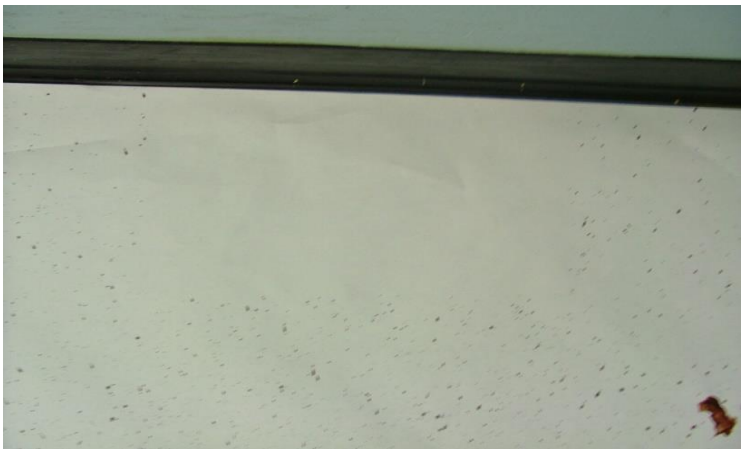


Figure 1.6: Medium velocity blood spatter to determine angle of impact

It can be caused by a blunt object, such as a bat or an intense beating with a fist.

Figure 1.7: High velocity blood spatter

In high velocity blood spatter, a weapon (firearm) is used and blood moves very fast which form a very small size of droplets.

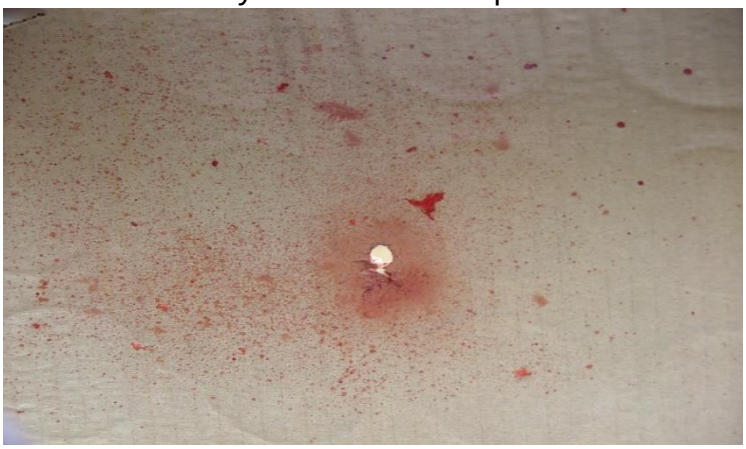


Figure 1.8: Shoe transfer mark

Blood is being transferred by movement from a bloody object or surface to a non-bloody surface.

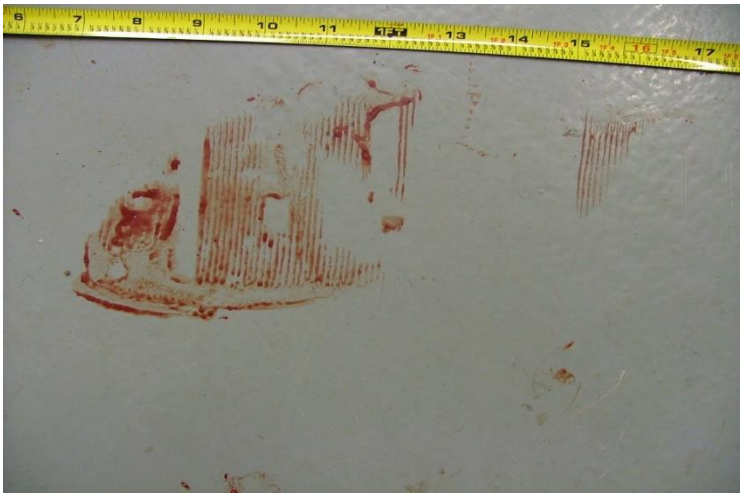


Figure 1.9: Blood pooling and shoe transfer

A static pool of blood accumulated from a leaking source flow to a particular area for a period of time.

Figure 1.10: Dripping pattern

When blood drops into itself on a surface, many small droplets are projected upwards into the air and leave an impression around the central irregular blood pool in the right angles and obliquely, resulting in surrounding circular and oval blood at splatter patterns (SAPS, 2010).

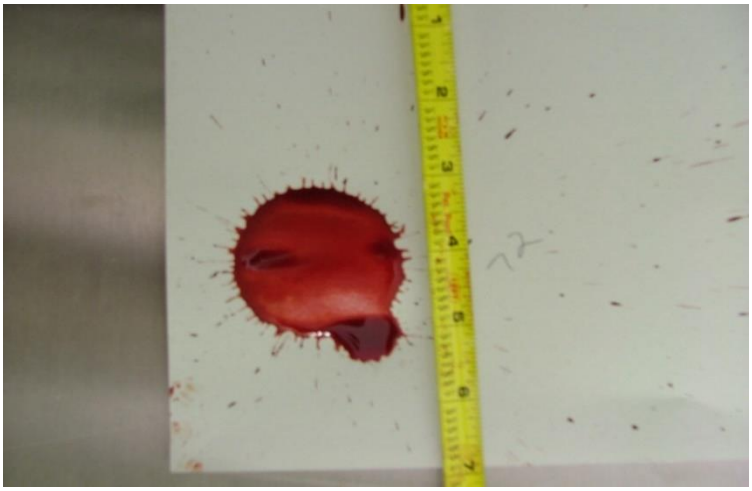


Figure 1.11: Gush dripping pattern

Blood is exiting the body from a breached artery. Arterial patterns are characterised by larger volume stains and may show pressure variations due to the injury.

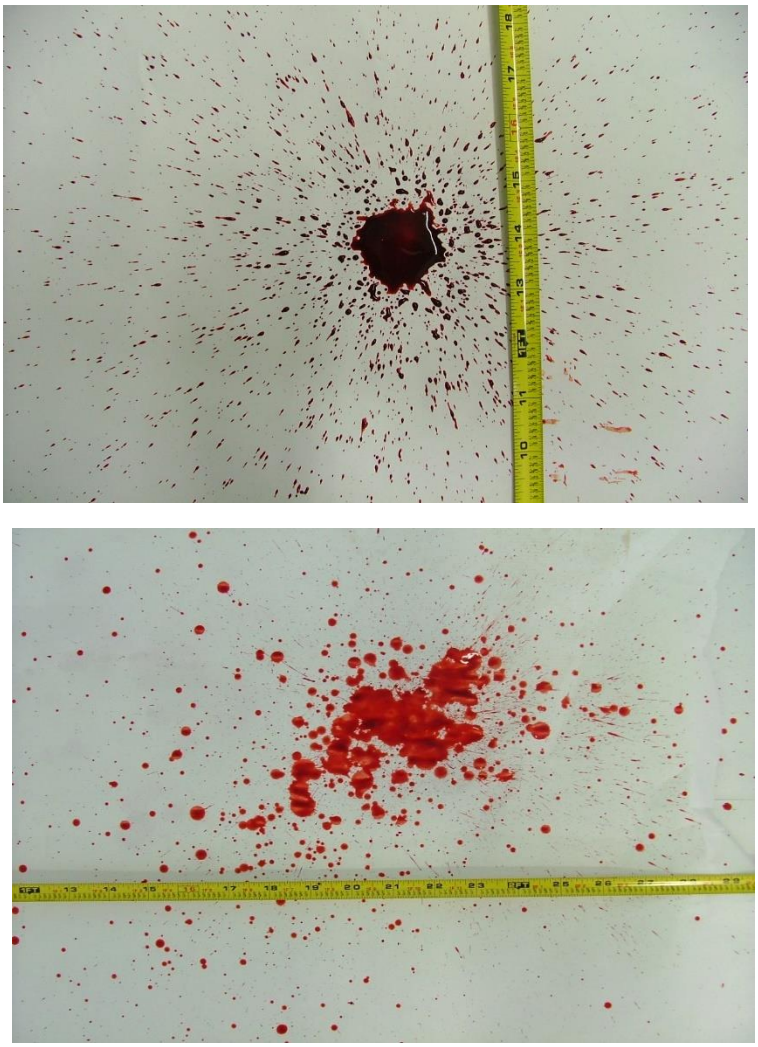
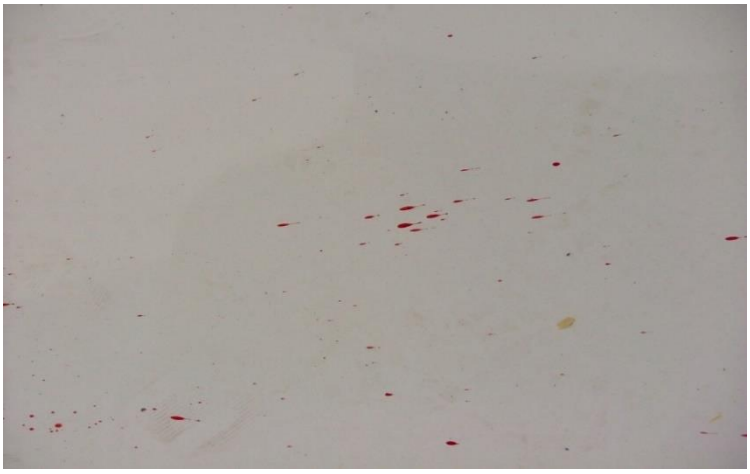
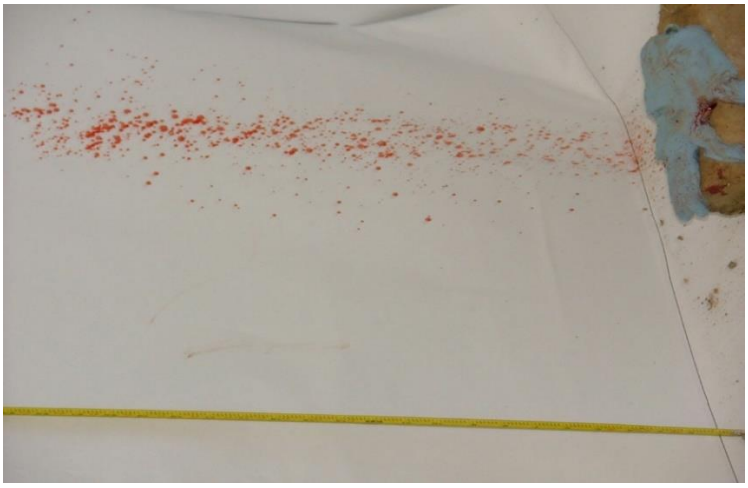


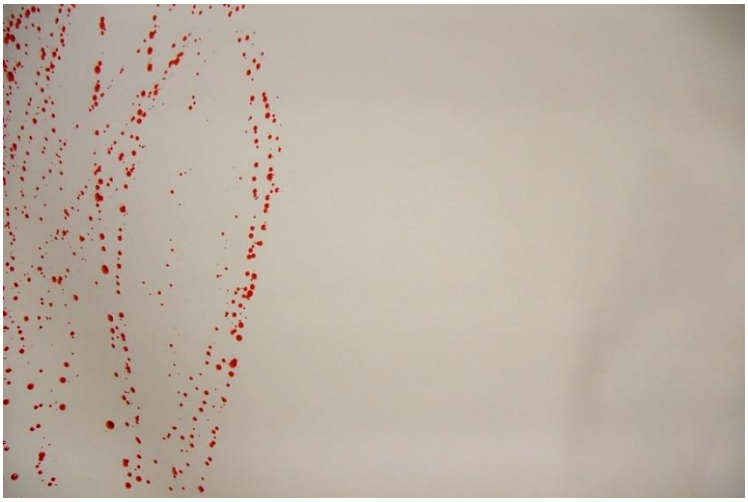
Figure 1.12: Castoff blood spatter

If the weapon used does not pick up more blood spatter from backswings it becomes progressively less; normally if the weapon acts from the back it does not pick up more blood spatter as the blow becomes less progressive than when it comes from the front. In practice a weapon will pick up more blood with each successful blow, SAPS Forensic Science Laboratory (SAPS, 2010). A cast-off pattern initiates a special position or site of the source of the blood-soaked item. Cast-off patterns confirm that multiple events have occurred; the blow was more than once. Cast-off spatter is created when more blood-covered object blows as it flings blood that creates an arc onto a nearby surface. According to Saferstein (2011: 388), the drops will be smaller as the actions go downward; most of the blood leaves the object when the movement goes upward. In some cases,

some obvious impact spatters occur. These cast-off drops will also hold fast to anything in its flight way, which can be ceilings, objects and walls.







According to Lochner and Zinn (2015: 89-90), on visiting the crime scene, the blood-spatter analyst will be able to determine and provide realistic and specific information such as: the number of drops and their shape by taking photographs and detailed notes; movement at the moment of the initial staining or later, if a body or other stain surface has been moved from its original position; the nature of the force used; evidence of a struggle; the distance of a blood source to the target surface; the angle of the impact of blood droplets: the shape of the bloodstain is changed by the angle at which a drop of blood impacts the surface; the impact direction of a drop of blood can be determined: the tail of the bloodstain generally points in the direction of travel of the blood drop; the type of droplets; the nature of the objects that was used to cause bloodshed as well as the number of blows involved. All collected evidence should be properly marked and labelled for the purpose of chain of custody/continuity of possession.

3.6 CONTINUITY OF POSSESION

The continuity of possession is also referred to as the “chain of custody” or “chain of possession” or “chain of evidence”. According to Lochner and Zinn (2015: 14), continuity of possession is a term which covers the process. In this process physical evidence, clues or exhibits that are found, identified as exhibits, and seized at the scene of incident, are recovered, stored, packaged, analysed, transported and presented in court, as an exhibit without any alterations. In the event of any changes being made to the evidence, such changes must be fully disclosed during the investigation and during any form of trial. The investigator must be able to prove that the integrity of the evidence has been maintained and, by doing so, he or she will authenticate the physical evidence.

3.6.1 Contamination of evidence

Contamination is when there is transfer of any other material to the original physical evidence. Contamination can also happen between two or more items of physical evidence. This is known as cross-contamination. Contamination can occur from the time evidence is found or seized until the actual analysis or presentation of the physical evidence in court. Too much handling of physical evidence becomes a contamination risk. If the equipment used to collect and to preserve physical evidence is not clean and free from any material, it will certainly transfer unwanted material. The authors strongly advise

the single use of equipment when the investigator collects any physical evidence and that each item be preserved and collected as a separate entity. The investigators should also limit access to the scene of the incident and use protective equipment (Lochner and Zinn, 2015: 20).

3.6.2 The covering letter

Lochner and Zinn (2015: 21) regard the covering letter as one of the most important documents that should be filled in the dockets. The covering letter usually accompanies physical evidence when the evidence is dispatched or submitted for analysis. On the face of it, the covering letter may not seem all that important, until continuity of possession becomes an issue. A detailed covering letter will provide information about the following: where the evidence was found; the case number; the date and time when the evidence was found; who had handled the evidence; how the evidence was collected; who had packaged the evidence; the description of the physical evidence; serial number of the physical evidence; tracking numbers allocated to the physical evidence as well as the seal number of the author of the covering letter. A detailed covering letter gives a clear history of the evidence and states in whose control and care it had been and for how long.

3.6.3 The statement of the investigating officer

The composition of the investigator's statement is one of the aspects in the investigation of any crime and any scene of incident. Investigators neglect to continuously update their statements. This leads to a running around at the end of the investigation and the investigator is then unable to give a true version of the investigation and the account of what had happened to the physical evidence. The important facts are left out and usually the continuity of possession is compromised. All the statements filed in the case dockets are important, however, the statement of the investigator is seen as the overarching statement. The investigator's statement is the key to the puzzle and keeps the pieces of information and physical evidence together. It also affects how the facts and physical evidence relate to one another (Lochner and Zinn, 2015: 21).

3.7 THE SIGNIFICANCE OF BLOODSTAIN PATTERN FOUND IN THE MURDER CRIME SCENE

According to Lochner and Zinn (2015:89), blood spatters often play a key role in solving violent crimes such as murder. By analysing bloodstain patterns, investigators can often determine the movements of the victim and the attacker. The researcher suggests that investigators must use their skills to ensure that crime scenes are processed in such a manner that will ensure that the integrity of evidence is maintained. To this end, it is fair to state that cases are either won or lost at crime scenes. The manner in which an individual approaches a crime scene will often determine whether the perpetrators will be prosecuted or not. To be successful, the bloodstain pattern analyst should approach every case differently; as a new problem to be solved, with a “new” set of facts, leads and circumstances to be considered (James et al., 2005: 421). According to these authors, bloodstain analysts ought to have the following characteristics:

- Open-minded, without prejudice, and a desire to learn.
- Remain objective and not be swayed by the opinions or theories offered by the individual who has retained their services.
- Never render opinions beyond the evidence, no matter the amount of pressure being placed on them by their superiors, the individual who requested their assistance, or any attorney.

The researcher is of the opinion that when investigating a scene of murder you must also look for clues around the scene, not only in the vicinity of the scene. The investigators must not focus on what the witness is telling or showing them. A murder crime scene was re-visited again at Ga-Rankuwa (CAS 212/05/2018), although the crime scene had previously been processed by the crime scene examiner for physical evidence, it remains in control of law enforcement.

After re-visiting the scene, the crime scene examiner for the murder case at Ga-Rankuwa was told by the witness and the statement from the perpetrator that a table knife was used as a weapon. A 16-inch whole was discovered on the victim’s body according to the doctor’s report from the post-mortem. During the investigation it was found that the alleged table knife was not found as the weapon used, but a big knife was identified as the murder weapon used through Bluestar technique (a laboratory chemical used to

detect human blood). The researcher opines that whenever blood if found at the crime scene, it must be collected and sent to a laboratory for the purpose identification and individualisation of the perpetrator as discussed as follows.

3.7.1 Suspect

The suspect is described as the person in respect of whom an arrestor has a reasonable suspicion that such person is committing an offence (Joubert, 2018: 493). A suspect in criminal context is someone who has been identified as a possible candidate for the crime even if nothing is proven yet. The researcher therefore suggests that to prove if a person is a perpetrator or not, the identification and individualisation of a suspect need to be done in order to eliminate the innocent.

3.7.2 Identification of a suspect

Zinn and Dintwe (2015: 54) state that identification of a perpetrator specifically relates to the positive identification of the suspect in person, rather than the identification of the illegal act. In forensic investigation, determining the identity of the perpetrator or suspected perpetrator of an unlawful act is of decisive importance because the detection and, by implication, the clarification of the incident situation are hardly possible without it. The most common direct method of perpetrator identification involves identification parades. Harries and Lee (2019:39) are of the opinion that the role of physical evidence when helping to identify a suspect is focused on forensic evidence.

3.7.3 Individualisation of a suspect

The overall aim of individualisation is to individualise the incident as the act of a particular person or persons. Individualisation can be described as a process that starts with identification, progresses to clarification and leads, if possible, to assigning a unique sample even among members of the same class. Individualisation can further be explained as the process of linking physical evidence to a common source, Zinn and Dintwe, 2015: 64). Individualisation involves the identification and comparison of disputed objects found at a scene of incident in order to adequately link each objects to the incident and/or to a person. These identifications and comparison of disputed objects have a twofold aim.

- To positively individualise the various objects in dispute.

- To conclusively determine the involvement of the objects or person by providing the standard of comparison.

However, the mere identification of an object does not have much evidential merit unless it is linked to a specific individual. Zinn and Dintwe (2015:419) further opine that suspects or charged persons in murder crime must preferably be taken to a medical practitioner so that a DNA reference sample can be taken to compare their forensic DNA profile based on the DNA found at the crime scene of incident.

3.8 THE SIGNIFICANCE OF DNA EVIDENCE FROM THE CRIME SCENE

Joubert (2018: 484) emphasises that the forensic DNA means the analysis of sections of the DNA of a bodily sample or crime scene sample to determine the forensic DNA profile. Joubert further said the analysis of a bodily sample is taken from a crime scene, providing a unique string of alpha numeric characters to provide identity references.

3.9 THE ADMISSIBILITY OF BLOODSTAIN FOUND AT CRIME SCENE AS PHYSICAL EVIDENCE

In the Criminal Procedure Act 51 of 1977, section 212(12) proof of certain facts by affidavit or certificate is admissible. The court before which an affidavit or certificate is under any of the preceding provisions of this section produced as *prima facie* proof of the relevant contents thereof, may in its discretion cause the person who made the affidavit or issued the certificate to be subpoenaed to give oral evidence in the proceedings in question, or may cause written interrogatories to be submitted to such person for reply, and such interrogatories and any reply thereto purporting to be a reply from such person, shall likewise be admissible in evidence at such proceedings (Swanepoel et al., 2017: 241-242).

Subsection (13) further states that no provision of this section shall affect any other law under which any certificate or other document is admissible in evidence and the provisions of this section shall be deemed to be additional to and not in substitution of any such law (Swanepoel et al., 2017: 242).

Joubert (2018: 407) emphasises that a police official who investigates a criminal case, or who testifies as a witness in court, should present reliable and relevant evidence to the

court in order for it to reach the correct decision, based on the available facts before it. According to James et al., (2005: 9) bloodstain analysts represent a range of forensic scientists and crime scene investigators with diverse levels of education. The courts have accepted testimony from individuals with strong backgrounds in chemistry, biology and physics. Many of these individuals possess degrees in science or forensic medicine. Most are employed in crime laboratories or medical examiner offices that have crime scene responsibilities. Girard (2011:49) agree with James et al., (2005) that the court recognises the physical evidence presented before it by forensic scientist with extensive knowledge on how the evidence was analysed and outcome of analysis may be interpreted in a context of a crime scene.

3.10 SUMMARY

This chapter presented details about murder investigation, taking into consideration the significance of bloodstain pattern analysis which plays a significant role in crime investigation. Bloodstain pattern evidence requires vast experience, testing if blood found is indeed a human blood as well as to determine how blood falling on that surface will behave by testing of the surface characteristics of the target. It is highly recommended that course of bloodstain pattern interpretation be taken prior to strategy of actual casework. Training and experience will also allow for the amount of helpful information to be obtained from this strategy.

Crime scene investigators should assure their correct interpretation of bloodstains on the crime scene by considering proper documentation of all the details. Stereotypic approaches should be avoided at all costs as such an approach will give dominance to ignorance, and as a result, the valuable clues are left out. A scene has to be treated with precaution as mishandling of such will contaminate evidence/exhibits. Even if the technician cannot conduct a total analysis due to a lack of comprehensive training on bloodstains, it is of great value that the technician be able to have knowledge of the patterns within the scene. The next chapter deals with presentation and interpretation of data.

CHAPTER FOUR: PRESENTATION AND INTERPRETATION OF RESEARCH FINDINGS

4.1 INTRODUCTION

In this chapter, the researcher presents the interpretation of data collected during interviews to participants who work directly with bloodstain in criminal investigation. Data is analysed and interpreted in this chapter; recommendations will be provided in the last chapter of this dissertation. Themes were developed and designed with the aim to achieve the objectives discussed in the beginning of this research. The researcher in this study seeks to:

- Determine the significance of bloodstain pattern analysis as a technique during a murder investigation.

In this chapter, participants provided information that answered questions posed during interviews. A literature review contributed to enhance the quality and the outcome of this study. The researcher's experience also contributed to confirm the quality of the research. Semi-structured interviews were conducted with participants using the interview schedule attached as Annexure A.

Bloodstain verification can be found on any crime scene especially where a violent murder crime was committed, and blood was shed. Through the bloodstain evidence collected at the crime scene, the force, movement and direction of the perpetrator and victim can be found. This chapter focuses on the findings of the research.

The following research questions were asked:

- What are the objectives of murder investigation?
- What is the significance of Bloodstain Pattern found on the murder crime scene?

The researcher considered doing this study as a means to give a clear perspective of a bloodstain pattern and the importance of investigating it. The knowledge within this field will help all the stakeholders that are involved in combating crime to enhance their investigation techniques.

The findings are based on interview responses from participants named sample A and sample B. The outcome of participants' responses during interview will be discussed in

the ensuing sections. During the interview, participants were probed regarding the understanding of murder investigation and bloodstain pattern; their opinions differ, and that will be observed in the following sections.

4.2 THEMES EMERGING FROM THE GENERATED DATA

Saunders et al., (2019: 658) described that some themes will become main themes, some may become secondary level themes linked to the main theme. The researcher evaluated the themes and the relationship between them. The researcher embarked on a Thematic Analysis when collecting data. The essential purpose of this approach was to search for themes, or patterns, that occur across a data set such as a series of interviews, observations, documents and so forth. The researcher coded her qualitative data as supported by Saunders et al., (2019: 651) to identify themes for further analysis related to her research question. Participants from Sample A were, participant 1- 9, 11-15,17, 18, 20, 21, and 26, while participants from Sample B were, participant 10, 16, 19,22- 25 and 27- 30. Both participants of sample A and B were asked the same questions. After analysing the interviews records and notes that were taken, the following main themes immerged.

4.2.1 Theme 1: Murder investigation

Palmiotto (2013: 164) purports that murder is when a person killed another person. Hess and Hess (2013: 262) agree with (Osterburg & Ward, 2010: 338) that murder is the unlawful and intentional killing of another person. A person commits murder only if, during the commission of an act, he/she intends to kill or cause grievous bodily harm, he/she knows that such an act will cause death or that there is a possibility that a person may die or can cause harm to another or is attempting a forcible crime other than voluntary murder. An intention is the key in murder. In this regard, participants from both sample A and B were asked what their understanding in murder investigation is.

The following are the answers provided by the participants from sample A:

> *"…To solve the murder crime in question".* **(Participant 1)**
>
> *"…It is the method where murder crimes are studied and criminal apprehended".* **(Participant 2)**

"…To detect the act of criminality to bring the perpetrator to justice". **(Participant 3)**

"…A process of investigation in order to find the killer". **(Participant 4)**

"…Collecting information/evidence for court proceeding". **(Participant 5)**

"…The process of apprehending the killers". **(Participant 6)**

"…It is to found out if a crime is indeed committed". **(Participant 7)**

"…To gather the truth about crime committed and arresting of the suspect". **(Participant 8)**

"…Is an undertaking that seeks, collect and gathers evidence of a crime". **(Participant 9)**

"…To determine the crime and criminality and solve the crime". **(Participant 11)**

"…Is the process of gathering information about a crime". **(Participant 12)**

"…The process of collecting facts or evidence about crime to discover if murder has indeed been committed and identify suspects". **(Participant 13)**

"…Is to search for information about a murder crime". **(Participant 14)**

"…The process of collecting evidence of a crime in order to identify the perpetrator". **(Participant 15)**

"…The process of apprehending suspect or criminals". **(Participant 17)**

"…Is the process of collecting information about murder that was committed in order to identify the perpetrator and affect arrest". **(Participant 18)**

"…Is an applied science that involves the knowledge of facts that are then used to inform murder criminal trials. A full murder investigation can also include, searching, interviews, interrogations, evidence, collections and preservation as well as various methods of investigation". **(Participant 20)**

"…An undertaking that seeks to gather evidence of a murder crime". **(Participant 21)**

"…The goal to ensure successful murder investigative process". **(Participant 26)**

The researcher agrees with literature and the responses by participants; it is the process to search if a murder crime has indeed been committed. Participants from sample B continued to respond as follows:

"…To determine act of criminality to bring the perpetrator to justice". **(Participant 10)**

"…The study to prove facts to be presented during trial". **(Participant 16)**

"…It is an applied knowledge that seeks to involve the study of facts and are even used to inform criminal trials". **(Participant 19)**

"…To solve a crime and convict the suspect/killers". **(Participant 22)**

"…Refers to the process of collecting facts/evidence about a murder in question". **(Participant 23)**

"…A process of investigation in order to reach a certain goal". **(Participant 24)**

"…Collecting information/evidence for court procedure". **(Participant 25)**

"…The process of collecting facts about a crime". **(Participant 27)**

"…It is to found out if murder in question has indeed been committed". **(Participant 28)**

"…Is an undertaking that seeks, collect and gathers evidence of a crime". **(Participant 29)**

"…The process of collecting facts/evidence about a crime to determine if crime has indeed been committed and identify the suspect". **(Participant 30)**

The above responses show that participants have a thorough understanding of murder investigations. According to Zinn and Dintwe (2015:70), only unnatural deaths are usually the focus of a legal enquiry because natural deaths are not associated with criminal acts or acts of negligence. An unnatural death means there are some doubts as to the cause of death. These doubts need to be clarified through forensic investigation. Since death

can have many causes, there are many factors that one should investigate in order to scientifically determine the causes of death. This is where forensic pathologists come into the picture: they apply medical science in the field in the field of law in order to detect the casual cause of death.

4.2.2 Theme 2: The importance of investigating murder

Murder investigation should be prioritised to prevent more criminal occurrence and that may promote peace in society. The investigating officer has the responsibility to thoroughly investigate and bring perpetrators to justice. Lyman (2011: 21) states that investigations are sometimes conducted as preventative measures, as convictions stop the offender from committing another crime in future.

Participants were asked, according to their understanding, what is the importance of investigating murder?

The following replies were given by the participants from sample A:

> *"…To find the act, intentions including the course of death".* **(Participant 1)**
>
> *"…Analyzing interview, collecting evidence, information in order to identify the suspect linked to the crime scene".* **(Participant 2)**
>
> *"…It is to establish and find facts that will link the perpetrator with the crime scene".* **(Participant 3)**
>
> *"…To solve the case".* **(Participant 4)**
>
> *"…To collect information to solve crimes and to lead the detectives to arrest criminals and enable them to be convicted in court".* **(Participant 5)**
>
> *"…To bring perpetrators to justice".* **(Participant 6)**
>
> *"…To prevent another murder from happening".* **(Participant 7)**
>
> *"…To stop a crime from being committed again".* **(Participant 8)**
>
> *"…To eliminate the killer from the community".* **(Participant 9)**
>
> *"…Tracking down the suspects".* **(Participant 11)**
>
> *"…To find the murderer".* **(Participants 12 and 26)**

"…Identifying and scrutinizing each piece of evidence and behavioural clue. Critical in developing a criminal profile". **(Participant 13)**

"…To find out if there is any evidence of wrongdoing". **(Participant 14)**

"…To bring perpetrators to justice". **(Participants 15, 20 and 21)**

"…To apprehend the suspect and to find evidence which are useful in court". **(Participant 17)**

"…To make sure criminals pay for their evil deeds". **(Participant 18)**

The researcher agrees with Lushbaugh and Weston (2012: 158) outlining the investigating officer's role to link the perpetrator to the criminal agency that caused death. Lushbaugh and Weston (2012: 158) further mentioned that the detection of criminal homicide is based on finding the answers to four questions. All the participants understood the question posed to them as they all gave feasible answers to the question.

Participants from sample B were asked the same question and the following are their responses:

"…To find the truth". **(Participants 10, 29 and 30)**

"…To be able to trace and convict the perpetrator for the crime with evidential proof". **(Participant 16)**

"…It is to prove intentions for causing death to a human being". **(Participant 19)**

"…Identifying and scrutinizing each piece of evidence and behavioral clue are critical in developing a criminal profile of an unknown killer". **(Participant 22)**

"…To lower the rate of crime". **(Participants 23 and 25)**

"…To bring perpetrators to justice". **(Participants 24, 27 and 28)**

Participants from both samples A and B show that they understood the question posed to them. Their answers varied, but all of them answered relevantly. Orthman and Hess (2013: 2) reveal the history of investigation with the three major roles, the first is to stop crime, and the second is to promote justice as well as to bring direction in a disorganised environment. The participant's answers are in line with the view of the author.

4.2.3 Theme 3: The importance of bloodstain pattern analysis as an investigative tool in the murder cases

The ability to interpret a bloodshed event should be viewed as a forensic tool, assisting the crime scene examiner to understand what happened and what could not have happened during a bloodshed event, Saferstein (2011: 239). According to Stuart et al., (2014: 547) if the stains are measured to determine their relationships, pattern as well as points of origin, such event may explain bloodstains.

Participants were asked about the importance of bloodstain pattern analysis as an investigative tool in the murder cases. The following are the responses from participants of sample A:

> *"…To reveal the origin of bloodstain, the distance of bloodstain from the target, speed with which blood left its source, position of victim and suspect".* **(Participant 1)**
>
> *"…In order to check direction, volume on how the blood came into contact with the surface".* **(Participant 2)**
>
> *"…Direction or side where the person was hit".* **(Participant 3)**
>
> *"…They are used to reconstruct the crime scene".* **(Participant 4)**
>
> *"…It can help to shed the light on to certain question surrounding the crime that was committed".* **(Participant 5)**
>
> *"…To get the motive and the origin of a crime".* **(Participant 6)**
>
> *"…It reveals the actions of both victim and suspect".* **(Participant 7)**
>
> *"…It shows the aggressiveness and actions of perpetrator and victim".* **(Participant 8)**
>
> *"…To determine contact and direction".* **(Participant 9)**
>
> *"…Are used in interpreting the action that acquired during crime".* **(Participants 11, 20 and 21)**
>
> *"…It reveals the actions and movement of the participant".* **(Participants 12 and 26)**

The following participants didn't respond to the question **(Participants 13,14,15,17 and 18)**

Fisher and Fisher (2012: 6) explain that BPA requires skills and training to correctly make interpretations about the bloodstain pattern. The researcher agrees with the author and some of the participants in that it is up to the investigator to read and understand the story before interpreting it. The details of the crime scene with bloodstain will be further explained and analysed by the Analyst during a trial.

Participants were asked about the importance of bloodstain pattern analysis as an investigative tool in the murder cases. The following are the responses from participants of sample B:

"…To reconstruct the sequence of events on the crime scene". **(Participant 10)**

"…The bloodstains patterns have the potential make the investigating officer to understand what happened and how it happened, and also the sequences events involved". **(Participant 16)**

"…Valuations are conducted to determine what actions or sequence of actions could have created the bloodstains or patterns observed". **(Participant 19)**

"…Rather than providing information about the victim and/or criminals, bloodstain patterns instead provide forensic investigators with information on the what and how of the bloodshed event". **(Participant 22)**

"…To get the origin of the action of crime". **(Participant 23)**

"…Blood found at scene can show the movement of both victim and suspects gives directions and clear understanding of scene". **(Participant 24)**

"…To adequately make a relevant ruling". **(Participant 25)**

"…To find the aggressiveness and intensions of murder as others use objects". **(Participant 27)**

"…To find the movement of both suspects and victim". **(Participant 28)**

"…To locate the interpreting of action before the incident". **(Participant 29)**

"…To reconstruct and have a clear vision of the act at scene". **(Participant 30)**

Saferstein (2011: 239) opines that the investigators must not ignore the fact that the place, distribution, and appearances of bloodstains and spatters may be useful for interpreting and reconstructing the events that accompanied the bleeding. Most participants from sample "A" showed that they have no knowledge of bloodstain while Sample "B" understood the question though having given varied answers.

4.2.4 Theme 4: Assigning murder cases to the police fieldworker

Knowing the kind of community and the crime assigned to you as a police field worker will assist in the approach to the crime scene. Every crime is different and should be approached differently. The police should have a good relationship with the community to build trust. Once there's mutual trust between the police and community, it is even easy to point out the suspect. Zinn and Dintwe (2015: 161) states that the preliminary investigation phase begins immediately after the crime has been reported. It should therefore be handled accurately, or it may jeopardise the entire investigation if not carried out properly.

Participants were asked according to their understanding, how is murder assigned to the police field worker?

The following are the responses by the participants from sample A:

> *"…The call taker/dispatcher from the saps radio control contacts the first responder from the station uniform branch then after confirmation, the dispatcher contact all relevant personnel including crime scene investigator to process the crime scene".* **(Participant 1)**
>
> *"…The case docket is assigned with clear directives in the investigation diary".* **(Participant 2)**
>
> *"…After the reporting of the murder case to the police, the case is being opened in the Community Services Centre of the police and registered, the case is assigned to the detective commander to the detective".* **(Participant 3)**

"…There is no order of assigning, as long a member is on standby, he/she will be assigned to murder case. Unless it is high profile case then the case will be assigned to national crime scene management". **(Participant 4)**

"…Generally, these cases are given to crime investigators directorate, members. People who are specifically trained in the investigation and collection of evidence and how to present it to the court". **(Participant 5)**

"…From police station to field workers". **(Participants 6, 20, 21 and 26)**.

"…By phone call as a priority case". **(Participant 7)**

"…As priority crimes to the field workers". **(Participant 8)**

"…By calling the commander or directly to the examiner". **(Participant 9)**

"…By a phone call". **(Participants 11 and 18)**

"…First responder at the crime scene report to the field worker". **(Participants 12 and 17)**

"…After the reporting of the murder case to the police, the case is being opened in the Community Services Centre of the police and registered, the case is assigned to the detective commander to the detective". **(Participant 13)**

"…By strictly prioritizing crimes and call the examiner". **(Participant 14)**

"…By calling directly to the crime scene examiner". **(Participant 15)**

Houck and Siegel (2013: 13) state that the crime must come to the attention of the police in order for a criminal investigation to take place and a sequence of steps may begin. The researcher agrees with the author and emphasises that the greater the delay in reporting the crime, the less the chances of finding evidence and clues at the crime scene. The researcher further stated the benefit of the rapid arrival at the crime scene by the crime scene examiner, involves avoid contamination, avoid evidence distraction by weather, suspect may still be around, witness may still be around and a victim/a dying person may provide information regarding the crime. Participants understood the question posed to them and gave varied answers according to their experience. Participants were asked, according to their understanding, how is murder assigned to the police field worker?

The following are the responses by the participants from sample B:

"…By phone call as priority case". **(Participants 10 and 25)**

"…From police station to field workers". **(Participants 16, 23, 24, 28, 29 and 30)**

"…Calling the commander or direct field worker". **(Participant 19)**

"…By a phone call as priority case". **(Participant 22)**

"…First responder at the crime scene should call the crime scene examiner". **(Participant 27)**

Palmiotto (2013: 14) mentions that reporting of murder incidents to the police can be done by a witness or a community member. The researcher agrees with author and emphasises that the police should have a good relationship with the community. Palmiotto (2013: 14) further mentioned that the success of a murder investigation often depends on the initial action of the first officer at the crime scene.

4.2.5 Theme 5: Duties and functions of police field workers in the investigation of murder cases

Police field workers are called crime scene examiners in the LCRC. Crime scene examiners have a major role in the crime scene. Perpetrators are brought to justice because of crime scene examiners' input and effectiveness on the crime scene. Saferstein (2011: 378) emphasises that crime scene reconstruction relies on the combined effort of criminalists, medical examiners, as well law enforcement personnel to reclaim physical evidence and sort out the events surrounding the matter of a crime.

Participants were asked what the duties and function of police field workers in the investigation of murder cases are.

The following are the responses by the participants from sample A:

"…To take control and secure the crime scene, preserve the originality of evidence and exhibits, investigate and process the crime scene thoroughly and through videography, photography, sketch, collection of exhibits, fingerprints examination and recording of facts and event". **(Participant 1)**

"…To collect evidence for the purpose of investigation and trial". **(Participant 2)**

"…To gather all evidence, and witnesses and follow up all leads in order to build and proof the case against the suspects in order to get a conviction in court". **(Participant 3)**

"…To reconstruct the crime scene. To use specialized equipment for searching of clues like fingerprints and forensic exhibits". **(Participant 4)**

"…To collect evidence at the crime scenes". **(Participants 5 and 8)**

"…To gather evidence found at a crime scene, forward them to laboratory and later present it to court". **(Participant 6)**

"…To gather evidence found at the crime scene for the purpose of investigation and forward to FSL". **(Participants 7, 9 AND 11)**

"…To collect exhibits at the crime scene for investigation purpose and forward to laboratory". **(Participant 12)**

"…To collect evidence at the crime scene and forward them to FSL for examination". **(Participant 26)**

"…To investigate the crime scene and to collect any evidential clues". **(Participants 18 and 15)**

"…To gather all evidence, and witnesses and follow up all leads in order to build and proof the case against the suspects in order to get a conviction in court". **(Participant 20)**

"…To collect evidence and forward to FSL". **(Participants 14 17 and 21)**.

"…To attend crime scene, examine and colleting of exhibits, forward to laboratory". **(Participant 13)**.

Brown and Davenport (2012: 8) believe that the crime scene examiners' role includes: securing the crime scene, photographing the crime scene, collecting and packaging the evidence, delivering evidence to the laboratory as well as testifying in court. The researcher also believes that all activities involving evidence found at the crime scene are performed by the crime scene examiners which makes them major role players amongst

all role players. The same question was also posed to participants from sample B and the following are their responses:

"…To gather and collect evidence for the purpose of investigation and trial". **(Participant 10)**

"…To collect exhibits at the crime scene for the purpose of investigation and forward to laboratory". **(Participant 16)**

"…To collect evidence at the crime scene". **(Participant 19)**

"…To investigate the crime scene and to collect any evidential clues". **(Participant 22)**

"… To take control and secure the crime scene, preserve the originality of evidence and exhibits, investigate and process the crime scene thoroughly and through videography, photography, sketch, collection of exhibits, fingerprints examination and recording of facts and event". **(Participant 23)**

"…To gather all evidence and witnesses and follow up all leads in order to build and prove the case against the suspects". **(Participant 24)**

"…In order to get a conviction in court". **(Participant 25)**

"…To reconstruct the crime scene". **(Participants 27 and 30)**

"…To use specialised equipment for searching of clues like fingerprint and forensic exhibits". **(Participant 28)**

"…To collect exhibits at the crime scene and forward them to FSL for examination". **(Participant 29)**

The others did not answer the question.

According to Watkins (2013: 108), the crime scene investigators are specialists in locating, collecting as well as preservation of evidence from the crime scene. The researcher agrees with the author on the duties mentioned above. Some participants agree with the author as their answers are aligned to the author's opinion.

4.2.6 Theme 6: Crime scene

The first few minutes of the first officer's arrival on the scene determines the success of any crime scene investigation and depends largely on the action taken (Houck and Siegel, 2011: 32). The crime scene is the start for every criminal investigation case, the success depends on it. Houck and Siegel (2011: 29) further state that without a crime scene, nothing would be attained in a forensic laboratory. Crime scene is the centre of the forensic world, the foundation upon which all subsequent analyses are based, and it is where everything starts.

Participants were asked based on your experience, what is a crime scene?
Participants from sample A replied as follows:

> *"…It's a place where an offence took place".* **(Participants 1, 21 and 26)**
>
> *"…A place where an exhibit can be collected".* **(Participants 2 and 30)**
>
> *"…Is a scene whereby a crime is committed".* **(Participants 3, 12 and 13)**
>
> *"… Contains physical investigation, evidence is collected by crime scene investigators and law enforcement".* **(Participant 4)**
>
> *"… It is a place where crime is committed, and exhibits are found".* **(Participant 5)**
>
> *"…It is the place where act of criminality occurred, where proof can be found and collected".* **(Participant 6)**
>
> *"…Is a scene whereby a crime has been committed".* **(Participants 7 and 20)**
>
> *"…It is a place where an offence has been committed and forensic evidence may be gathered".* **(Participant 8)**
>
> *"…A place where a crime was committed".* **(Participant 9)**
>
> *"…It is a place where an offence has been committed and forensic evidence may be gathered".* **(Participant 11)**
>
> *"…The place that contains physical evidence".* **(Participant 14)**
>
> *"…It includes vehicles, a person's body, and any type of building, places in the open air as well as objects found near or at those locations".* **(Participant 15)**

"…The place where evidence is collected by crime scene examiner". **(Participant 17)**

"…Is where the criminal activity took place e.g. murder". **(Participant 18)**

The majority of participants from this sample fully understood what is meant by a crime scene; their answers revolve around one definition that says it is a place where a crime has indeed been committed and reported. The researcher agrees with the author, Palmiotto (2013: 97) outlining that a crime scene is a proof that indeed a crime has been committed and is the initial point where criminal investigation begins and contains proof that would connect the suspect to the crime scene.

Any place where the crime has occurred and reported, as well as a place where evidence relating to a possible crime is found, even at some distant location can be regarded as crime scene, Watkins (2013: 114). Participants from sample "B" were asked the same question as sample "A" based on your experience, what is a crime scene? Participants from sample B responded as follows:

"…Is the place including the surrounding area where an alleged crime was committed". **(Participant 10)**

"…Is a place where crime was committed, and it may include all other places where the suspect or the victim was moving or placed". **(Participant 16)**

"…Is a place including the surroundings area where an alleged offence was committed or where items with potential evidential value may be collected". **(Participant 19)**

"…It is the place where a crime took place and where clues and evidence can be collected to help resolve crime". **(Participant 22)**

"…A place that is being investigated by the police because a crime has happened there". **(Participant 23)**

"…Any location that may be associated with a committed crime". **(Participant 24)**

"…A place where a crime has occurred". **(Participant 25)**

"…It's a place that is being investigated by the police because a crime is committed there". **(Participant 27)**

"…It includes a person's body, any type of building, vehicles, and places in the open air or object found at those locations". **(Participant 28)**

"…Any place where potential evidence may be found by investigators". "…Is the place where an offence has been committed". **(Participant 29)**

"… Is a place including the surrounding area where an alleged offence was committed or where items with potential evidential value may be collected". **(Participant 30)**

The participants from both samples gave varied responses. The researcher observed the responses and agreed with the author, Lushbaugh and Weston (2012: 39) that the crime scene is the focus of the preliminary investigation. Lushbaugh and Weston further explain that for most crimes, the investigative process starts at the scene of the crime. The successful supervision of a crime scene involves three major responsibilities. The first entails the responding of officers whose task it is to render the crime scene safe and to control movement. The second involves the crime scene investigators who manage the search for evidence and also prepare the proper documentation of the crime scene. The third is to look for witnesses.

One participant states that it includes vehicles, a person's body, any type of building, places in the open air as well as objects found near or at those locations, indirectly agreeing with Becker and Dutelle (2013: 28), emphasising that the crime scene include all areas through which the particulars moved while entering or leaving the crime scene. The researcher observed the responses and believed that crime scene is any surrounding area of a crime scene including the body of a person.

4.2.7 Theme 7: Evidence

According to Lushbaugh and Weston (2012: 76), investigators often fail to recognise bloodstain on clothing and other objects and, therefore, fail to collect valuable evidence. The researcher believes that evidence is anything that proves the involvement of the

perpetrator that is found at the scene of crime. Both participants from sample A and B were asked what evidence and the following is are the responses from sample A:

> *"…Is the available body of facts or information indicating whether a belief or proposition is true or valid".* **(Participant 1)**
>
> *"…Any exhibits that is found at the crime scene including the surrounding area where an alleged crime was committed".* **(Participant 2)**
>
> *"…Is a clue that is found at the where crime was committed, and it may include all other places where the suspect or the victim was moving or placed".* **(Participant 3)**
>
> *"…Is a proof that indeed a crime is committed".* **(Participants 4, 13 and 14)**
>
> *"…It is any object or surface that can be linked to a crime that took place".* **(Participant 5)**
>
> *"… Anything that is found at the crime scene that is clues and evident enough that can be collected to help resolve crime".* **(Participant 6)**
>
> *"…Anything to prove the commission of a crime".* **(Participant 7)**
>
> *"…A body of the deceased is evidence enough".* **(Participant 8)**
>
> *"… A person that is directly caught in an act of crime and a photo or video is taken of him, to prove his guiltiness".* **(Participant 9)**
>
> *"…Any blood that is found that may be associated with a committed crime".* **(Participant 11)**
>
> *"…A proof that links a suspect to the crime committed".* **(Participants 12, 17 and 20)**
>
> *"…An exhibit".* **(Participants 15, 18, 21 and 26)**

The following are the responses from participants in sample B

> *"…An exhibit".* **(Participants 10, 22, 27 and 30)**
>
> *"…It's any proof that links suspects to the crime scene".* **(Participants 16 and 29)**

"…Anything that is being investigated by the police because a crime is committed there". **(Participant 19)**

"…It includes a person's body, any type of building, vehicles, and places in the open air or object found at those locations". **(Participant 23)**

"…Anything that is valuable and can be used at the court of law". **(Participant 24)**

"…something that is collected at the crime scene by the investigators to be used in court". **(Participant 25)**

"…It is used in the procedure to convict criminals". **(Participant 28)**

Lochner and Zinn (2015: 127) state that the analysis and interpretation of evidence is done by trained experts. They are usually people with specifically relevant academic qualifications and are often attached to a forensic science laboratory.

4.2.8 Theme 8: The role of Forensic Science Laboratory in murder investigation

Forensic science plays an important role as the key part in criminal justice as they analyse evidence of the past. FSL is concerned about origin and identity. Houck and Siegel (2011: 53) outline the purpose of forensic science, that is, it proves the relationships between people, places and things involved in legal cases through the identification, analysis and if possible, individualisation of evidence.

The participants were asked to provide their perception about the role of Forensic Science Laboratory in the criminal investigation.

The following are the responses given by the participants from sample A:

"…To assist the investigations and the courts to come to their findings and conclusions". **(Participant 1)**

"…The rendering of an effective forensic analysis service by applying the principles of physics". **(Participant 3)**

"…To examine the bloodstain found at the crime scene". **(Participants 4 and 20)**

"…To analyze the evidence collected from the crime scene". **(Participant 5)**

"…The rendering of an effective forensic analysis service by applying the principles of physics". **(Participant 9)**

"…To examine exhibits brought to FSL and link them to the crime committed". **(Participant 11)**

"…Performing analysis on object objects brought to them by individual from various forensic offices". **(Participant 13)**

"…To gather and examine evidence related to crime". **(Participants 14, 17 and 26).**

Some participants from sample A showed no knowledge on this question because they did not respond to the question. Forensic Science Laboratory is the profession and scientific discipline directed to the recognition, identification, individualisation, even the evaluation of physical evidence by application of the natural sciences in matters of law and science (Lushbaugh and Weston, 2012: 90). The researcher agrees with the author that FSL function is to come up with the results in identifying and individualising of evidence found at crime scene. The participants understood the question as their answers were not totally out of question.

"…To link the suspects through evidence collected from crime scene e.g. DNA or to identify types of substances used". **(Participant 10)**

"…To identify who committed a crime by using DNA related exhibits found at crime scene". **(Participant 16)**

"…They make sure physical evidence is being examined". **(Participant 19)**

"…Scientific principles and methods are used at FSL to identify or analyse the exhibit brought for examination". **(Participant 22)**

"…To assist the investigations and the courts to come to their findings and conclusions". **(Participant 23)**

"…To occupy laboratory role". **(Participant 24)**

"…It is disciplines that gathers and examine evidence related to crime. Its aim is to

provide an unbiased scientific report to the investigation offices and thus help judiciary". **(Participant 25)**

"…Forensic experts apply scientific principles and methods to the analysis, identification and classification of physical evidence relating to criminal or suspected criminal cases. They do much of their work in laboratories, where they test and analyze evidence than they record the results". **(Participant 27)**

"…Scientific examination or analysis conducted at the crime scenes and at laboratory and conducts analysis of exhibits materials related to an offence being investigated using or with the aid of scientific methods and scientific analysis". **(Participant 28)**

"…The occupy laboratory role. Forensic professionals use image modification tools to search for criminals absconding from the law for a long time". **(Participant 29)**

"…Forensic scientists analyze physical evidence (fingerprint, blood, hair etc.) collected from the incident scene to identify suspects". **(Participant 30)**

Lushbaugh and Weston (2012: 90) further mentioned that the crime laboratory is staffed by technicians educated and trained in criminalistics. Criminalistics is a subsystem in the administration of justice that studies the effect of a criminal upon a crime scene (and other sites of criminal activity) and vice versa. The informational output of a crime laboratory depends on its input: the physical evidence collected at crime scenes and forwarded to the laboratory for examination. The forensic science staff is responsible for deciding whether or not to develop information from physical evidence within a laboratory operation. Depending on the circumstances of the case, the general strategy is to order analyses so that the maximum amount of information is secured. Participants show that they understood the question and responses varied from one another but relate to the question.

4.2.9 Theme 9: Locard Principle

The crime scene examiner must approach the crime scene with a clear mind and understanding that there has to be evidence because something has happened. As long

as the crime is committed, there has to be evidence at the crime scene. When two or more objects come together, they will leave evidence to show their contact. The crime scene examiner has the duty to find evidence left at the crime scene, collect it and sent it for analysis. Orthman and Hess (2013: 18) state that Locard's exchange principle is a basic forensic theory which states items that come into contact with each other always convey material in however minute, to each other.

Participants were asked, what is your understanding of the Locard principle? The following are the responses from sample A:

> *"…Every contact leaves a trace".* **(Participants 1, 3, 4, 5, 9, 13, 14 and 21)**
>
> *"…All contacts leave a trace or a mark".* **(Participant 2)**
>
> *"…Two objects come into contact there is always a transfer of material".* **(Participants 6 and 20)**
>
> *"… There is evidence in all crime scenes".* **(Participants 7, 17 and 26)**
>
> *"…The perpetrator of a crime will bring something into the crime scene and leave with something from it".* **(Participant 8)**
>
> "…When a crime is committed, there will always have evidence left at scene". **(Participant 11)**
>
> "...Suspects will bring something to the scene and leave with something from it". **(Participants 12 and 18)**
>
> "…It connects suspects and crime scene through evidence found at scene". **(Participant 15)**

The researcher is giving an example of a perpetrator who used a window to enter the place, leaving evidence of fingerprints on the window. Saferstein (2011: 8) indicates that the Locard exchange principle states that whenever two objects come into contact with each other, there is always a transfer or exchange of items and information between them. Rodivich (2012: 86) emphasises that the Locard principle mark the transfer of material when people and objects come into contact. Participants from sample B were asked the

same question, namely what is your understanding of the Locard principle? The following are the responses from sample B:

> *"…For every contact leaves a trace i.e., whenever two or more persons come into contact with the other, it leaves a transfer of traces".* **(Participant 10)**
>
> *"…It is when two objects (e.g., suspect and victim) are coming together during the commission of an offence and certain clues are left behind at the crime scene".* **(Participant 16)**
>
> *"…Every contact leaves a trace".* **(Participants 19, 23, 24, 28 and 30)**
>
> *"…When two objects come to contact there is always a transfer of material".* **(Participants 22 and 27)**
>
> *"…the perpetrator of a crime will bring something into the crime scene and leave with something from it and that both can be used as forensic evidence".* **(Participant 25)**
>
> *"…Every physical touch leaves a mark"* **(Participant 29)**

Fisher and Fisher (2012: 32) point out that it is not possible for anyone to enter a place without making changes in it; either by removing something from it or bringing something to it. All participants from both sample A and B understood the question posed to them about the Locard principle.

4.2.10 Theme 10: The correct procedure to be followed when collecting bloodstain patterns in murder crime scenes

The bloodstain pattern found at the crime scene contains very useful information that can be used for court purposes. The BPA analyst has learnt how to handle and interpret the bloodstain found at scene and need not be ignored. Assisting in the reconstruction of the events of a committed incident that has created the stains and stain patterns present at a crime scene is the general role of the Bloodstain Pattern Analyst in a criminal investigation. Participants from both sample A and B were asked, what is the correct procedure to be followed when collecting bloodstain patterns in a murder crime scene? Sample A participants responded as follows:

"…It must be approached accordingly as it may jeopardise the whole process". **(Participant 1)**

"…Any crime scene where there was bloodletting, bloodstain pattern analysis must be crucial". **(Participant 2)**

"…Take note of all different patterns and name them". **(Participant 3)**

"…Concentrate on finding patterns and photograph them". **(Participant 4)**

"…Start processing a crime scene before contamination". **(Participant 5)**

"…Photograph every detail at the crime scene and if possible, take a video". **(Participant 6)**

"…Mark and photograph all events took place in the crime scene". **(Participants 7, 9, 13 and 18)**

"…Record every little thing you see at the crime scene". **(Participant 8)**

"… Make a sketch of all detail in the crime scene". **(Participant 11)**

"…Start from the point of entry until the exhibit for better outcome on conviction". **(Participant 12)**

"…Take DNA sample and link with the blood found at the crime scene". **(Participant 14, 15, 17 and 21)**

"…Firstly, identify the object used to kill a person". **(Participant 26)**

The same question was posed to Sample B participants and their responses were as follows:

"…Consider every stain found at the crime scene important". **(Participant 10)**

"…Use Luminol to check if the blood on the crime scene is indeed human blood before collecting". **(Participant 16)**

"…Collect the blood using syringe and process everything after send to FSL for sampling". **(Participant 19)**

"…Photograph every detail as found at the crime scene". **(Participant 22)**

"…Collect the DNA sample for individualising the suspect and send to FSL". **(Participant 23)**

"…If suspect found at the crime scene DNA should be collected from him or her and linked with the blood found at the crime scene". **(Participant 24)**

"… Use Bluestar to check if blood is human blood". **(Participant 25)**

"…Package patterns of bloodstain in the same category if they are the same if not, separate them". **(Participant 27)**

"…Work from outside to inside". **(Participant 28)**

"…Perform presumptive and confirmatory test for blood after documenting and before processing". **(Participant 29)**

"…Ensure that all equipment used is decontaminated before and after use". **(Participant 30)**

Only one participant from sample A didn't provide the answer. Both samples showed little knowledge of collecting bloodstain in the way they answered and offered different views. Saferstein (2011: 378) states that BPA experts see bloodstains as a valuable thing that can come up with a valuable insight into the events that happened during the commission of a violent crime. Saferstein (2011: 378) further states that BPA interpretation can reveal the following: the direction where the blood originated from, the angle at which a blood droplet struck the surface, the location or site of a victim at the time a bloody wound was inflicted, the minimum number of blows that struck the bleeding victim, the movement of a bleeding individual at the crime scene as well as the approximate location of individual delivering blows that produced a bloodstain pattern.

4.2.11 Theme 11: Bloodstain patterns

The bloodstain pattern can be studied and interpreted by the BPA analyst. BPA at crime scene need not be ignored as it carries a lot of information. Almost all information needed about the activity and role players at the crime scene depend on the bloodstain pattern. According to the Learning Programme (SAPS, 2015: 37) the scientific research of bloodstain pattern analysis is used to supply information about the blood shedding events that produced patterns on the crime scene. BPA is based on a very simple theory. Blood

as a fluid will react to external forces in a predictable fashion. A gravity and air resistance will act together in producing similar results (patterns) under general identical conditions, the cohesive forces of surface tension and viscosity as well as the various external forces (creating mechanism). Participants were asked based on their experience, what their understanding of bloodstain patterns is. The following are the responses by the participants from sample A:

"…To determine the origin of the blood". **(Participant 1)**

"…A bloodstain pattern is left on a surface after it has left a body of a being". "…Bloodstain found at scene and been used for investigation". **(Participant 2)**

"…It is the blood found at the scene that's occurring during crimes commission". **(Participant 3)**

"…It has something to do with the movement, direction, intentions and actions that caused the bloodshed on the scene". **(Participant 4)**

"…It reveals more in-depth knowledge about the crime scene". **(Participant 5)**

"…To determine how blood spitted to the surface". **(Participant 6)**

"…To determine how blood reacts to motion and force and makes it easy for the blood spatter analyst to reconstruct the crime scene". **(Participant 7)**

"…The types of blood around the body lying on the scene". **(Participant 8)**

"… To indicate or determine the origin of travel of the victim or the accurate position of the victim". **(Participant 9)**

"…The pattern in which blood was shed and distributed at the scene". **(Participant 11)**

"…It can give the whole action of the crime scene". **(Participant 12)**

"…Indicate or determine the origin of travel of the victim or the accurate position of the victim". **(Participant 13)**

"…Determines how blood reacts to motion and force and makes it easy for the blood spatter analyst to reconstruct the crime scene". **(Participant 14)**

"…It is when the blood falls on a surface and forms shapes or patterns". **(Participant 15)**

"…A bloodstain pattern is left on a surface after it has left a body of a being". **(Participant 17)**

"…The height from which the blood falls will affect the size of the stain". **(Participant 18)**

"…Pattern analyst looks at the physical characteristics of the stains patterns like size, shape, distributions, overall appearance, location and surface texture where the stains are found. Analyst interprets what pattern types are present and what mechanism may have caused them". **(Participant 20)**

"…They can be used at court as evidence". **(Participant 21)**

"…The patterns of blood found at scene that draws conclusions about an incident". **(Participant 26)**

According to the Learning Programme (SAPS, 2015: 37) bloodstain patterns are reproducible phenomena. Each type of creating mechanism will result in uniquely identifiable bloodstain patterns. The physical characteristics of the bloodstain pattern assist in defining the general nature of the incident that caused it. Fisher and Fisher (2012: 196) mention that more experience and training for BPA is required to accurately interpret the bloodstain pattern correctly. The researcher agrees with Fisher and Fisher (2012: 196) that BPA requires ample training and understating before one can regard him fit to testify on BPA.

SAPS Learning Programme (2015: 37) emphasises that bloodstain pattern analysis seeks to define "what" caused the bloodstain in the scene. The Forensic Fact File (SAPS, 2010: 1) states that BPA is the research of blood as it comes into contact with a surface. In addition to the benefits of a biological examination (DNA and so forth), BPA may issue investigative facts. The same question was posed to participants of sample B, based on their experience what their understanding of bloodstain patterns is?

Participants from sample B responded as follows:

"…To determine how blood splattered to the surface". **(Participant 10)**

"…Types of blood around the body lying". **(Participant 16)**

"…It is a criminal investigation in order to assist in the reconstruction of those events of an alleged incident that occurred". **(Participant 19)**

"…It can determine certain clues about the scene. **(Participant 22)**

"…The diameter and shape of blood splatter which reflect the origin and trajectory of external blood flow in the context of homicide or violent in which skin is disrupted". **(Participant 23)**

"…Bloodstain pattern found at scene reveals more in-depth about a crime". **(Participant 24)**

"…It can reveal the movement and direction of the perpetrator and the victim". **(Participant 25)**

"…In bloodstain found at scene, a movement of perpetrator and a victim is found". **(Participant 27)**

"…To find out of the intentions and aggressiveness in an act". **(Participant 28)**

*"…Shows the positions of the deceased and as well as of the suspect".***(Participant 29)**

"…Is the interpretation of bloodstain in a crime scene in order to create the actions that caused the bloodshed". **(Participant 30)**

4.2.12 Theme 12: Different types of bloodstains found at the crime scenes

There are different patterns in the bloodstain; the difference is caused by the action taken, and object used, whether at the moment and surface. The BPA analyst is able to analyse and reach a conclusion on what has transpired on the crime scene, what actually brought bloodstains to create a certain pattern. The court will be able to have a verdict on a case investigated. Houck and Siegel (2011: 245) indicate that bloodstains can be grouped into three main classes: passive, transfer as well as projected or impact stains. Passive bloodstains include flows, clots, drops, and pooling. Transfer bloodstains include transfers patterns, wipes, swipes and general contact bloodstains. Examples of projected or impact bloodstains are spatters, splashes, cast-off stains, and arterial spurts or gushes. Participants were asked what different types of bloodstains are found at crime scenes.

The following are the responses by the participants from sample A:

"…Drip, drop, gush and splash". **(Participant 1)**

"…Back spatter and arterial spurting". **(Participant 2)**

"…Transfer pattern, cast off, gunshot spatter, and void pattern". **(Participant 3)**

"…Cast off, wipe marks, swipe marks and transfer marks". **(Participant 4)**

"…Passive stains, transfer strains, projected, drops, flow, drops and typical results from gravity acting on an injured body". **(Participant 5)**

"…Passive, transfer and projected". **(Participant 6)**

"…Transfer, passive stains, flows and pool". **(Participant 7)**

"…Transfer and impact stains". **(Participant 8)**

"…Passive, impact and transfer". **(Participant 9)**

"…Impact drops and passive stains". **(Participant 11)**

"…Back spatter, bloodstain spatter and cast-off spatter". **(Participants 12 and 26)**

"…Passive stains, transfer and projected stain". **(Participant 13)**

"…Passive, transfer and impacted stains". **(Participant 14)**

"…Pool, flows, gush and transfer marks". **(Participant 15)**

"…Blood spatter, back spatter". **(Participant 17)**

"…Cast off patter, drip, transfer, drips trail, flow, arterial, swipe and pool pattern". **(Participant 18)**

"…Passive and transfer stains". **(Participant 20)**

"…Passive, transfer and projected stains". **(Participant 21)**

The researcher agrees with the author Houck and Siegel (2011: 245) and gave an example where backward or forward spatter stain is found. This spatter is created on a gunshot case. Backward is from an entrance wound. The gunshot spatter differs because

of the kind of firearm used, in the case where the victim was shot, whether the bullet exits the body; the distance between the victim and the gun and the distance between the victim to the wall, objects and floors. Backward spatter has only a few large drops, while forward spatter has fine mist. Dutelle (2011: 239) states that there are three basic classifications of bloodstain, passive, spatter and altered stains.

Participants from sample B were also asked the same question: what different types of bloodstains are found at crime scenes and their answers were as follows: Participants from both samples answered correctly; some mentioned the basic classification of bloodstains, while others mentioned the patterns under basic classification. They all understood the question.

These are the responses from sample B

> *"…Clot, drip, flow, pool, cast off, spatter, splash, spine, fly spot, wipe, swipe, and pattern transfer".* **(Participant 10)**
>
> *"…Passive, transfer and projected stains".* **(Participant 16)**
>
> *"…Transfer, pool, and flow blood spatter".* **(Participant 19)**
>
> *"…Flows, transfer, pool, backward spatter and forwards blood spatter".* **(Participant 22)**
>
> *"…Gushing, flows, pool, and forward blood spatter".* **(Participant 23)**
>
> *"…Back spatter, cast off, contact and gushing stains".* **(Participant 24)**
>
> *"…Transfer flows and pools".* **(Participant 25)**
>
> *"…Back spatter and bloodstain".* **(Participant 27)**
>
> *"…Passive, transfer and projected stains".* **(Participant 28)**
>
> *"…Flows, backwards, spatter and dripping".* **(Participant 29)**
>
> *"…Flow, transfer, gush and back spatter".* **(Participant 30)**

4.2.13 Theme 13: The significance of bloodstain pattern found in the murder crime scene

A bloodstain found at the crime scene plays a major role as it can be determined whom the blood belongs to. A single drop of blood provides valuable information needed for prosecution. The bloodstain pattern can even reveal the activities performed at the crime scene. According to Saferstein (2013: 122), the critical phase of the investigation will be the initial reconstruction of the events that preceded the onset of the incident.

Both participants from sample A and B were asked about the significance of bloodstain pattern found at the murder crime scene. Participants from sample A responded as follows:

> *"…In order to check direction, volume on how the blood came into contact with the floor".* **(Participant 1)**
>
> *"…The direction or side where the where the person was hit".* **(Participant 2)**
>
> *"…They are used to reconstruct crime scene".* **(Participant 3)**
>
> *"…It can help to show light in some certain questions surrounding the crime that was committed".* **(Participant 4)**
>
> *"…To assist in the reconstruct of those events of alleged incidents that could have created the stains and stains pattern present at crime scene".* **(Participant 5)**
>
> *"…To get the motive and the origin of a crime".* **(Participant 6)**
>
> *"…To find out movement about the crime scene".* **(Participant 7)**
>
> *"…It reveals the actions of both victim and suspects".* **(Participants 8, 21 and 26)**
>
> *"…It shows the aggressiveness and action of perpetrator and victim".* **(Participant 9)**
>
> *"…To determine contact and direction".* **(Participant 11)**
>
> *"…To find the position of the deceased and the suspects".* **(Participant 12)**
>
> *"…To assist in the reconstruction of those events of an alleged incidents that could have created the stains".* **(Participant 13)**

"…To get to the bottom of the origin of the crime and the whole movement at the crime scene". **(Participant 14)**

"…Are used in interpreting the actions that occurred during crime". **(Participant 15)**

"…To assist in the reconstruction of those events of an alleged incident that could have created the stains and stains pattern present at crime scene". **(Participant 17)**

"…To get the motive and the origin of a crime". **(Participant 18)**

"…To show the aggressiveness and action of perpetrator and victim". **(Participant 20)**

The same question was posed to participants from sample B and their answers were as follows:

"…To find the intensions of the suspects by looking at the movement". **(Participants 10, 22, 25 and 27)**

"…In order to check direction, volume on how the blood came into contact with the floor". **(Participant 16)**

"…To find out movement about the crime scene". **(Participant 19)**

"…Find the intensions of the suspects by looking at the movement". **(Participant 23)**

"…To get to the bottom of the origin of the crime and the whole movement at the crime scene". **(Participants 28 and 29)**

"…. Are used in interpreting the actions that occurred during crime". **(Participants 24 and 30)**

Both participants from sample A and B gave different answers to the question posed to them, however, some showed no knowledge of bloodstain. Gilbert (2010: 81) states that reconstruction of the crime scene is skilled by carefully noticing where evidence is located in relation to the former position. The researcher believes that by the drops of blood on

the crime scene, involvement of the victim and perpetrator can be revealed. The interpretation of bloodstain on the crime scene can convict the perpetrator during trial.

4.2.14 Theme 14: The admissibility of bloodstain pattern found at the crime scene as evidence

Evidence of bloodstain left at the scene is regarded useful in the court of law. The court is able to use bloodstain found at the scene to reconstruct and establish how the victim was killed. According to Attorney Carman (2018), testifying about bloodstain pattern analysis in criminal cases started when a group of scientists and forensic investigators began testifying as experts in court (Dutelle, 2011: 255). They went on to train investigators, hundreds of police officers, moreover crime laboratory technicians, and, over time, they testified at trials as well.

Participants from both sample A and B were asked: what is the admissibility of bloodstain pattern found at the crime scene as evidence? The following are the responses from sample A.

> *"…Is that DNA of each individual are unique".* **(Participant 1)**
>
> *"…Through the evidence presented by experts at court".* **(Participant 2)**
>
> *"…Bloodstain analysis has been accepted as reliable evidence by courts".* **(Participant 3)**
>
> *"…If properly documented, the bloodstain evidence will be admissible in the court of law".* **(Participant 4)**
>
> *"…100% admitted at court".* **(Participant 5)**
>
> *"…It is admissible if presented by the bloodstain pattern analyst".* **(Participant 7)**
>
> *"…It is admissible and should be presented by the Bloodstain pattern analyst".* **(Participant 11)**
>
> *"…It is presented by the experts of bloodstain pattern or someone who is trained in it".* **(Participant 12)**
>
> *"…It is admissible when presented by the experts".* **(Participant 13)**

"…It is regarded as circumstantial scientific evidence and testimony is given by trained experts". **(Participant 17)**

"…Bloodstain cannot stand alone; it must corroborate evidence from the other sources to be admissible". **(Participant 18)**

"…Bloodstains analysis evidence are fully admissible in courts in S.A". **(Participant 20)**

"…It is the documentation of bloodstain patterns using the correct requirements". **(Participant 21)**

"…Bloodstain pattern evidence are admissible as evidence. Bloodstain patterns can be very important in criminal cases, blood prints on a crime scene will place the suspect directly on the crime scene". **(Participant 26)**

The following are the responses from sample B:

"…It is admissible when presented by the expert". **(Participant 10)**

"…Admissible always, as long as it is presented by an expert". **(Participant 16)**

"…Admissible in court through bloodstain pattern analysts' experts". **(Participant 19)**

"…It is admitted and of great use as it helps in court ruling". **(Participant 22)**

"…It is allowed when presented by forensic experts". **(Participant 23)**

"…Victims' blood as well as of perpetrator". **(Participant 27)**

"…Bloodstains analysis evidence are fully admissible in courts in S.A". **(Participant 28)**

"…It is admissible at court and presented by the qualified or trained person". **(Participant 30)**

Other participants from sample A and B did not respond to the question. The researcher agrees with the few participants and the author Dutelle (2011: 255) that in order for the crime scene reconstruction with the use of BPA to be done, the bloodstain pattern analyst

will decide the age of the bloodstain, clots, and patterns. Such recreation and replication will be necessary in order for related analytical findings to be admissible in court.

4.2.15 Theme 15: What is a suspect?

In South Africa, as is the case anywhere in the world, the police may arrest a person for suspicion of involvement in criminal activities. Unfortunately, not all arrested persons are ultimately found guilty of any crime, leaving the authorities open for civil claims for wrongful arrest. During the interviews in this study, participants were asked their perception of who a suspect is and participants from sample A responded as follows:

> *"…Suspect is any person who is suspected or has committed a criminal act that is punishable by law".* **(Participants 1, 2, 4, 5 and 15)**
>
> *"…Suspect is any person who committed a crime".* **(Participants 3, 6, 9, 11, 13, 14, 17, 18, 20 and 26)**
>
> *"…Any person suspected to have committed a crime but not yet found guilty in court of law".* **(Participant 12)**
>
> *"…Is person who is believed to be guilty of a crime".* **(Participants 7, 8 and 21)**

The following are the responses by the participants of sample B:

> *"…Suspect is any person who committed a crime".* **(Participants 10, 23, 24, 25 and 30)**
>
> *"…Every person suspected of committing a crime and not yet found guilty by the court for such crime is the suspect".* **(Participant 16)**
>
> *"…A person thought to be guilty of an offence".* **(Participants 19 and 27)**
>
> *"…A known person accused or suspected of starting a crime".* **(Participant 22)**
>
> *"…A person who is suspected to have committed crime".* **(Participant 28)**
>
> *"…Is any person who committed an act that is punishable by the state".* **(Participant 29)**

Participants' responses stated that it is any person who is suspected of committing crime. Literature reveals that a suspect is a person suspected of being involved in the

commission of a crime and includes accomplices. According to Zinn and Dintwe (2015:451) a suspect is a person or an organisation that is suspected of having committed a crime.

4.2.16 Theme 16: Identification of a suspect

Identifying a suspect involves various technical skills and experience on the part of the investigating officers. One experienced detective may have an instinctive feeling about a particular individual knowing something about a particular crime. As indicated, this comes from years of experience in crime investigation. The same can be said about a detective having a sense of the type of force used during the perpetration of crime by merely looking at the bloodstain patterns found at crime scenes.

Participants were asked what they understand by the term identification of a suspect.

The following are the responses by the 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 14)**
>
> *"…It can be identified through imprint and origin".* **(Participant 20)**
>
> *"…A positive identification of the suspect can be used to place the suspect under the arrest and the act of the identification may be used later as evidence in the prosecution".* **(Participant 21)**

The following are the responses by the participants from sample B:

> *"…To identify the suspect with the id parade by the victims".* **(Participant 10)**
>
> *"…Known by a certain individual and further be identified by fingerprint identification".* **(Participant 19)**
>
> *"…Identification of suspect is to link the suspect to the crime scene".* **(Participant 24)**
>
> *"…When you have identified a person through some form of evidence to a crime".* **(Participant 25)**

"…Any tool that can help to proves that a person has committed crime, either by photos or fingerprint and DNA". **(Participant 27)**

"…Procedures used by the police to obtain evidence or information against the suspect". **(Participant 28)**

Most of participants from sample A and B did not provide answers. The participants do not fully comprehend what identification of a suspect entails. The consulted literature indicated that identity of the suspect is confirmed by means of relevant proof linking him/her to the crime, differentiating the suspect from all other persons as the perpetrator of the crime (Van Graan & Budhram, 2015: 64).

4.2.17 Theme 17: Individualisation of a suspect

It is important firstly to determine whether what appears to be a bloodstain at the crime scene is actually blood, and if so, to determine whether such is actually human blood. Once such is determined, the laboratory has to determine the type of such blood and its origin/source, as well as to ascertain whose blood it is. Thereafter, it is important to link such blood to either the victim of perpetrator.

Participants were asked what they understand by the term individualisation of a suspect.

The following are the responses by the participants from sample A:

"…Individualisation of a suspect is the establishment of the uniqueness of suspected person from others". **(Participant 1)**

"…Said suspect can be individualised with fingerprint or DNA as each person has unique characteristic". **(Participant 14)**

"…Is when DNA sample is taken from the suspect at the scene of crime and linked to the DNA evidence found at the crime scene". **(Participant 20)**

The following are the responses by the participants from sample B:

"…Uniqueness of the suspects, each individual got a unique e.g. own DNA, own fingerprint nobody have the same fingerprint in the world, will be able to individualise the person by identifying with fingerprint". **(Participant 10)**

"…Making sure who is the real suspect". **(Participant 19)**

"...Form of naming a person fingerprint and DNA". **(Participant 25)**

"…Means the uniqueness of the suspected person from others, e.g. can be done by a permanent scar". **(Participant 27)**

"…Proving or indicating the uniqueness of a suspect amongst others". **(Participant 28)**

The majority of the participants did not provide responses to the question posed -sixteen participants from sample A and six participants from sample B. The researcher believes that the participants have a lack of understanding about the individualisation of the suspect.

Participants who provided the responses show that they understood what individualisation of suspect entails and their responses are conforming to the consulted literatures; Horsewell (2004: 6) indicates that individualisation means to distinguish somebody from others. Bell (2008: 210) emphasises that individualisation can also take place with other types of evidence such as blood and semen (via DNA typing), impression evidence.

4.2.18 Theme 18: The significance of DNA evidence from the crime scenes

The successful prosecution of perpetrators of crime begins at the crime scene. This means that crime scenes should be handled with the significance it deserves as any kind of evidence contamination may lead to the acquittal of a perpetrator of crime. It is hence important for investigators to be well-trained to handle crime scenes as subsequent developments will refer back to the crime scene.

Participants were asked what the significance of DNA is as evidence to identify and link the suspects to the crime scene. The following are the responses by the participants from sample A:

"…DNA is important tool to identify a suspect for fair trial a DNA have to be performed in order for a court to rule fairly". **(Participant 1)**

"…To identify, individualise and link the suspect to the crime scene". **(Participant 14)**

"…Scene evidence must be compared with the control sample to determine the custodian of the DNA". **(Participant 20)**

The following are the responses by the participants from sample B:

"…To connect suspects to crime scenes, and to establish or exclude the suspects to crime scenes". **(Participant 10)**

"…It helps to solve the crime". **(Participant 19)**

"…DNA evidence is surer than fingerprints in identifying a person". **(Participant 25)**

"…Participant 10, it can be used to solve old crimes that occurred years ago by the development of DNA testing". **(Participant 27)**

The responses of the participants show that they have a different understanding of the significance of DNA as evidence. Hess and Orthomann (2010: 142) emphasise that in most of cases, DNA evidence could provide conclusive evidence. Moreover, DNA evidence can even indicate the race, gender, eye colour, as well as the hair colour of the person in question. Twenty three participants did not give responses to the question asked. The researcher come to a conclusion that participants do not fully comprehend the significance of DNA as evidence entails. This may be evident in the large percentage of cases being thrown out of court due to insufficient or lack of evidence.

4.3 SUMMARY

This chapter lay out the presentation of data and the interpretation of the findings that were collected from the participant's responses and literature review. The questions were asked, and the participants responses were quoted verbatim and at times interpreted, supported by available literature where appropriate. The researcher noted that most of the questions were answered, but lacking knowledge on bloodstain patterns. The next chapter of this study presents the recommendations.

CHAPTER FIVE: RECOMMENDATIONS AND CONCLUSION

5.1 INTRODUCTION

This chapter will present the recommendations and the conclusion of this study. The recommendations are based on the responses from the participants, available literature and the researcher's experience. Exploring the significance of bloodstain patterns analysis in murder cases in Pretoria was selected as a topic, in order to improve the quality of investigation and information within the SAPS. The aim of this study is to explore the importance of BPA as an investigating technique during a murder investigation in Pretoria.

In order to attain the aim of this study, the researcher selected and asked the following two questions:

- What are the objectives of murder investigation?
- What is the significance of bloodstain pattern found in the murder crime scene?

This chapter focuses on what was discovered during this study. The problem statement, research aim and research questions relate to the findings of this study. The researcher made the following recommendations to address the aim of this research, which is to determine the significance of BPA as a technique during a murder investigation. This chapter will at the end have the conclusion about the study.

5.2 SUMMARY OF FINDINGS

In this research, the focus was on BPA. The study revealed that the court allow bloodstain pattern analysis to be presented by the BPA analyst or trained experts in the field. Furthermore, it is the responsibility of the crime scene examiner to document and preserve evidence such as bloodstain.

5.2.1 General orientation

In chapter one, general orientation is presented with a clear direction of methodology. This chapter explained the research problem under investigation. The objectives and aim of this study were outlined. The research questions are also addressed in order to stay focused on the research topic and to attain the aim of this study which is to explore the importance of BPA as an investigating technique during a murder investigation in Pretoria.

The key theoretical concepts which are the heart of the research were defined. The research design and approach, target population, data collection, data analysis as well as the trustworthiness to ensure validity and reliability was discussed. The researcher conducted semi-structured interviews with the participants identified in the LCRC's of the Tshwane North Cluster.

5.2.2 Research question 1: What are the objectives of murder investigation?

Chapter two, this chapter presented the comprehensive overview of research question 1, the objectives of murder investigation. This research sought to gain knowledge on murder investigation, the importance of investigating murder, the importance of bloodstain pattern analysis as an investigative tool in the murder cases, crime scene, evidence, the role of police field workers in the investigation of murder as well as the role of FSL in the murder investigation. The crime scene examiner and the FSL work hand in hand for the purpose of better conviction rate.

During murder investigation, forensic science is applied as a procedure as governed by the legal standards of admissible evidence. The literature consulted illustrate that forensic science is at the heart of murder investigation. The documentation and presentation of evidence found in the crime scene is done in scientific methods and presented before court in an order required by court.

5.2.3 Research question 2: What is the significance of bloodstain pattern found in the murder crime scene?

Chapter three, this chapter presented the significance of bloodstain pattern found in the murder crime scene. The Locard principle which is of value in all crime scenes is discussed in this study. The correct procedure to be followed when collecting bloodstain in murder crime scene was also discussed. The bloodstain pattern, its types and the diagrams illustrating the kind of patterns found at crime scene is attached, for the crime scene examiner not to ignore them during investigation of murder. Bloodstain pattern analysis is done at violent crime scenes to determine what actions or sequences of action could have created the bloodstain pattern. Crime scene examiners should also identify human blood by testing it before collection. Linking of suspect to the crime scene by the use of DNA is of value in this study as the heart of this research is BPA, blood is the key.

Forensic science is the critical element of the judicial system, forensic scientists seek to examine and analyse evidence derived from the crime scene and anywhere to develop findings to assist in the investigation and prosecution of suspects of murder crimes or extract innocent person from suspicion.

5.2.4 Presentation and interpretation

Chapter four presented participants' views and experience in the field of the study as collected during the semi-structured interviews and quoted *verbatim*. Related literature and patterns were categorised and presented through themes and sub-themes. Each theme was presented with supporting literature with the aim of exploring the importance of BPA as an investigating technique during a murder investigation in Pretoria.

5.2.5 Recommendations and conclusions

In chapter five, this chapter presented the recommendations and conclusions of the study. Furthermore, this chapter presented recommendations on the research findings highlighting the challenges of murder investigations. The researcher also discussed the importance of investigating murder. As a result, the researcher discovered what was obstructing the police to bring perpetrators to justice and also wanted to explore knowledge of using bloodstains found at the scene as an investigation technique.

According to the study on participants' responses, it was proven that SAPS members do not have knowledge on the purpose of using bloodstain evidence in the investigation of murder. The researcher realised that bloodstain evidence found at the scene is crucial important and need to always be used as evidence in court for better conviction rate.

This research plays a significant role in finding solutions to problem, however, in South Africa there are many unsolved serious cases because proper processes and investigation were not conducted. This research aims to empower investigators with skills. Most importantly, the researcher aims to develop strategy which will empower investigators to understand the significance of BPA.

5.3 RECOMMENDATIONS

These recommendations are informed by the findings of the study and literature reviewed.

5.3.1 Specialised training on the importance of crime scene for police officials

The researcher is aware that not all police officials understand the value of evidence found on the crime scene. The researcher recommends that all role players of criminal investigations attend a workshop, where a scene of murder is reconstructed; complete with reporter, witness, suspect, first responder and all kinds of exhibits that may be found at a crime scene, including the body of a victim. This kind of workshop will create a clear vision and understanding about the objectives of criminal investigations, the need to attend to all the exhibits left at scene. The SAPS members should know how gaps or loopholes they create when ignoring some information affect the trials. This will show them the importance of all evidence at the crime scene.

The SAPS members need to refresh their minds about the following:

- The purpose of objectives of murder investigation;
- The purpose of thorough processing of crime scenes.

The researcher is aware that SAPS members sometimes do not understand each other's duties. The researcher recommends that all role players learn the basics of other role players' duties, for the purpose of protecting evidence or information needed to be collected by the other role players.

5.3.2 Specialised training on BPA for all crime scene examiners

The study of participants' responses shows that crime scene examiners have scant knowledge of bloodstain patterns. The researcher recommends a full course of BPA to equip members with the necessary knowledge.

It is recommended that the crime scene examiner be offered the following courses:

- Bloodstain patterns;
- Photography of bloodstains at crime scenes;
- Interpreting bloodstains found at the scene

The researcher realised that the crime scene examiner merely photographs crime scenes with bloodstains but gives no evidence of it. That leaves the investigation either wanting or incomplete. It is recommended that SAPS members be trained how to give evidence on bloodstains in court. It is also recommended that the SAPS training centre issue certificates upon completion of BPA courses as bloodstain evidence is required to be

presented by BPA analysts/experts in court. There is no expectation that every crime scene technician should be a bloodstain pattern analyst, but every crime scene technician must be trained up to a level that allows him or her to recognise the different bloodstain pattern.

5.3.3 Implementation of structure in the SAPS specialising with only murder

The researcher, with the experience gained in the field of forensics realised that not all crime scene examiners want to deal with murder. Not all of them want to deal with corpses on a daily basis. The researcher realised that crime scene examiners sometimes make mistakes because they are not strong enough to process the crime scene while there is a dead person and some even fail to attend to a post-mortem of which results are of utmost importance in the court of law. The researcher therefore recommends the implementation of a unit specialising in murder exclusively, where only those who are willing and emotionally capable to deal with murder can freely execute their duties.

5.3.4 Establishing of cold case unit

The establishment of a cold case unit will help to find out the reason of unsolved murder investigation. If a case cannot be cracked in few hours after the crime has been committed, it will increase the chances of an unsolved case. In the beginning of the investigation the case is being pursued actively, but along the way loses momentum or abandoned due to other unresolved crimes. By establishing this unit, the researcher believes that it will force the role players to execute their duties accordingly as the reason for the unsolvable crime will be recorded.

5.3.5 Murders involving firearms

Special efforts have been launched before, for everyone in possession of an illegal or unwanted firearm to return them to police station. It was done to reduce the rate of crime in SA. The researcher recommends that the launch be executed again as the rate of crime is still high. The researcher also recommends that the legislative control of firearms be improved for the purpose of reducing crime. The researcher further recommends the increase of punishment in murder crimes committed with a firearm.

5.4 CONCLUSION

The research on exploring the significance of BPA in murder cases in Pretoria was selected to determine the significance of BPA as a technique during a murder investigation. After analysing all characteristics of bloodstains left on the scene, the crime scene examiner will be able to test if bloodstains found at the scene are of human or not. The crime scene examiner will further be able to preserve evidence, ensure thorough examining of the crime scene as well as a successful prosecution of a murder investigation.

The researcher believes that if members were trained in bloodstain pattern, evidence on bloodstain will not be avoided at crime scenes. The researcher has empowered herself; she is confident that the study has also empowered crime scene examiners and FSL members with knowledge. This study was able to explain the problem statement addressed in chapter one, all questions were answered and the aim is achieved. The researcher believes that this study will clarify previous understandings and also bridge the gap on the future bloodstain courses.

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SAPS CASES USED

Loate CAS, 346/10/2017

Ga-Rankuwa CAS, 212/05/2018

ANNEXURE A: INTERVIEW SCHEDULE

ANNEXURE A. INTERVIEW SCHEDULE: FIELD WORKERS (SAMPLE “A”) and FSL MEMBERS (SAMPLE “B")

Participant number: _____

PARTICIPANT

I agreed to be interviewed and that any information obtained from me can be used in this research:

YES / NO

SIGNATURE OF PARTICIPANT (optional) _____

DATE _____

TOPIC: Exploring the significance of Bloodstain Pattern Analysis (BPA) in murder cases in Pretoria

AIM: To determine the significance of BPA as a technique during a murder investigation.

RESEARCH QUESTIONS:

● What are the objectives of Murder investigation?

● What is the significance of Blood Pattern Analysis in the investigation of a murder case?

SECTION A: HISTORICAL BACKROUND

A.1) What is your rank?

_____

A.2). How long have you been working as a field worker?

1 – 5 years, 5 – 10 years, 10+ years

A.3) Are you currently investigating crimes where blood is involved?

YES / NO

A.4). How many years have you been investigating crimes where blood is involved?

1 – 5 years, 5 – 10 years, 10+ years

A.5). What qualifications do you have?

A.6). Did you receive specific training to investigate bloodstain pattern?

YES / NO

SECTION B: THE OBJECTIVES OF MURDER INVESTIGATION

B.1) What do you understand about murder investigation?

B.2) What is the importance of investigating murder?

B.3 What is the importance of bloodstain pattern analysis as an investigative tool in the murder cases?

B.4) How are murder cases assigned to the police field workers?

B.5) What is the role (duties and functions) of the police field workers in the investigation of murder cases?

B.6 Define crime scene

B.7 What is evidence

B.8) What is the role of the Forensic Science Laboratory (FSL) in criminal investigations?

SECTION C: THE SIGNIFICANCE OF BLOODSTAIN PATTERN FOUND IN THE MURDER CRIME SCENE

C.1). What is your understanding of the Locard principle?

_____

C.2). What are the correct procedures to be followed when collecting bloodstain patterns in murder crime scene?

_____

C.3). What is your understanding about bloodstain pattern?

_____

C.4). Name the different types of Bloodstain Patterns found at the crime scene.

_____

C.5). What is the significance of bloodstain pattern found in the murder crime scene?

_____

C.6). What is the admissibility of bloodstain found at crime scene as physical evidence?

_____

C.7). What is continuity of possession

_____

C.8). What is a suspect?

_____

C.9). Identification of a suspect

_____

C.10). Individualisation of a suspect

_____

C.11). What is the significance of DNA evidence from a crime scene?

_____

ANNEXURE B: SAPS PERMISSION TO CONDUCT RESEARCH

INFORMATION NOTE

To: Warrant Officer MF Pilusha
SAPS Criminal Record and Crime Scene Management

From: The Commander
SAPS Academy Pretoria Central

PERMISSION TO UTILISE PHOTOGRAPHS FROM SAPS ACADEMY PRETORIA CENTRAL

1. Herewith permission to utilise photographs of scenarios of crime scenes as received from SAPS Academy Pretoria Central.
2. The photographs can be used to complete your dissertation.
3. Please don't use photographs where the SAPS emblem are displayed.
4. All the best with your studies and completing your dissertation, please feel free to contact us for any assistance and guidance.

Kind regards

COLONEL
COMMANDER: SAPS ACADEMY PRETORIA CENTRAL
AL ROUX

Information note compiled by:	Colonel AL Roux
Telephone number:	012 393 3680 / 082 498 2185
E-mail:	RouxAlbert@saps.gov.za
Date:	2020-07-10

Page 1 of 1

ANNEXURE C: SAPS PERMISSION TO CONDUCT RESEARCH

SUID AFRIKAANSE POLISIEDIENS/SOUTH AFRICAN POLICE SERVICE

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

Privaatsak/Private Bag X 94

The Divisional Commissioner FORENSIC SERVICES

The Divisional Commissioner DETECTIVE SERVICE

SOUTH AFRICAN POLICE SERVICE

THE HEAD: RESEARCH

SOUTH AFRICAN POLICE SERVICE PRETORIA

0001

PERMISSION TO CONDUCT RESEARCH IN SAPS: EXPLORING THE SIGNIFICANCE OF BLOODSTAIN PATTERN ANALYSIS IN MURDER CASES IN PRETORIA: UNIVERSITY OF SOUTH AFRICA: MASTER'S DEGREE: RESEARCHER: MF PILUSHA

A.1. The above subject matter refers.

2. The researcher, Ms MF Pilusha, is conducting a study titled: Exploring the significance of bloodstain pattern analysis in murder cases in Pretoria, with the aim to determine the significance of bloodstain pattern analysis as a technique during a murder investigation.

3. The researcher is requesting to interview thirty (30) forensic field workers, including Forensic Science Laboratory (FSL) investigators, from the Local Criminal Record Centres at Pretoria North, Pretoria Central, Ga-Rankuwa and Lyttleton.

4. The proposal was perused according to National Instruction 1 of 2006. 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.

7. PERMISSION TO CONDUCT RESEARCH IN SAPS: EXPLORING THE SIGNIFICANCE OF BLOODSTAIN PATTERN ANALYSIS IN MURDER CASES IN PRETORIA: UNIVERSITY OF SOUTH AFRICA: MASTER'S DEGREE: RESEARCHER: MF PILUSHA

which will include your terms and conditions if there are any and the following:

7.1 The research will be conducted at his/her exclusive cost.

7.2 The researcher will conduct the research without the disruption of the duties of members of the Service and where it is necessary for the research goals, research procedures or research instruments to disrupt the duties of a member, prior arrangements must be made with the commander of such member.

7.3 The researcher should bear in mind that participation in the interviews must be on a voluntary basis.

7.4 The information will at all times be treated as strictly confidential.

7.5 The researcher will provide an annotated copy of the research work to the Service.

7.6 The researcher will ensure that research report / publication complies with all conditions for the approval of research.

8. If approval is granted by your office, for smooth coordination of research process between your office and the researcher, the following information is kindly requested to be forwarded to our office:

• Contact person: Rank, Initials and Surname.

- Contact details: Office telephone number and email address.

8. A copy of the approval (if granted) and signed undertaking as per paragraph 6 supra to be provided to this office within 21 days after receipt of this letter.

9. Your cooperation will be highly appreciated.

B. 1. Copy for your information.

THE HEAD: RESEAR
DR PR VUMA

RESEARCH

DATE: 2020 -05- 18

DATE: MAJOR GENERAL

ANNEXURE D: SAPS PERMISSION TO CONDUCT RESEARCH

South African Police Service — Suid-Afrikaanse Polisiediens

Privaatsak Private Bag X94	Pretoria 0001	Faks No. Fax No.	(012) 334 3518

Your reference/U verwysing:

My reference/My verwysing: **3/34/2**

THE HEAD: RESEARCH
SOUTH AFRICAN POLICE SERVICE
PRETORIA
0001

Enquiries/Navrae: **Lt Col Joubert**
AC Thenga
Tel: **(012) 393 3118**
Email: **JoubertG@saps.gov.za**

Ms MF Pilusha
UNIVERSITY OF SOUTH AFRICA

RE: PERMISSION TO CONDUCT RESEARCH IN SAPS: EXPLORING THE SIGNIFICANCE OF BLOODSTAIN PATTERN ANALYSIS IN MURDER CASES IN PRETORIA: UNIVERSITY OF SOUTH AFRICA: MASTERS DEGREE: RESEARCHER: MF PILUSHA

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:** Col NM Rababalela
- **Contact Details:** (012) 421 0440/082 378 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 (ACL)

DATE: 2020-06-12.

1

ANNEXURE E: UNISA ETHICAL CLEARANCE

ERC Reference No. : ST71-2020

Name : MF PILUSHA

Date: 2021:03:18

Dear Maleho Francinah Pilusha

Decision: Ethics Approval from

2021:03:18 to 2024:03:18

Researcher: Ms Maleho Francinah Pilusha
Supervisor: Dr DQ Mabunda

EXPLORING THE SIGNIFICANCE OF BLOODSTAIN PATTERN ANALYSIS IN MURDER CASES IN PRETORIA

Qualification: M-Tech Forensic Investigation

Thank you for the application for research ethics clearance by the Unisa 2021 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 18*

March 2021 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. Provisional authorisation is granted.

2. The researcher(s) will ensure that the research project adheres to the values and

principles expressed in the UNISA Policy on Research Ethics.

3. Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study should be communicated in writing to the CLAW Committee.

4. The researcher(s) will conduct the study according to the methods and procedures

set out in the approved application.

5. Any changes that can affect the study-related risks for the research participants, particularly in terms of assurances made with regards to the protection of participants' privacy and the confidentiality of the data, should be reported to the Committee in writing, accompanied by a progress report.

6. The researcher will ensure that the research project adheres to any applicable

national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study. Adherence to the following South African legislation is important, if applicable: Protection of Personal Information Act, no 4 of 2013; Children's act no 38 of 2005 and the National Health Act, no 61 of 2003.

7. Only de-identified research data may be used for secondary research purposes in

future on condition that the research objectives are similar to those of the original research. Secondary use of identifiable human research data requires additional ethics clearance.

8. No field work activities may continue after the expiry date **2024:03:18**. Submission of a completed research ethics progress report will constitute an application for renewal of Ethics Research Committee approval.

Note:

The reference number ST71-2020 should be clearly indicated on all forms of communication
with the intended research participants, as well as with the Committee.

University of South Africa
Preller Street, Muckleneuk Ridge, City of Tshwane
PO Box 392 UNISA 0003 South Africa
Telephone: +27 12 429 3111 Facsimile: +27 12 429 4150
www.unisa.ac.za

Yours sincerely,

Prof T Budhram

Chair of CLAW ERC
E-mail:buhrt@unisa.ac.za
Tel(012 433 9462)

Prof M Basdeo
Executive Dean : CLAW
E-mail: MBasdeo@unisa.ac.za
Tel: (012) 429-8603

ANNEXURE F: UNISA COVID-19 POSITION STATEMENT ON RESEARCH ETHICS

Prof T Meyiwa
P. O. Box 392, UNISA, 0003
TELE: +27 (0) 12 429 2851
EMAIL: *meyiwt@unisa.ac.za*

TO: **ALL RESEACHERS**

DATE: 09 April 2020

SUBJECT: **UNIVERSITY OF SOUTH AFRICA COVID-19 POSITION STATEMENT ON RESEARCH ETHICS**

Dear Colleagues

On 15 March 2020 President Cyril Ramaphosa addressed the nation to declare a state of national disaster, following an increase in confirmed cases of COVID-19. The evolving COVID-19 pandemic requires that research is adapted on an ongoing basis to the dynamic situation.

A responsible approach to human participant, community engaged, animal, environmental, molecular and cell research is required in the context of COVID-19. Unisa supports the continuation of research activities, where possible, guided by the following principles and activities supported by the Policy on Research Ethics:

Protection of the participant, the community, and the researcher(s) and research support staff from any risks of harm while conducting research through the implementation of clear pragmatic risk mitigation measures.

Researchers must assess the risk - benefit ratio of a research study, particularly research that requires face-to-face contact, and the collection of data in public spaces or in locations where social distancing cannot be practiced.

The respect for the participant's rights for self-determination should always be carefully considered, for example the right to decline participation or to withdraw or collectively exploring alternative ways of participation.

In the interest of participants and researchers, the consensus is that new face-to-face or studies with an inherent risk to participants and/or researchers should not be embarked upon for the duration of the lockdown period.

Although this sounds like a blanket statement, registered Unisa Health Research Ethics Review Committees would be willing to consider well-motivated applications as exceptions only. The researcher needs to provide an accompanying letter with a detailed rationale for why this research study needs to be enacted during this time.

Unisa Ethics Review Committees (ERCs) will continue to accept and review research ethics applications but will clearly indicate where the ERC does NOT wish this study to commence with immediate effect in accordance with the lockdown regulations.

No research involving face-to-face contact or research studies involving settings where it is difficult to institute social distancing or practice protective measures may continue without formal notification and approval by the ERC that granted the approval in consultation with one of Unisa's registered Health ERCs/RECs.

Where or when it is unavoidable to reduce, suspend or postpone research activities, the onus is on the principal researcher to notify the ERC that approved the research study and to provide a rationale why the research needs to continue.

The ERC must inform the Unisa Research Ethics Review Committee (URERC) of all ongoing studies that may pose a risk of harm relating to the Covid-19 pandemic. National instituted protective measures such as hand hygiene, cough etiquette, and social distancing should be implemented, and monitored at sites where these studies will continue.

Research for degree purposes: The College of Graduate Studies and the Heads: Graduate Studies and Research will negotiate processes to mitigate the possible negative fallout to student progress (both new research and research that is in progress). The COVID-19 outbreak and its ramifications are difficult to measure or predict, but the suggested time frame for this position statement to be enacted is not less than the lockdown period.

Staff, researchers and supervisors are requested to carefully monitor any further internal communications for directives and guidance on this matter. Researchers who are dependent on internal, and more so external, sources of funding and sponsorship should consider the potential risks that COVID-19 and social distancing strategies will have on project milestones and audit reporting deadlines. Where possible, researchers should engage with the funder/sponsor regarding these timeframes.

Approved research that may continue without ERC notification

- Research conducted by Unisa researchers that does not engage participants face-to-face and thus limits or does not pose the risk of COVID-19 infection may continue without ERC notification.

- Research studies that collect data online or consists of the review of records are considered of low risk in current circumstances and may continue.

- Data science research and other forms of research that does not require face-to-face interaction may continue.

- Laboratory-based research where appropriate safety precautions can be taken and legitimate access to the facilities negotiated may continue (except research related to COVID-19).

The researcher/s remain responsible to ensure safety and protective measures, and to continue to minimise risk.

The onus is on the researcher to contact the relevant Ethics Review Committee if uncertain or concerned about how, or if at all, to proceed with approved research studies.

Kind regards

Prof T Meyiwa

Vice Principal: Research, Postgraduate Studies, Innovation and Commercialisation

Acknowledgement:

Stellenbosch University (SU) Faculty of Medicine and Health Sciences (FMHS) Researchers' Position Statement on Research Involving Human Participants (Clinical Research), 6 April 2020

ANNEXURE G: TURNIT IN REPORT

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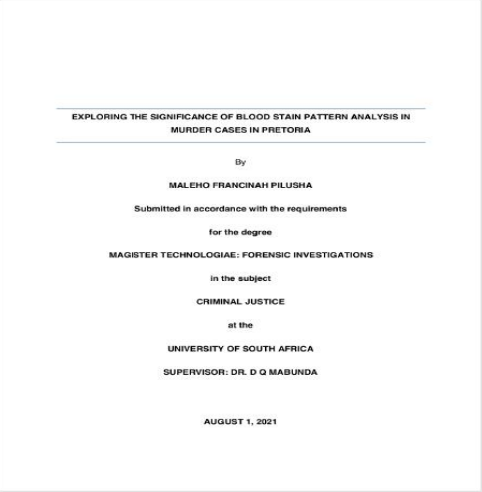

EXPLORING THE SIGNIFICANCE OF BLOOD STAIN PATTERN ANALYSIS IN MURDER CASES IN PRETORIA

By

MALEHO FRANCINAH PILUSHA

Submitted in accordance with the requirements

for the degree

MAGISTER TECHNOLOGIAE: FORENSIC INVESTIGATIONS

in the subject

CRIMINAL JUSTICE

at the

UNIVERSITY OF SOUTH AFRICA

SUPERVISOR: DR. D Q MABUNDA

AUGUST 1, 2021