

**THE SIGNIFICANCE OF BLOOD SPATTER ANALYSIS TO RECONSTRUCT  
MURDER SCENES**

by

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the degree of

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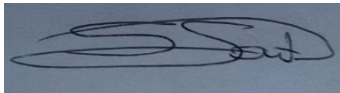
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I further declare that I have not previously submitted this work or part of it for examination at Unisa for another qualification or at any other higher education institution.



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## **ACKNOWLEDGEMENTS**

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## **DEDICATION**

This study is dedicated to my late parents, Mashwabada Adlington Sontundu and Esther Nomission Sontundu, who used to encourage me to always aim high, work hard, persevere, and go for my goals. I know they are watching me from Heaven as I am busy making them proud.

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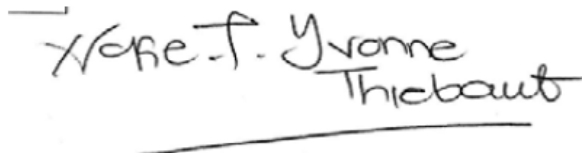
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## **ABSTRACT**

Crime scenes will always be a critical source of information in any investigated criminal incident. It is where most clues or evidence about a criminal activity are found. The police are mandated to preserve and investigate or process crime scenes to assist in bringing perpetrators to justice. Different evidential materials, such as blood spatters, fingerprints, and weapons are normally found in crime scenes. This study explores the significance of blood spatter analysis to reconstruct murder scenes. The study adopted a quantitative approach, with survey questionnaires and a literature review as data collection methods.

The target population was crime scene investigators of the Mthatha Local Criminal Record Centre and detectives of both Mthatha Central and Madeira SAPS. Thirty questionnaires were distributed. In analysing the collected data, a frequency distribution data analysis method was used. This study established that most crime scene investigators lack knowledge regarding the significance of blood spatter analysis to reconstruct murder scenes. The responses of most respondents indicated a confusion between collecting blood for deoxyribonucleic acid analysis and blood spatter analysis. Therefore, this study recommended that training manuals and workshops be developed or implemented within detective-training programmes of SAPS.

## **KEY CONCEPTS**

Blood spatter; Blood spatter analysis; Crime scene; Criminal investigation; Crime scene reconstruction; Murder

## **ACRONYMS**

|           |   |
|-----------|---|
| BSA:      | Blood Spatter Analysis                            |
| BM:       | Citizen-Based Monitoring                          |
| CR & CSM: | Criminal Record and Crime Scene Management        |
| CSI:      | Crime Scene Investigation                         |
| CSM:      | Crime Scene Management                            |
| CSR:      | Crime Scene Reconstruction                        |
| DNA:      | Deoxyribonucleic Acid                             |
| DPME:     | Department of Planning, Monitoring and Evaluation |
| FR:       | Forensic Register                                 |
| FSL:      | Forensic Science Laboratory                       |
| IR:       | Information Register                              |
| KSDDM:    | King Sabatha Dalindyebo District Municipality     |
| LCRC:     | Local Criminal Record Centre                      |
| NI:       | National Instruction                              |
| PR:       | Plan Register                                     |
| RSA:      | Republic of South Africa                          |
| SABC:     | South African Broadcasting Corporation            |
| SAPS:     | South African Police Service                      |
| SOP:      | Standard Operating Procedure                      |
| TV:       | Television  |
| UNISA:    | University of South Africa                        |

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## CHAPTER 1: GENERAL ORIENTATION

### 1.1 INTRODUCTION

Violent crimes leave several different biological materials behind as evidence of the incident. Blood is said to be the most consistent evidence in revealing the victim, attacker, and circumstances of the criminal incident. Blood spatter can reveal the site and mode of the attack (Franjic, 2019:19). Testimony in 2014 of Col van der Nest, a South African Police Service (SAPS) blood spatter analyst, was the first to be broadcast live on South African Broadcasting Corporation (SABC) television (TV), and the police applauded their colleague's expertise (SABC News, 2014:np). This was a testimony in the murder case of Oscar Pistorius. Furthermore, the researcher noticed that this testimony created awareness in the police and public of one of the critical investigation techniques called blood spatter analysis (BSA). According to Fish, Miller, Braswell and Wallace (2014:27), crime scene investigation (CSI) is a valuable component of the criminal justice system. Sapse and Kobilinsky (2012: ix) proposed that a thorough CSI means that all evidential material is processed at the scene or collected for processing at forensic science laboratories (FSL).

According to South African Police Service (2018:7), an 18-month pilot project of citizen-based monitoring (CBM) allowed community members to rate their local police on several performance areas. A finding from this project was detectives' inadequate investigation of cases. This project was a collaboration between SAPS and the Department of Planning, Monitoring, and Evaluation (DPME). The results showed that 51% of the respondents indicated that detectives did not investigate their cases competently and successfully. Sapse and Kobilinsky (2012: ix), further reflect that analysing physical evidence identified at a crime scene could be critical for solving any crime, and CSI must be done properly and thoroughly. According to De Klerk (2018:1), each crime scene has a toolbox full of forensic exhibits of evidential value waiting to be discovered and used to prosecute criminals. As part of this forensic toolbox, blood spatter must be considered. This research, therefore, focused on the significance of BSA in reconstructing murder crime scenes.

The study's objectives relate to murder crime scenes and criminal investigations. The methodology used in gathering and analysing the collected data was a starting point. The researcher explored different blood spatters and their significance in murder CSIs. Two critical disciplines in investigating criminal activities, criminal investigations and CSIs, are also discussed in this study. BSA done during CSIs is critical in criminal investigations. Lastly, the researcher's findings and recommendations for implementation by SAPS crime scene investigators and the conclusion conclude the last section of this study.

## **1.2 PROBLEM STATEMENT**

According to Leedy and Ormrod (2015:45), a problem statement is the axis around which the research effort revolves; it is the heart of every research project. Bairagi and Munot (2019:57) describe a problem statement as a challenge based on limitations a researcher identifies in a practical or theoretical situation and wants to find a solution. A first and critical step of any research is to define the research problem in the correct words (Bairagi & Munot, 2019:57). Col van der Nest's testimony at Oscar Pistorius' murder trial about BSA resulted in many police members talking about the importance of conducting proper BSA at murder crime scenes (SABC News, 2014:np). While the researcher was working at the Mthatha Local Criminal Record Centre (LCRC) he observed that crime scene investigators at the Mthatha LCRC, Mthatha Central SAPS, and Madeira SAPS ignore blood spatter when investigating bloodied crime scenes or they do not understand the significance of BSA. They focus on photographing the deceased body and collecting blood samples to be sent to the FSL for deoxyribonucleic acid (DNA) analysis.

According to Saferstein (2011:379), BSA is a valuable technique that can provide insights into the events that occurred during a violent crime. The analyst analyses blood spatter at the crime scene. Lochner and Zinn (2015:89) support this, stating that bloodstain pattern analysis requires much experience and can only be done by an expert in the field. The principal problem investigated in this research emanates from the researcher's observation that reconstructing murder crime scenes by analysing blood spatter is not done in the Mthatha policing area.

According to Buck, Kneubuehl, Näther, Albertini, Schmidt and Thali (2010:22), the morphology (structure) of the bloodstain pattern determines approximate blood source locations, the minimum number of blows, and the victim's position. Failure to do BSA at a crime scene should be regarded as leaving valuable evidence behind. The gruesomeness of the activities at the scene during the incident could be hidden if BSA is ignored. The courts can be unsure or give lighter sentences to the suspects due to insufficient evidence. Choromanski (2020:3) wrote that BSA is a field of forensic science concerned with examining bloodstain patterns. And the blood spatter analyst can be able to determine the way in which the blood spatters were created by analysing their sizes, shapes, locations and placement in relation to other stains.

Reported murder crimes increased in the Mthatha policing area, as indicated on table 1.2 page 19 of this study. What is more concerning is the decline in the conviction rate, as statistics in the last few years indicate that convictions are at a historic low (*Crime in South Africa*, 2021:np). Poor criminal activity investigation and botch-ups by prosecutors have resulted in a historic low prosecution and conviction rate (Versluis & De Lange, 2019:np). In other words, prosecutors can also ruin (botch) the chances of conviction in a criminal case. According to the SAPS National Instruction (NI) 1, the LCRC and detectives must examine the crime scene by identifying, documenting, and collecting physical evidence (SAPS, 2015:6). The researcher is of the view that ignoring blood spatters at a crime scene is starving the courts of information that should have assisted in making well-informed decisions when concluding the case. Since, once a scene has been cleaned, blood evidence is destroyed and cannot be restored.

### **1.3 RATIONALE OF STUDY**

“Spatter found in the downstairs lounge was caused by an arterial spurt. The stairs are above the lounge” (SABC News, 2014:np). This statement is one of many made by Col Ian van der Nest during the testimony in the Oscar Pistorius murder trial in March 2014 at the Pretoria High Court. This murder trial attracted much media attention within the Republic of South Africa (RSA) and the media from outside the country's borders.

According to Matisoff, Barksdale and Matisoff (2011:9), in 1955, Dr Paul Kirk introduced the legal system to blood spatter evidence in an affidavit he presented to the Court of Common Pleas in the State of Ohio vs. Samuel Shepherd. This case marked one of the earliest instances of the legal system recognising the importance of BSA. The source highlighted that using BSA, he could establish the relative positions of the suspect and victim during the incident. Also, he demonstrated that the suspect had struck the victim with his left hand (Matisoff et al, 2011:9).

Crime in South Africa has increased alarmingly over the past few years (*Crime in South Africa*, 2021). The researcher observed that murder incidents in South Africa are reported daily. The fact sheet of RSA crime statistics for 2018 indicated an increase in the recorded number of murder cases that were reported over a specific period (Factsheet South Africa's Crime Statistics, 2018:np). This document indicated the increase as follows:

- 2013/2014: 17 023 murder cases were reported
- 2014/2015: 17 805 murder cases were reported
- 2015/2016: 18 673 murder cases were reported
- 2016/2017: 19 016 murder cases were reported
- 2017/2018: 20 336 murder cases were reported

The researcher has been working as a crime scene investigator at Mthatha LCRC between June 2015 and November 2017 and has never seen BSA being done in murder crime scenes in that area. LCRC is a unit under the SAPS Forensic Division, and their tasks support the detectives in their criminal investigations. In conducting this study, the researcher explored the significance of BSA in reconstructing murder crime scenes in the Mthatha policing area. The researcher also followed the murder trial of Oscar Pistorius in March 2014 on TV. The successful investigation and testimony of Col van der Nest made the researcher realise the importance of researching this neglected investigation technique. Since the researcher never saw BSA being done in the Mthatha policing area, where murder incidents happen daily, motivated him to conduct this study.



The Mthatha region is mostly a rural area, people are still sceptical to consider the modern or forensic ways of investigation; and that is why the researcher felt the urge to conduct this study and investigate this phenomenon. Incident investigation still relies on witness statements. Furthermore, the courts have legal personnel with knowledge of modern ways of investigation because of education. Blood patten will always be the most valuable evidence that can provide direction in murder incident investigations. Most murder crime scenes contain evidence in the form of blood spatter. The success or failure of any murder investigation might depend on recognising and analysing blood at a crime scene. The detective must be able to identify this evidential method because BSA should be done as soon as the investigation starts at the crime scene (Wiid, 2016:iv).

#### **1.4 RESEARCH OBJECTIVES**

Kumar (2011:50) described research objectives as goals that researchers set out to attain in their studies. Creswell (2012:111) proposed that a research objective is a statement of intent used in quantitative research, specifying the goals that the researcher plans to achieve in a study. The aim of this study is to improve the knowledge and expertise of the investigators for the betterment of murder investigations. This study's objectives are as follows:

- To explore whether police investigators understand the concept of using BSA in murder crime scene investigations,
- To evaluate investigators' level of knowledge about the theory of BSA in criminal investigations, and
- To investigate police detectives' understanding of the significance of BSA in reconstructing murder scenes.

#### **1.5 HYPOTHESES**

According to Creswell (2012:111), a hypothesis is a statement in quantitative research where the investigator predicts the outcomes of a relationship among attributes or characteristics. Hypotheses were traditionally used in experiments, as they serve as research questions to narrow the purpose statement to specific predictions.

Grove, Gray and Burns (2015:149) proposed that a hypothesis is a formal statement of expected relationship(s) between two or more variables in a specific population. Shields (2019:5) wrote that hypothesis is directly related to a theory but contains operationally defined variables and is in testable form. It determine through research, if the theory is correct. The researcher devised hypotheses to explain the ignoring of BSA in murder crime scenes, causing inadequate investigation of these scenes.

- Hypothesis one: There is inadequate investigation of murder cases in the Mthatha policing area where blood spatter is ignored.
- Hypothesis two: There is improper investigation of murder cases in the Mthatha policing area, which might affect the criminal investigation.
- Hypothesis three: Investigators in the Mthatha policing area does not consider the significance of BSA as a technique to reconstruct murder scenes.

## **1.6 RESEARCH PURPOSE**

Grove et al (2015:131) proposed that research should be a clear, concise statement of the specific goal or focus of a study. Babbie (2017:91) and Denscombe (2014:4) emphasised that research is conducted for three broad purposes, namely, to explore, describe, and explain with additional purposes, such as forecasting, criticising, evaluating, developing, and empowering. Leavy (2017:5) believes that a research may assist audiences into thinking about or seeing something differently, creating an awareness campaign, or promoting new learning. And therefore a study may be conducted to evoke, provoke, or unsettle. This study focused on the following purposes:

- Exploration: the researcher explored police investigators' understanding of the concept of BSA in murder CSIs.
- Explanation: the researcher consulted and used relevant literature to explain the significance of BSA in reconstructing murder scenes.
- Empowering: the study generated added information on the significance of BSA to reconstruct murder scenes to empower crime scene investigators and improve their investigative skills and knowledge.

## **1.7 RESEARCH DEMARCATION**

This study was conducted in the Mthatha policing area, in the eastern part of the Eastern Cape Province. This policing area is part of the King Sabatha Dalindyebo Municipality (KSDM), which has a population of 512 000 (KSDM Draft Annual Report, 2021:14). Mthatha is the biggest town in the area, previously called Transkei during the era of homelands in South Africa. Most people in the area are culturally driven and proud of their traditions and rituals (*Mthatha Town*, 2018:np). The Mthatha Central and Madeira SAPS are the two biggest stations policing this area. The Mthatha LCRC conducts CSIs for physical evidence in this area, which is rural and urban. The researcher, therefore, focused this study on these two police stations and the Mthatha LCRC.

## **1.8 DEFINITION OF KEY CONCEPTS**

Babbie and Mouton (2012:111) emphasised that before researching, the researcher must define the operational concepts contained in the problem statement. According to Kumar (2011:62), contextualising key concepts allows the reader to be familiar with the field and have a good comprehension of the phenomenon being studied. The key theoretical concepts that are used in this study are defined below.

### **1.8.1 Blood spatter**

Shen, Brostow and Cipolla (2015:1) noted that blood spatter is formed or created when blood passively falls due to force being applied to a body. They can be classified into passive/gravity, spatter, and altered blood spatter (Brodbeck, 2012:53).

### **1.8.2 Blood spatter analysis**

According to Girard (2011:45), BSA is interpreting bloodstain patterns to provide vital information about what happened at a crime scene. The size, shape, and pattern formed by bloodstains at a crime scene can be used to reconstruct the events. The location of blood spatter evidence during BSA is the most critical element, followed by identifying other characteristics of the blood drops, such as size, shape, and distribution (Ramirez & Parish-Fisher, 2012:157).

### **1.8.3 Crime scene**

Dutelle and Becker (2019:67) emphasised that a crime scene includes all areas through which participants moved while entering to commit the crime, during the crime, and while exiting the crime scene. The crime scene is typically a single, well-defined area, but it might encompass several non-contiguous areas (Dutelle & Becker, 2019:67).

### **1.8.4 Crime scene reconstruction**

Forest, Pizzola and Kammrath (2021:17) stated that crime scene reconstruction (CSR) is the process of recognising, assembling, and analysing information derived from the physical evidence in order to determine the sequence and details of past events. Reconstruction can be accomplished using witness statements, the suspect's confession, the statement of a living victim, or examining and interpreting physical evidence (Chisum & Turvey, 2011:9).

### **1.8.5 Criminal investigation**

Birzer and Roberson (2012:28) describe a criminal investigation as the process of determining whether a crime has occurred, collecting evidence to identify suspects, recovering property, and documenting findings clearly and concisely to present to the prosecutor and criminal justice system. It is the often used term relating to the process associated with investigating a criminal event (Dutelle & Becker, 2019:3).

### **1.8.6 Murder**

Joubert (2010:101) defined murder as unlawfully and intentionally causing the death of another human. Kemp, Walker, Palmer, Baqwa, Gevers, Leslie and Steynberg (2012:271) proposed that X commits murder when they unlawfully and intentionally cause the death of Y, another human.

## **1.9 RESEARCH METHODOLOGY**

This section discusses the research methodology used to investigate the significance of BSA to reconstruct murder crime scenes.

Sahu (2013:3) described a research methodology as a systematic process of solving a research problem. “Research methodology deals with general laws and principles of organising the research activity – choosing an efficient (adequate, rational) research technique” (Novikov & Novikov, 2013:3). According to Bairagi and Munot (2019:ix), research methodology includes a wide assortment of tools and techniques for systematic and effective research. The researcher, therefore, implemented the following methodological principles in this study.

### **1.9.1 Research design**

According to Schwartz-Shea and Yanow (2012:16), a research design is a basic structure of a research project, the investigation plan focused on a research question central to the concerns of a specific epistemic community. Similarly, Edmonds and Kennedy (2017:np) proposed that a research design is the actual structure or framework indicating the time frame(s) in which data will be collected and the number of groups or respondents that will be involved.

In this research, a practical problem regarding the investigation process of crime scenes is the focus point. The researcher, therefore, followed an empirical design where questionnaires were used to obtain information from respondents and studied the statistics of murder incidents over five years in the Mthatha policing area. According to Malhotra (2016:2), empirical research compares theories and observations using real-life data for analysis. Empirical studies use data analysis methods and statistical techniques for exploring relationships (Malhotra, 2016:2). Empirical research involves collecting and analysing new data (Leedy & Ormrod, 2013:5). The researcher, consequently, studied crime scene investigators’ real practices; hence, empirical research was appropriate for this study.

### **1.9.2 Research approach**

The research approach is described as plans and procedures for research, spanning the steps from broad assumptions to detailed data collection, analysis, and interpretation methods (Creswell, 2014:3). The researcher followed a quantitative approach.

According to Bairagi and Munot (2019:8), quantitative research involves measurements of quantities of characteristics that can be used as features for the research study. And quantitative research uses statistical analysis on parameter values for conclusion. Furthermore, Leavy (2017:9) noted that quantitative research approach may be based on linear methods of data collection and analysis that result in statistical data. And this approach is generally appropriate when the primary purpose is to explain or evaluate.

#### **1.9.2.1 Advantages of a quantitative approach**

Morgan (2014:9) stated that quantitative approach is the most appropriate when a researcher want the results to apply to a broad range of people (generality), in ways that treat every research respondent alike (objectivity), so that it can be determined whether the observations match the hypotheses (deduction). According to McKenzie (2013:180), a major advantage of the quantitative approach is that it is objective and quick to administer and interpret, with research results expressed only in numbers that are easy to administer. Equally important, Pheiffer (2013:20) noted that in a quantitative approach, results are immediately available because it is a direct research form.

#### **1.9.2.2 Disadvantages of a quantitative approach**

According to Creswell and Clark (2011:12), in the quantitative approach, researchers are mostly in the background and, therefore, their personal bias and interpretations are seldom discussed. The researcher also observed that the inability to control the environment where the respondents answer the questionnaires is a disadvantage. For example, a respondent's responses might be influenced by factors, such as assistance from colleagues or friends. Moreover, Pheiffer (2013:20) noted that implementing this approach could be extremely time-consuming.

### **1.10 TARGET POPULATION**

A research population is a group of people to whom researchers hope to generalise their findings. It is the total group of interest (Carter, Lubinsky & Domholdt, 2011:93). According to Harrison and Callan (2013:132), a research population is a collective group of people sharing a common characteristic.

The population for this research was 30 SAPS members investigating murder cases; fifteen crime scene investigators from Mthatha LCRC, eight detectives from Mthatha Central SAPS, and seven detectives from Madeira SAPS. Mthatha LCRC has 33 crime scene investigators, Mthatha Central SAPS has 21 detectives, and Madeira SAPS have 16 detectives. Of the total study population, 43% of investigators answered the questionnaires.

They are the investigators with knowledge of murder crime scene investigations. The Madeira SAPS is also in the Mthatha policing area. The researcher included unit commanders and senior members in managerial positions and detectives and crime scene investigators from LCRC because they have experience in the study field. Therefore, the views and knowledge of managers who plan strategies for their respective sections were also investigated and evaluated.

### **1.11 SAMPLING**

According to Christensen, Johnson and Turner (2014:150), sampling is the process of taking a sample from a population. Equally important, Bryman, Bell, Hirschsohn, Dos Santos, Du Toit, Masenge, Van Aardt and Wagner (2011:170) refer to a sample as a segment or subset of the population selected for investigation. In selecting the respondents for the study, the researcher applied a fishbowl-sampling (or out of a hat) technique, which is a random sampling method. Rossi, Wright and Anderson (2013:164) described fishbowl sampling as first having a name list of all probable participants. Second, the researcher had a hat with small, folded papers, numbered from one to the number of targeted respondents (for example, 1–7). The papers were mixed thoroughly. Grove and Ciper (2020:16) stated that a random sampling method requires that each member of the study population has an equal and independent opportunity to be chosen for inclusion.

The proposed respondents drew the folded papers with numbers. There were also blank papers in the hat. The respondents within the population who picked papers with numbers completed the questionnaires.

The research sample was 30 SAPS members; fifteen crime scene investigators from Mthatha LCRC, eight detectives of Mthatha Central SAPS, and seven detectives of Madeira SAPS who engage in murder CSIs. The researcher was aware that the respondents are experienced murder crime scene investigators and, therefore, suitable for this study. The respondents were also happy with the fishbowl-sampling technique that the researcher applied.

## **1.12 DATA COLLECTION**

Data collection is the process of applying research methods and techniques to collect the necessary information (Guthrie, 2012:7). This study, therefore, relied on data to be processed efficiently and effectively. According to De Vos, Strydom, Fouche and Delport (2011:171), quantitative data collection methods employ measuring instruments. Social and human sciences' measuring instruments refer to structured observation schedules, structured interviewing schedules, questionnaires, checklists, indices, and scales (De Vos et al, 2011:171).

In this study, the researcher used formulated questionnaires as primary data gathering and applied other data collection techniques, such as a literature study. A formulated questionnaire is a form used in a survey design that respondents complete and return to the researcher (Creswell, 2012:382). International and national data sources were consulted to find a theory relating to the research topic and provide solutions to the research objectives. Furthermore, statistics of murder incidents in the Mthatha policing area were obtained from the crime statistics website, as per table 1.2 of this study. Porta (2014:67) emphasised using a combination of investigation methods, data sources, or theoretical frameworks in a single study, referred to as triangulation. Hence, the data for this study were collected from various relevant sources relating to the significance of BSA to reconstruct murder crime scenes.



### 1.12.1 Literature study

Guthrie (2012:28) explained the literature study as an analysis of relevant publications (usually from the previous decade) that help define and set the context for the research topic. According to Creswell (2014:34), the literature study is about locating and summarising studies on a topic the researcher chose. These are research studies but could include conceptual articles or opinion pieces providing frameworks for thinking about topics. The researcher did a preliminary study relating to BSA. The researcher consulted various literature on the concept of BSA in different libraries and the Google Scholar database. No literature had the same title as that of the researcher.

Most literature focuses BSA on certain crime scene surfaces or as a technique to reconstruct only primary crime scenes. This study, however, also focused on secondary crime scenes. A secondary crime scene is any subsequent scene connected to a primary scene (initial place of the incident) (Petherick, 2015:44). The literature on BSA was found in most CSI books. In the Google database, the literature on BSA was found in dissertations, theses, and articles. The consulted national and international literature shed light on the significance of BSA in reconstructing events at a crime scene during the incident. Furthermore, the researcher used both primary and secondary sources.

#### (a) Primary sources

- Official registers relating to the topic, such as policies, reports, and standard operating procedure (SOP) documents
- CSI and management documents, such as national instructions and numbered letters
- Statistics of the Mthatha region reflecting the reported murder incidents over five years (2014, 2015, 2016, 2017, and 2018).

#### (b) Secondary sources

- Various textbooks relating to the topic, research methodology
- Local newspapers, pamphlets, articles, and dissertations relating to the topic.

### **1.12.1.1 Advantages of a literature study**

Conducting a literature study, the researcher gained more knowledge and a good background about the effect of BSA in reconstructing murder crime scenes. A literature study can help provide objective, reliable, and more current information (Withrow, 2014:29).

### **1.12.1.2 Disadvantages of a literature study**

The researcher noticed that most libraries have old literature and few newly published books. The researcher noticed that the literature study is time-consuming. Pfeiffer (2013:25) also shares the same sentiment. Writers are sometimes biased and do not have first-hand information (Efron & Ravid, 2019:60).

### **1.12.2 Using a survey questionnaire**

Recker (2013:76) described the survey method as gathering information about the characteristics, actions, perceptions, attitudes, or opinions of a large group of units of observations (such as individuals, groups, or organisations), referred to as a population. Observations confirm or support data collected using methods, such as questionnaires or interviews (Gerrish & Lacey, 2010:383). Furthermore, Creswell (2012:14) claimed, in the quantitative approach, the researcher might collect data from respondents using survey questionnaires, standardised tests, and checklists. In this study, questionnaires were used to collect data from respondents.

The researcher conducted surveys using open and closed-ended questionnaires, where respondents were given five days to answer, allowing respondents enough time to answer the questionnaires freely and without any pressure. Creswell (2012:382) described a questionnaire as a form used in survey design that respondents in a study complete and return to the researcher. Moreover, Bryman et al (2011:199) claimed that open-ended questions allow respondents to answer in any way they want, where closed questions are a set of fixed answers from which participants must choose.

In addition, Riazi (2016:34) and Maruyama and Ryan (2014:176) referred to closed-ended questionnaires as those that provide two or more response alternatives and respondents are instructed to select a choice closest to their position. Respondents were asked open-ended and closed-ended questions to evaluate their knowledge or understanding of the significance of BSA in reconstructing murder crime scenes. In other words, the questions were formulated in such a way that it will confirm or disapprove the hypotheses.

The researcher requested the commanders to avail only the detectives who are involved with or have experience in murder incident investigations in the Mthatha policing area, since blood spatter analysts are only available in Pretoria. The researcher devised, printed, and self-distributed 30 questionnaires during morning parades to the respondents as follows: fifteen were distributed to Mthatha LCRC crime scene investigators, eight to Mthatha Central SAPS detectives, and seven to Madeira SAPS detectives. Only 24 respondents responded with 11 Mthatha LCRC crime scene investigators, and 13 from both Mthatha Central and Madeira SAPS detectives. Commanders and group supervisors (in managerial positions) also participated in answering the questionnaires. Six respondents who did not complete the questionnaires in the presence of the researcher promised to email them. They, however, did not keep their promise and the researcher reminded them telephonically, but no one responded.

As a matter of introduction during data collection proceedings, the researcher first had a short meeting with the commanders (managers) of the three units, Mthatha LCRC, Mthatha Central, and Madeira detective branches. This was done to obtain the managers' commitment and, simultaneously, make them aware that they are not forced to participate in the study. The researcher also explained the reasons or background for the study to all respondents before distributing the questionnaires. The survey comprises five closed-ended questions about the historical information of the participants, five open-ended questions about criminal and CSIs, and five open-ended questions about CSR and BSA.

The researcher observed that surveys are easy to administer. Recker (2013:77) states that surveys are simple to score and that responses could be generalised to other members of the population studied and other similar populations.

Surveys can also be used to predict behaviour. It is only a snapshot of behaviour at one place and time. The author further remarked that surveys are susceptible to low response rates, which could diminish the generalisability of the results. However, the inability to observe the participants' verbal and non-verbal cues is a disadvantage. For example, what is written might come out differently if it was said with non-verbal expressions.

### 1.12.2.1 Profile of role players

Table 1.1 provides a breakdown of the 24 SAPS members from Mthatha Central and Madeira detective branches and Mthatha LCRC, who completed the survey questionnaires. This table was drawn up by the researcher. Respondents one to eight were Mthatha Central SAPS detectives, nine to 15 were Madeira SAPS detectives, and 16 to 30 were Mthatha LCRC crime scene investigators. Six respondents did not complete the questionnaires, as originally promised.

**Table 1.1 Respondents' Profiles**

| <b>Respondent number</b> | <b>Male</b> | <b>Female</b> | <b>Years of experience at SAPS</b> | <b>Years of experience as a Detective or LCRC Member</b> | <b>Post Matric qualification</b> |
|--------------------------|-------------|---------------|------------------------------------|--|----------------------------------|
| 1                        | Yes         |               | 10 & more                          | 1–5  |                                  |
| 2                        |             | Yes           | 10 & more                          | 5–10   |                                  |
| 3                        | Yes         |               | 5–10                               | 5–10   |                                  |
| 4                        | Yes         |               | 10 & more                          | <b>1–5</b>   | BTECH: Policing                  |
| 5                        |             | Yes           | 1–5                                | 1–5  |                                  |
| 6                        | Yes         |               | 10 & more                          | 10 & more  |                                  |

|    |     |     |           |           |                               |
|----|-----|-----|-----------|-----------|-------------------------------|
| 7  | Yes |     | 36        | 20        |                               |
| 8  | Yes |     | 10 & more | 10 & more |                               |
| 9  | Yes |     | 10 & more | 10 & more |                               |
| 10 | Yes |     | 10 & more | 10 & more |                               |
| 11 | Yes |     | 1–5       | 1–5       | BTECH: Forensic Investigation |
| 12 | Yes |     | 10 & more | 10 & more | BTECH: Policing               |
| 13 |     | Yes | 10 & more | 1–5       | BTECH: Forensic Investigation |
| 14 | Yes |     | 10 & more | 5–10      | National Diploma: Policing    |
| 15 | Yes |     | 10 & more | 10 & more | BTECH: Forensic Investigation |
| 16 | Yes |     | 5–10      | 5–10      |                               |
| 17 | Yes |     | 5–10      | 5–10      |                               |
| 18 | Yes |     | 10 & more | 5–10      | BTECH: Policing               |
| 19 |     | Yes | 10 & more | 10 & more |                               |
| 20 | Yes |     | 10 & more | 5–10      |                               |

|               |                   |               |           |           |                               |
|---------------|-------------------|---------------|-----------|-----------|-------------------------------|
| 21            |                   | Yes           | 5–10      | 5–10      | BTECH: Forensic Investigation |
| 22            | Yes               |               | 5–10      | 5–10      | National Diploma: Policing    |
| 23            | Yes               |               | 10 & more | 10 & more | BTECH: Policing               |
| 24            | Yes               |               | 5–10      | 5–10      |                               |
| <b>Totals</b> | 20<br>(83.3<br>%) | 4 (16.6<br>%) |           |           | 10 (41.6 %)                   |

#### **1.12.2.2 Using statistics**

The researcher examined the crime statistics, as obtained from the crime statistics website, to comprehend the reported murder incidents in the Mthatha policing area. Muralidharan and Symsundar (2012:62) noted that since variability can only be described statistically, statistical methods are central to quality improvement efforts. Statistical tools and techniques offer various quality improvement tools to detect variations in the process (Muralidharan & Symsundar, 2012:62). The focus was on murder cases recorded or reported over five years (2014, 2015, 2016, 2017, and 2018) to compare murder cases and the contribution of Mthatha LCRC in the investigation of these incidents by applying BSA. The official registers of Mthatha LCRC, such as, the information register, forensic register, and plan register, which are used to record different activities performed at different crime scenes, were perused as per agreement with the commander to fulfil this study's research objectives.

LCRCs must investigate crime scenes for physical evidence in their respective areas and keep offenders' records. The IR is used to record all cases attended by LCRC, whereas the PR is used to record photographed crime scenes and plans drawn by trained LCRC photographers. Different forensic-related activities such as BSA, DNA analysis, and fibre collection are recorded in the FR. The outcomes of the above exercise, which will be fully discussed in Chapter Four, revealed that BSA in reconstructing murder scenes is not considered when investigations are conducted, and murder incidents increase yearly. According to Haag and Haag (2021:2), crime scene reconstruction techniques are employed to learn what actually happened in a crime scene. Therefore, reconstruction of a crime scene can assist in sorting out the different versions of the events and helping to support or refute them. Therefore, the discipline of BSA is significant in CSR. The table below reveals the reported murder cases between 2013 and 2018 in the Mthatha policing area.

**Table 1.2 Reported murder cases in Mthatha policing area from 2013 to 2018**

|                            | YEARS     |           |           |           |           |            |
|----------------------------|-----------|-----------|-----------|-----------|-----------|------------|
| STATION                    | 2013/2014 | 2014/2015 | 2015/2016 | 2016/2017 | 2017/2018 | TOTAL      |
| MTHATHA<br>CENTRAL<br>SAPS | 139       | 92        | 122       | 127       | 160       | <b>640</b> |
| MADEIRA<br>SAPS            | 44        | 39        | 37        | 49        | 55        | <b>224</b> |
| <b>TOTAL</b>               |           |           |           |           |           | <b>864</b> |

(Source: *Mthatha Crime Statistics*, 2019)

### **1.13 DATA ANALYSIS**

According to De Vos et al (2011:249), quantitative data analysis is the technique by which researchers convert data to a numerical form and subject it to statistical analysis. The analysis reduces data to an intelligible and interpretable form so that the relations of research problems can be studied and evaluated, and conclusions are drawn (De Vos et al, 2011:249). Creswell (2012:15) implied that quantitative data analysis comprises breaking down data into parts to approve or disapprove hypotheses. Statistical procedures, such as comparing groups or relating scores to individuals, provide information to address the research questions or hypotheses (Creswell, 2012:15). In this study, the researcher applied a frequency distribution data analysis method. Bishnu and Bhattacharjee (2018:98) noted that a frequency distribution is a summary table for numerical data in which data are arranged into numerical ordering, either individually or in groups, and corresponding frequencies.

However, Grove and Ciper (2017:59) stated that frequency is the number of times a score or value for a variable occurs in a dataset. A frequency distribution is a statistical procedure that involves listing all probable values or scores for a variable in a study. In analysing data in this study, the researcher constructed tables with columns to organise and display the data (Bishnu & Bhattacharjee, 2018:98). In these tables, phrases or terms (variables) from the collected data were placed sequentially in one column. Another column in the table contains the number of respondents who used or applied the phrases in their responses. Another column contained the percentage of used terms or phrases. This analysis enabled the researcher to provide raw scores for each table. With this analysis, research hypotheses could, therefore, be approved or disapproved.

### **1.14 METHODS TAKEN TO ENSURE VALIDITY**

Kumar (2011:177) implied that validity could be broadly described as a concept of appropriateness and accuracy applied to the research process. Moutinho and Hutcheson (2011:327) noted that a study is valid if it measures what it claims to and no logical errors exist in concluding the data. This concept is based on two sub-concepts, namely credibility and transferability (Kumar, 2011:177).



To ensure validity in this study, the researcher used questionnaires to collect data from research respondents and literature sources. The literature information was obtained from specific books, the Google Scholar database, and journals in the relevant subject field, ensuring that information is obtained from reliable and valid sources.

#### **1.14.1 Credibility**

Credibility involves establishing that the results are credible and believable from the participants' perspective (Kumar, 2011:177). Moreover, Denscombe (2011:299) wrote that credibility concerns the extent to which researchers can demonstrate that their data are accurate and appropriate. In this study, the researcher ensured credibility by self-distributing the questionnaires and observing their completion by respondents. Data collection from various sources also contributed to ensuring the credibility of the study. Furthermore, the researcher's 14 years of experience in investigating crime scenes assisted in validating the collected data and ensuring the credibility of the study.

#### **1.14.2 Transferability**

Transferability refers to the degree to which the results can be generalised or transferred to other contexts or settings (Kumar, 2011:177; Moller & Chaudhry, 2012:145). The researcher ensured transferability by thoroughly explaining and describing the processes that were followed in collecting and analysing the data so that others (i.e., other researchers) can follow and re-apply it. Hence, Fortune, Reid and Miller (2013:17) noted that transferability refers to the applicability of findings and conclusions derived from one setting or context to other settings or contexts.

### **1.15 METHODS TAKEN TO ENSURE RELIABILITY**

Reliability, according to Edlund and Nichols (2019:22), refers to the extent to which a measure yields the same results on repeated trials. Reliability is crucial, as the trustworthiness of a study's results partly depends on trust in the measurement tool (Edlund & Nichols, 2019:22). Kumar (2011:181) highlighted that research can be reliable if the research tool is consistent and stable; hence, predictable and accurate. Reliability is also based on dependability and conformability (Kumar, 2011:181).

To ensure the reliability of the study, the researcher formulated relevant questionnaires related to the research objectives to ensure a response intended for this study. The respondents were from the SAPS detective branches and LCRC members who engage in murder incident investigations. Furthermore, all analyses and conclusions were based on the collected data from the questionnaires, researcher observations, and literature information.

#### **1.15.1 Dependability**

According to Kumar (2011:181), dependability is concerned with whether the researcher would obtain the same results if the same thing could be observed twice. Bless, Higson-Smith and Sithole (2013:237) noted that dependability demands that the researcher follows a clear research strategy and must indicate that each step has been thoroughly completed. To ensure dependability, the researcher used questionnaires and the respondents were asked the same questions. Furthermore, the researcher explained the research methodology followed in this study. The researcher also used well-recognised literature, and a reference list of all sources used was compiled and cited properly.

#### **1.15.2 Confirmability**

Kumar (2011:181) noted that confirmability is the degree to which the results could be confirmed or corroborated by others. Moller and Chaudhry (2012:145) wrote that confirmability relates to how well others can confirm the results. The researcher kept a record of all respondents' answers to ensure conformability. The researcher kept a detailed record of the processes followed in this study to ensure that interpreting the findings and recommendations could be easily traced to their sources. Furthermore, in analysing the collected data, the researcher ensured accuracy and avoided mistakes and the wrong interpretation of the collected data.

### **1.16 ETHICAL CONSIDERATIONS**

Ethics in the research context are standards of professional behaviour, and they guide researchers to act with integrity, especially towards the respondents in the study (Guthrie, 2012:15).

The author further stated that technical competence is an ethical obligation, ensuring that researchers are credible when they provide research results and that their work is held in high repute. The researcher ensured not to allow an irregularity in obtaining data in this study. The researcher complied with the Code of Ethics for Research of the University of South Africa (South Africa, 2013:3) and applied for ethical clearance as soon as the research proposal was approved; ethical clearance was granted. According to the Unisa Policy on Research Ethics, the researcher noticed the importance of

- respect for and protection of the rights of respondents and institutions,
- informed and non-coerced consent,
- privacy and confidentiality of data collected,
- integrity, transparency, and accountability,
- fair analysis and reporting of information,
- risk minimisation,
- respect for cultural differences, and
- correct referencing methods.

Furthermore, permission to conduct this research was obtained from the SAPS Head Office Research Section. According to SAPS (2006:np), the SAPS NI 1 of 2006 paragraph 1 indicates that this instruction regulates requests to research in the service by persons from outside the service or by employees who wish to research for private purposes (such as for their studies). The researcher ensured that this study complied with the code of ethics. Informed consent from all respondents in the study was obtained before distributing the questionnaires (Denzin & Lincoln, 2011:65-66). The researcher did not mislead or deceive the respondents. The findings were reported honestly, and full acknowledgement of sources consulted was done (Leedy & Ormrod, 2010:103). This research was evaluated on the Turnitin programme, and the results indicate that no plagiarism was committed (see attached addendum).

### **1.17 PROBLEMS ENCOUNTERED DURING RESEARCH**

The following are problems encountered and out of the researcher's control during this study.

- The researcher had to drive 460 km between his residence and respondents' workplace to distribute and collect questionnaires. Ideally, distributing questionnaires in the three units (Mthatha LCRC, Mthatha Central SAPS Detective Branch, and Madeira SAPS Detective Branch) was to be done in three days, as per the telephonic arrangement with the unit commanders. However, Madeira Detective Branch members were unavailable on the first day of the appointment, and their commander stated work commitments as a reason. Also, on the rescheduled date, the members were unavailable, and their commander seemed to be irritated by the researcher's presence. Furthermore, the time spent while waiting on certain respondents to complete the questionnaire was a challenge.
- Some respondents could not complete the questionnaires in the presence of the researcher, requesting the researcher to collect them the following day. That also added kilometres driven by the researcher, which was exhausting.
- Six respondents failed to honour their promise of completing the questionnaire in their spare time and email it to the researcher. Four of these respondents were Mthatha LCRC crime scene investigators, and two were Madeira Detectives. The researcher followed up telephonically but without success, as the respondents had different excuses for not completing questionnaires. Therefore, the target of 30 respondents could not be met.

### **1.18 RESEARCH STRUCTURE**

This study is divided into four chapters, which are as follows.

Chapter 1: General orientation – This chapter provides a conventional direction of the study, covering the problems encountered during research, the research objectives, hypothesis, purpose of the study, key concepts, research methodology, ethical considerations, and research demarcation.

Chapter 2: Murder crime scene and criminal investigations – This chapter explores a literature review covering murder crime scene and criminal investigations. Both primary and secondary scenes are fully described, followed by discussing the process and objectives of crime scene and criminal investigations and managing crime scenes. Feedback from questionnaires will also be discussed.

Chapter 3: Blood Spatter Analysis – The theoretical framework of the significance of BSA in reconstructing murder crime scenes is the focus of this chapter. Classifying blood spatter is a starting point, followed by documenting BSA and factors affecting blood spatter in murder crime scenes. The purpose of CSR using BSA is discussed. Feedback from respondents will be discussed.

Chapter 4: Findings and Recommendations – This chapter summarises the findings by answering each research hypothesis relating to the research objectives. Workable recommendations are highlighted to improve the knowledge and expertise of SAPS investigators to enhance murder investigations.

## **CHAPTER 2: CRIME SCENE AND CRIMINAL INVESTIGATIONS**

### **2.1 INTRODUCTION**

Crime scene investigation (CSI) is not only going to a scene, taking pictures, making notes, and collecting physical evidence. It is the first and critical step of any criminal investigation (Miller & Massey, 2019:7). According to Pepper (2010:1), the investigation of a crime is like putting together a jigsaw. No one person has all the pieces, but some key shapes can be found at the crime scene. The source also emphasised that only one opportunity exists for the crime scene investigator to recover forensic evidence from the crime scene, which could be scientific, such as DNA, blood spatter, or unique marks on bullets. Investigating any incident typically involves both criminal and CSI. The objectives of the two concepts are related or target the same outcome. Therefore, the success of any investigation cannot be accomplished without the involvement or considering one or both concepts. According to Brandl (2019:11), evidence found during CSI is the basic substance of criminal investigation.

This chapter discusses research hypotheses one and two. Hypothesis one: There is inadequate investigation of murder cases in the Mthatha policing area where blood spatter is ignored. Hypothesis two: There is improper investigation of murder cases in the Mthatha policing area, which might affect the criminal investigation. However, Locard's Principle will be a starting point because it is the foundation for why crime scenes are searched for physical evidence to be used in a criminal investigation (Miller & Massey, 2019:7). The crime scene and criminal investigation will be discussed. Also, the meaning and objectives of crime scene and criminal investigation will be discussed. Furthermore, the responsibilities and role of the LCRC and investigation procedures form part of this chapter. A brief explanation of the principles of crime scene management (CSM) will be discussed. Lastly, the summarised feedback of respondents from the survey questionnaires forms part of the discussion in this chapter.

## 2.2 LOCARD'S EXCHANGE PRINCIPLE

According to Miller and Massey (2019:7), Locard's exchange principle forms the foundation for why crime scenes are searched for physical evidence to be used in criminal investigations. This principle states that whenever two objects are in contact, a mutual exchange of matter will occur between them. The authors further noted that the physical evidence found at a crime scene will link the suspect to the scene, the victim to the scene, and the suspect to the victim and vice versa (Miller & Massey, 2019:7). Physical (or real) evidence is described as any evidence with an objective existence; that is, anything with size, shape, and dimension (Dutelle & Becker, 2019:98). It can take any form, with examples, such as fingerprints, blood, and soil (Dutelle & Becker, 2019:98).

Marcella and Menendez (2010:12) noted that in the 20th century, Edmond Locard, a forensic scientist, postulated the Locard exchange principle, also known as Locard's theory. Edmond Locard was the director of the first crime laboratory in Lyon, France. The Locard's exchange principle states that with contact between two items, an exchange will occur (Marcella & Menendez, 2010:12). Houck (2017:4) highlighted that although similar, non-equivalent versions are used in other disciplines; however, Locard's exchange principle exists as the central tenet of forensic science. Although Locard never uttered the definition of the principal as such, its universal statement of every contact leaves a trace stands as a universally accepted shorthand phrasing.

Houck (2017:4) reflected that Locard's principle embraces all forms of contact, from biological to chemical to physical and even digital traces and extends the usual perception of forensic science beyond dealing only with physical vestiges. Moreover, Bertino and Bertino (2016:22) submitted that Locard established several critical ideas that are still part of forensic studies. Also, Locard's exchange principle states that when a person contacts an object or another person, a cross-transfer of physical evidence can occur. The exchange material indicates that the two entities were in contact. More importantly, the exchanged evidence bears a silent witness to the criminal act (Bertino & Bertino, 2016:22).

## 2.3 CRIME SCENE

A crime scene is described as the engine room of any investigation, where clues and evidence are found, steering the investigation forward (Lochner & Zinn, 2015:10). Chisum and Turvey (2011:148) defined a crime scene as any area where a crime has occurred. Furthermore, in many cases, a crime scene is discovered because of violence witnessed or inferred from some fact or evidence. Dutelle (2017:12) referred to the working definition of a crime scene (both primary and secondary) as everywhere evidence might be that will help explain the events. It is where the crime was committed. Thatcher (2013:1) and LeMay (2011:1) highlighted that a crime scene is defined as where a crime was committed and that contains evidence about the crime.

Thatcher (2013:1) further highlighted that a crime scene could be as small as a square foot or less, or large, covering several places in different areas or even different states. Huffman and Wallace (2012:51) proposed that a crime scene can be defined as where an illegal act has occurred, in which physical evidence of the action can be recovered. This location is the tip of the spear upon which all subsequent methodologies in forensic science will be applied. Houck, Crispino and McAdam (2018:20) concurs with the abovementioned views, as they note that in technical terms, a crime scene is an area or location where an illegal act occurred. Physical evidence can be retrieved for CSI from this location. The SAPS NI 1 stipulates that crime scene means the place, including the surrounding area, where an alleged offence was committed or where items with potential evidential value may be collected (SAPS, 2015:2).

In the empirical research and trying to test hypothesis one, the respondents were asked to define a crime scene in their understanding (Question 3). Of 30 selected respondents, 24 answered the questionnaire. The six respondents who did not return the questionnaire might have been unwilling to participate, as follow-up attempts to obtain the questionnaires were futile. Of the 24 respondents, 13 were police detectives from Mthatha Central and Madeira SAPS and 11 crime scene investigators of Mthatha LCRC. All 24 respondents answered Question three.



Compared with the literature discussed above, the answers provided by most respondents indicated that they do not fully understand what is meant by the crime scene concept, as they fail to mention that it is also a place with evidence that can assist in solving the crime in question. These are some of the respondents' answers:

- Respondent number one commented, "*incident that has happened*".
- Respondent number 15 wrote, "it is a place/location whereby crime has been committed".
- Respondent number 20 agreed with the literature, as he commented that a "crime scene is any location that may be used or associated with a committed crime or the place where an offence has been committed and forensic evidence may be gathered".

The overall responses can be summarised as follows (Annexure: A):

- Sixteen respondents wrote that it refers to a place where a crime was committed, or the alleged offence occurred.
- Four respondents noted that a crime scene is where a crime was committed and where physical evidence, exhibits, or information about the incident can be found. These respondents provided a proper response, as their definition can be noticed in the literature above. For example, Huffman and Wallace (2012:51) wrote that a crime scene is where an illegal act has occurred, where physical evidence of the action can be recovered.
- Four respondents wrote that a crime scene can be any location that might be associated with a committed crime or a place where an offence has been committed and forensic evidence can be gathered.

### **2.3.1 Primary crime scene**

Different authors have described a crime scene as an area where an illegal act occurred. According to Aggrawal (2011:153), in some cases, there will be only one crime scene and, in some incidents, there might be multiple crime scenes.

Aggrawal (2011:153) further highlighted that in instances where there are multiple crime scenes, the first area where the incident started is referred to as the primary scene. LeMay (2011:1) share the same views as Aggrawal (2011:153), stating that in many cases, a primary scene exists where the incident occurred and numerous other locations exist that contain evidence. Therefore, in murder cases or incidents, BSA can be conducted at the primary crime scene and other locations.

Petherick (2015:44) presented a different view, proposing that in a murder incident, the location where a body is found is the primary crime scene. Furthermore, the author stated that using these words does not imply that it is where the original event occurred. Baxter (2015:39) proposed that in the absence of the deceased body, the primary crime scene might be where the crime occurred. LeMay (2011:1) stated that a primary crime scene is where the crime occurred. However, Dutelle (2017:12) holds a different opinion, writing that crime scene investigators should consider the first scene where evidence is located as the primary scene, even if it is not the most significant. However, Turvey (2012:291) wrote that the primary scene is where the offender engaged in most of his or her principal offence behaviour. It could also be where the most physical evidence was deposited during the offence. Lastly, several authors hold various views in describing a primary scene. Ballard (2010a:7) described a primary crime scene as one where a crime has occurred.

### **2.3.2 Secondary crime scene**

According to Ballard (2010a:7), a secondary crime scene is where a suspect has been either before or after the crime was committed. Dutelle (2017:12) and LeMay (2011:1) emphasised that where the initial incident occurred is the primary scene and any subsequent locations are secondary scenes. Aggrawal (2011:153) wrote that some experts refer to the first scene (where the murder occurred) as the primary crime scene and the second (where the body was disposed of) as the secondary crime scene. According to others, the primary scene is where the body was found and where the police officers were called to respond.

Bertino and Bertino (2016:25) highlighted that a distinction might be made between primary and secondary crime scenes and priorities assigned regarding the examination. The location of a crime is the primary scene and, if movement to a new location occurs, the latter is considered a secondary crime scene (Bertino & Bertino, 2016:25). Furthermore, the demarcation of crime scenes can also be decided by the amount of evidence or interaction they contain (Petherick, 2015:44). Based on this opinion, Petherick (2015:44) mentioned that a secondary crime scene is where some of the victim-offender interaction occurred, but not the majority. Turvey (2012:291) referred to a secondary crime scene as a place where some of the victim-offender interaction occurred, but not the majority. The author highlighted that a secondary crime scene does not involve principal offence behaviour, but supporting behaviour.

## **2.4 CRIME SCENE INVESTIGATION**

Harris and Lee (2019:57) proposed that CSI is most critical and challenging in forensic investigation. It requires a combination of scientific knowledge, logical reasoning, systematic approach, and investigative experience (Harris & Lee, 2019:57). Moreover, Fish et al (2014:27) noted that CSIs remain the primary means of establishing linkages between a victim and suspect or the suspect and the crime scene, and it is a valuable component of the criminal justice system (Fish et al, 2014:27). According to Dutelle (2017:4), CSI is associated with investigating a criminal event. A systematic process of searching, documenting, collecting, preserving, and interpreting physical evidence associated with an alleged crime scene to determine the truth regarding the incident in question (Dutelle, 2017:4).

Miller and Massey (2019:7) submitted that the foundation of all CSIs is the investigator's ability to recognise the potential and importance of physical evidence, large and small, at the crime scene. Proper CSIs are the starting point for establishing what happened and who did it. Miller and Massey (2019:7) further commented that, contrary to how it is portrayed in the media, CSI is not glamorous or accomplished easily or lackadaisically. It is a scientifically organised, methodical, systematic, and logical process.

The subsequent identification of the physical evidence along with determining its source or origin is the next step in the investigation. Considering the legal requirements in any criminal investigation and for the correct analysis of the evidence by crime laboratories, careful processing, documentation, and collection of physical evidence are integral parts of the investigation process and CSIs (Miller & Massey, 2019:7).

Houck et al (2018:47) emphasised that CSI must be free from outside influences but must work with stakeholders from other disciplines with different work practices, needs, and expectations. Also, to law enforcement, quality CSI means that crime scene investigators find evidence that, when analysed, helps the police apprehend the true perpetrators. Furthermore, Maloney, Housman and Gardner (2014:5) maintained that CSI is searching for evidence and properly documenting, preserving, and collecting this evidence. The researcher is of the view that crime scene investigation is the process of collecting and preserving evidence in the crime scene, by relevant role players, that will assist in linking the perpetrator with the incident being investigated.

#### **2.4.1 Objectives of CSI**

According to Bertino and Bertino (2016:2), solving the crime depends on piecing together the evidence to form a picture of what happened at the crime scene. The goal of CSI is to recognise, document, photograph, and collect evidence at the crime scene (Bertino & Bertino, 2016:2). Gardner (2012:1) referred to the goal of crime scene processing as collecting evidence and scene context in as pristine condition as possible. Dutelle (2017:6) confirmed that various personnel could be involved in crime scene processing, but their objectives remain the same, and they should:

- Determine whether a crime has been committed. It can be determined that no crime occurred, or if the issue is one for the civil courts, law enforcement personnel have no responsibility.
- If a crime has been committed, determine whether it was committed within the investigator's jurisdiction.
- Discover and document all facts regarding the complainant in question.

- Identify and eliminate suspect/s because of collected physical and testimonial evidence.
- Locate and apprehend the perpetrator.
- Throughout the process, maintain a proper chain of custody to ensure that collected evidence is admissible in court.
- Effectively testify as a witness to the collected evidence within the court.

According to Bertino (2012:22), Shaler (2012:5) and Fish, Miller and Braswell (2011:55), the focus of CSIs is to reconstruct the incidents, ascertain the sequence of events, determine the operation method (modus operandi), disclose the motive, uncover what property was stolen and from where, determine what the perpetrator might have done before, during, and after the incident, and lastly identify, document, collect, and preserve physical evidence of the crime.

#### **2.4.2 CSI process**

According to Maloney et al (2014:11), processing of a crime scene requires certain roles to be filled and tasks to be accomplished no matter what the size and complexity of the scene. The source further indicated that it should be ensured that the order of crime scene processing is meticulously maintained by all crime scene investigators. Lochner and Zinn (2015:40) and Maloney et al (2014:12), highlighted the following basic principles of crime scene investigation:

##### **2.4.2.1 Recognition or observation of evidence**

Lochner and Zinn (2015:41), submit that as soon as the crime scene investigator arrives at a crime scene, he/she should begin looking for physical evidence. That is the evidence related to the crime that has been committed. Similarly, Houck, Crispino and McAdam (2018:100) emphasises that before a crime scene investigator begin any systematic search for physical evidence, he/she must first be able to recognise the evidence.

#### 2.4.2.2 Recording or documenting the scene

Sutton and Trueman (2013:np) highlighted that scene documentation and recording is the initial stage in crime scene work. And photographic, video recordings, and sketch plans are made noting the precise location of evidence items. Similarly, Lochner and Zinn (2015:43) believes that by accurately recording the physical evidence found at the crime scene, the crime scene investigator can ensure that such evidence is reliable and can thus present it successfully in court. Also, that evidence is generally recorded as photographs, videograph, sketches (plans) and written notes.

#### 2.4.2.3 Searching the crime scene

Lushbaugh and Weston (2016:40) mention that the main purpose of a search is to look for evidence of what happened when the crime was committed. Also, as the crime scene investigator surveys the scene preparatory to searching, he/she develops some concepts of the type and nature of evidence that should be the objective of the crime scene search. According to Palmiotto (2013:99), the purpose of visiting and searching a crime scene is to locate, collect and preserve physical evidence for the purpose of solving a crime and securing a conviction in court.

#### 2.4.2.4. Collecting evidence

The collection of evidence at a crime scene has always involved significant operational and legal considerations (Lyman, 2011:90). The source further note that crime scene investigators must collect, and ensure to preserve the chain of possession or custody of all evidence collected. Lyle (2012:189) states that the forensically important biological substances found at a crime scene are the following – blood, semen, urine, faeces, vomit, hair, fingerprint residue and sloughed off cells.

#### 2.4.2.5 Process and preserve evidence

According to Baxter (2015:9), once the evidence has been identified and properly collected, there is further processing that must occur.

That processing may include additional photographs of the evidence and processing the scene for other evidence such as fingerprints and other trace evidence. In addition, DuPre (2013:8) added that the CSI process should include re-evaluating scene boundaries, starting the crime scene log, observing the scene, documenting the findings, and narrate basic requirements. Moreover, Petherick (2015:54) and Li (2015:3) stated that the CSI process should begin with an initial assessment of the scene, which is done before the arrival at the actual crime scene. Upon arrival at the crime scene, the investigating officer should:

- Do another assessment,
- Ensure scene security,
- Do a general survey,
- Detect and preserve evidence,
- Collect evidence, and
- Interpret and reconstruct the scene.

### **2.4.3 Responsibility of CSI**

Baxter (2015:3) states that CSI is not a single investigator's responsibility, but a team effort. The team approach allows each member to use their area of expertise towards a common goal of solving that specific crime or incident. The CSI team comprises the following people:

- Initial responding officers are responsible for bringing a chaotic, uncontrolled scene under control, and their actions are critical in the overall investigation;
- The crime scene investigator must document the scene (photographs, note-taking, and sketches), identify the evidence, properly process and collect the evidence, properly process (at the scene) and submit evidence (for example, in a lab), and prepare written reports and additional materials;
- The detective is the overall manager of the case and is responsible for the entire investigation. They should be present during the processing of the scene to relay information back and forth between interviewing detectives and other role players;

- Analysts perform some analyses on the evidence (i.e., DNA, firearm examination, etc.); and
- A crime scene analyst or reconstructionist should reconstruct events and attempt to answer additional investigative questions.

Dutelle (2014:7) proposed that all CSI role players should support one another, as none can stand alone or is more important than the other. Dutelle (2014:7) mentioned five basic components of investigation, namely, a first responder, detective/investigator, crime scene investigator or technician, criminalistics/forensic scientist, and the court. Furthermore, Fish et al (2014:2) implied that the type of physical or biological evidence at the crime scene and examinations that must be performed will determine several scientists and technicians that should be involved in the analysis of that evidence. The source further elaborates that a crime scene investigator is critical in the collaborative team, including the lead detective, the medical examiner, the prosecutor's office, and forensic scientists at the crime laboratory (Fish et al, 2014:2).

Shaler (2012:5) proposed that the following people should be activated to investigate a crime scene, especially murder incidents:

- Experienced police/scene investigator/detective leading the forensic unit, where the forensic unit is defined as a crime scene investigative team.
- A criminalist with a strong scientific background and scene investigative experience.
- A forensic scientist working in a trace/serology unit in a crime laboratory who was assigned to the investigation.

During the surveys, police detectives from Mthatha Central and Madeira SAPSs and crime scene investigators from the Mthatha LCRC were asked to provide their understanding about the responsibility of CSI within the SAPS. That was question four of the questionnaire testing hypothesis one. Thirteen respondents from police detectives and 11 crime scene investigators from the Mthatha LCRC answered this question.



Most respondents provided limited (one each) responses, compared to the literature above mentioning several role players in CSI's. The majority of police detectives from Mthatha Central and Madeira SAPSs referred to the investigator, whereas Mthatha LCRC crime scene investigators referred to LCRC members as having the responsibility of investigating crime scenes.

These are some of the answers from respondents.

- Respondent number three (detective) wrote, "crime scene investigator or I/O who was attended the crime scene".
- Respondent number nine (detective) commented, "*the investigator*".
- Respondent number 19 (LCRC) noted, "crime scene investigation personnel or known as LCRC personnel".

The overall responses can be summarised as follows (Annexure: A).

- Eight respondents noted that an investigator is responsible for CSI.
- Three wrote that LCRC personnel are responsible for CSI.
- Seven commented that detectives, LCRC members, and any other trained police official are responsible.
- Six wrote that first responders and investigating officers are responsible for CSI.

#### **2.4.4 Role of LCRC crime scene investigators at the murder scene**

The SAPS NI 1 prescribes that the LCRC in the area where an incident occurred, must provide a crime scene supervisor and examiner, also referred to as crime scene investigator (SAPS, 2015:14). Suboch (2016:1) refers to crime scene investigators as experts in one or more forensic disciplines, such as DNA analysis, BSA, toxicology, chemistry, and impression evidence, such as footwear, tyre, tool marks, and fingerprint technology. Ballard (2010:7) described crime scene investigators as special officers who examine the incident site carefully and collect evidence.

Similarly, Chisum and Turvey (2011:151) claimed that, in many jurisdictions, specially designated law enforcement evidence technicians (crime scene investigators) are tasked with crime scene processing duties. Baxter (2015:8) highlighted that this team member is also called crime scene investigator, crime scene technician, evidence technician, and forensics. The role of a crime scene investigator in a murder scene includes the following (Baxter, 2015:8).

#### 1. Documenting the scene

Law enforcement agencies use more specialised positions to document specific aspects of the scene. They include scene photography, someone to sketch the scene, someone to document the bloodstains, and someone to document a shooting scene (Baxter, 2015:8) and (Fisher & Fisher, 2012:58).

#### 2. Identify the evidence

Crime scene investigators must identify and properly collect the evidence. This is the most important of all duties a crime scene investigator can undertake (Baxter, 2015:8).

#### 3. Properly process and collect the evidence

Once the scene has been properly documented and processed and all potential evidence has been collected, the crime scene investigator must properly process the evidence (Baxter, 2015:8). The author also elaborated that this is where the chain of custody of the evidence begins.

#### 4. Properly process and submit the evidence

According to Baxter (2015:9), once the evidence has been identified and properly packaged and transported to the lab, further processing must occur. That might also include additional photographs of the evidence and processing for other trace evidence.

#### 5. Prepare written reports and additional supporting materials

The investigator prepares a written report once all the evidence has been properly processed and submitted (Baxter, 2015:9).

Furthermore, Suboch (2016:1) and Fisher and Fisher (2012:58) partly concurred with Baxter (2015:8), emphasising that the role of a crime scene investigator includes thorough documentation of the characteristics and specifics of the scene via notes, photography, and sketching the scene, including physical evidence, and marking, measuring, collecting, and preserving evidence. Casting shoe and tyre tracks and BSA provide information about the events that led to the bloodshed (Suboch, 2016:1).

#### **2.4.5 SAPS NI 1/2015 and expert role in crime scenes**

The SAPS National Instruction (NI) was designed to regulate CSM to ensure that crime scenes are properly controlled, managed, documented, and investigated and that the integrity of items with potential evidential value is maintained. Furthermore, the principles of CSM and the various phases of managing a crime scene, as set out in this NI, should be applied to any type of crime scene. A responsibility to ensure that crime scenes are managed by following this NI is given to the Provincial Commissioner, Cluster and Station commander, Divisional Commissioner of Forensic Services, and Divisional Commissioner of Supply Chain Management (SAPS, 2015:2).

The SAPS NI 1 of 2015 highlights the following phases in dealing with a crime scene: reporting, activation, responding, controlling, handing over, planning, investigating, processing, debriefing, restoring, releasing, and evaluation phases (SAPS, 2015:7). Furthermore, the role of the expert at the crime scene is to:

- Ensure that the crime scene is photographed or recorded to provide a visual representation of the scene;
- Ensure that the scene is photographed or recorded in the condition found and before it is altered in any way. All physical evidence must be recorded in its original position. The condition of the scene must be recorded after concluding the process;
- Ensure that all presumptive and confirmatory body fluid tests are conducted;
- Determine the evidential value of exhibited material for collection;
- Ensure that all evidence collected has been logged and managed according to the directives for collecting and packaging exhibits;

- Determine the evidence numbering; and
- Ensure continuity of possession (chain of evidence) and integrity of the evidence (SAPS, 2015:16).

Most respondents demonstrated a lack of knowledge regarding expert roles at crime scenes specified in the SAPS NI 1/2015. During the empirical research, respondents were asked about their knowledge of the NI 1/2015 regarding expert roles at crime scenes. This was question five of the survey questionnaire, testing hypothesis number one. Of 24 respondents who returned the questionnaires, 25% of the respondents did not answer, and 37% indicated that they do not know the answer to the question (Annexure A). Thirty-eight per cent wrote responses that were different to the abovementioned roles of the expert at crime scenes (SAPS, 2015:16).

These are some answers from respondents.

- Respondent number five wrote, “*no knowledge*”.
- Respondent nine wrote, “*N/A*”.
- Respondent number eleven noted, “I have no knowledge of National Instruction 2/2015”.
- Respondent number 23 commented, “fingerprint expert look for identification of fingerprints in point of entry where suspect handled”.

The overall summary of the responses in the empirical study is as follows (Annexure: A).

- Nine respondents responded with either unknown, none, no knowledge, do not know, or N/A.
- Six respondents did not answer the question; they left a space.
- Respondents 18 and 19 wrote that it guides how a member of the LCRC should behave when dealing with a crime scene.
- Respondent 13 interestingly wrote that this SAPS NI is about how to manage, control, and investigate a crime scene with integrity.

## 2.5 CRIME SCENE MANAGEMENT

Fish, Stout and Wallace (2010:185) proposed that each member in charge of a specific crime scene should follow the CSM process every time. This process includes documenting the original appearance of the scene and evidence and limiting the alteration to the crime scene, evidence contamination/cross-contamination, or destruction. According to Maloney et al (2014:11), the CSM process is based on arrival and initial organisation of role players or resources, investigative plan/scene strategy, scene considerations, investigative direction, scene processing, command function, scene completion, and post scene activities.

According to the SAPS NI 1 (SAPS, 2015:3), CSM means the process of planning and implementation of measures to

- take control and secure the crime scene,
- ensure the integrity, preservation, and the originality of evidence and exhibits,
- investigate and process the crime scene thoroughly without the crime scene being altered or contaminated,
- coordinate and optimise the collection of exhibits,
- use the investigation support resources optimally,
- record facts and events properly, and
- ensure that the crime scene remains under police investigation.

Graves (2014:385) emphasised the significance of cautiously approaching a crime scene.

The source further author identified and explained the following phases to CSM:

- Crime scene preservation: secure the scene and detain any witnesses and suspect/s if present. If any physical violence has occurred, tend to any injured people.
- Crime scene survey: refrain from doing anything that might spoil evidence. Avoid contaminating the scene and take note of all people on the scene at the time of arrival. Identify anything that is evidentiary and secure it.

- Crime scene documentation: photograph and, if possible, make a video survey of the scene. All things or any materials that are collected as evidence must be carefully documented.
- Crime scene search: investigators should look for additional evidence that might be concealed. Several types of searching a crime scene can be applied.
- CSR: this phase might not be necessary for anything but an actual crime scene. However, it is common for forensic teams to analyse the location and position of various items at the scene. According to Miller (2014:167), CSR is the process of determining or eliminating events and actions that occurred at the crime scene by analysing any crime scene patterns. This concept will be discussed in detail in Chapter Three.

## **2.6 CRIMINAL INVESTIGATIONS**

Dutelle and Becker (2019:3) alluded that we live in a world where the term criminal investigation is thrown around quite freely. News shows, internet feeds, blogs, and, for those who still read them, magazines and newspapers, are frequent users of the term (Dutelle & Becker, 2019:3). This often used term relates to the process associated with investigating a criminal event. This criminal investigation discussion was aimed at approving or disapproving hypothesis number two. Stelfox (2013:1) stated that criminal investigation is one of the key functions of the police service.

The author stated that it contributes to achieving several objectives at each policing level, from investigating anti-social behaviour in neighbourhoods to international counter-terrorism operations (Stelfox, 2013:1). According to Hess, Hess-Orthmann and Cho (2017:8), a criminal investigation is a reconstructive process using deductive reasoning, a logical process in which a conclusion follows from specific facts. It is a process of discovering, collecting, preparing, identifying, and presenting evidence to determine what happened and who is responsible for the wrongdoing (Hess et al, 2017:8). Brandl (2019:10) referred to a criminal investigation as the process of collecting crime-related information to reach certain goals.

According to Reilly (2019:2), a criminal investigation is a multifaceted effort involving studying facts presented by a criminal act or pattern of criminal conduct. These facts could be used to identify, locate, and prove the guilt or innocence of a person or persons. Birzer and Roberson (2012:28) noted that criminal investigation involves the process of determining whether a crime has occurred, collecting evidence to identify suspects, recovering property, and document findings clearly and concisely for presentation to the prosecutor and use in the criminal justice system.

Furthermore, respondents were asked about their understanding of criminal investigation. That was question one of the survey questionnaire, testing hypothesis two. All 24 respondents who returned the questionnaire answered the question (13 police detectives from Mthatha Central and Madeira SAPS and 11 crime scene investigators from Mthatha LCRC). The ideal target of respondents to participate in the study was 30, with six failing to return the questionnaire. The researcher's telephonic follow-up in acquiring about the six outstanding questionnaires was unsuccessful, with respondents having different stories about their failure in returning them. In answering the questionnaire, most respondents demonstrated their knowledge of a criminal investigation, as their answers were not that different from the literature above.

These are some answers from respondents.

- Respondent number two commented, it "is to investigate alleged crime which has been committed".
- Respondent eight wrote, "investigate criminal activities alleged committed crimes".
- Respondent 13 commented, "it is a process of searching for the truth regarding an unlawful act or criminal activity"; and
- Respondent number 20 indicated, "it is a science that involves evidence collection, preservation of facts about crime scene using various methods for the purpose of presenting that evidence in the court of law".

The overall summary of the responses in this question is as follows (Annexure: A).

- Thirteen respondents described criminal investigation as investigating an alleged crime that has been committed.
- Ten respondents noted that criminal investigation involves gathering or collecting physical evidence, interviewing witnesses, interrogating suspects, and searching for information to present in court. They correspond with the definition furnished by Hess et al (2017:8) and Brandl (2019:10).
- One respondent referred to criminal investigation as solving an illegal activity that depicts the wrongness and righteousness the public has with the government, conducted by the police.

### **2.6.1 Objectives of criminal investigation**

The concepts of criminal investigation were discussed in length above and, therefore, it is necessary to dwell on the objectives of criminal investigation. Hess et al (2017:10) remarked that the goal of criminal investigation would be to solve cases, to discover the truth. However, the goals of criminal investigation are not so simple. Investigators must first determine whether a crime has, in fact, been committed and, if it has, systematically seek evidence to identify the individual who committed the crime, locate the individual, and obtain sufficient evidence to prove in court that the suspect is guilty beyond a reasonable doubt (Hess et al, 2017:10).

Lyman (2011:15) wrote, “because of the changing nature of criminal activity and the role of the investigator, the objectives of the criminal investigation may be more complex than people imagine”. Hess et al (2017:11) noted the following objectives of criminal investigation:

- Determine whether a crime has been committed.
- Legally obtain information and evidence to identify the responsible person.
- Locate and arrest the suspect.
- Recover stolen property.
- Present the best possible case to the prosecutor.



- Convict the defendant.

According to Oliver (2017:309), the objectives of criminal investigation are often oversimplified as being to solve crimes. While that might be the immediate goal of detectives, the overarching goals for the police department as part of its societal role are to control criminals, pursue justice, and address problems (Oliver, 2017:309). Respondents were asked about their knowledge of the objectives of criminal investigations. That was question two of the survey questionnaire, testing hypothesis two. Thirteen police detectives of Mthatha Central and Madeira SAPS and 10 crime scene investigators of Mthatha LCRC answered this question. One Mthatha LCRC crime scene investigator did not answer the question.

Most respondents provided only one objective of criminal investigation, whereas the literature above indicated more. Only seven respondents showed an understanding of the objectives of criminal investigation, even though they did not mention them all, as furnished by Hess et al (2017:11) and Lyman (2011:15). For example, they all ignored critical objectives, namely, legally obtaining information and evidence to identify the responsible person and convicting the defendant.

These are some answers from respondents.

- Respondent five wrote, “to bring perpetrator to justice”.
- Respondent 12 commented, “to investigate and solve crimes. To bring perpetrators to justice”.
- Respondent 18 opined, “it is to bring or to afford the victims justice and relief”.
- Respondent number 23 noted, “who committed the crime? Insufficient evidence, witnesses especially eye witness”.

The overall responses are summarised as follows (Annexure: A).

- Thirteen respondents wrote that the objectives of criminal investigations are to bring perpetrators or suspects to justice or before the court of law.

- Seven respondents noted recovering, collecting evidence, documenting, interrogating, and preserving evidence.
- One respondent did not answer the question.
- Respondent 21 wrote that it is to find the truth about criminal conduct committed.
- One respondent wrote, “Section 35 of the constitution: Police investigate crime, uphold, enforce the law”.

## **2.7 SUMMARY**

In this chapter, two critical aspects contributing to solving most criminal incidents were discussed, crime scene and criminal investigation. CSI has been highlighted as a first and critical step of any criminal investigation (Miller & Missey, 2019:7). Therefore, the two aspects are related as they are critical in solving criminal activity. From the theoretical information, Locard’s exchange principle forms the background of CSI and two crime scenes were identified, primary and secondary scenes. Primary scenes have been described as an initial place where the incident occurred and secondary scenes as any place where there might be evidence linked to the primary scene.

The objectives of crime scene and criminal investigation were discussed that demonstrated the same goals. Furthermore, CSI responsibilities, the role of LCRC, and the entire process was discussed. Also, feedback from survey questionnaires has also been covered in this chapter. Lastly, the SAPS NI guiding the procedure of CSI and the behaviour of those involved in CSI were discussed.

## **CHAPTER 3: BLOOD SPATTER ANALYSIS AND CRIME SCENE RECONSTRUCTION**

### **3.1 INTRODUCTION**

Blood is physical evidence typically found in most murder crime scenes. According to Madea (2014:127), in cases of violent crimes, blood traces might be present at the crime scene, which might offer valuable information for reconstructing the course of events leading to the violent death of an individual. Houck and Siegel (2015:250) wrote that one of the most explicit methods of forensic science that exemplifies its reconstructive nature is the analysis and interpretation of blood spatters. Brodbeck (2012:51) affirmed that blood spatter analysis (BSA) is used to shed light on various forensic matters, including reconstructing events. According to Choromanski (2020:3), one of the beneficial outcomes of a properly conducted blood spatter analysis is the ability to rule out certain possible scenarios presented to the investigators.

In this chapter, BSA and CSR are discussed. The focus is on hypothesis three: investigators in the Mthatha policing area does not consider the significance of BSA as a technique to reconstruct murder crime scenes. Describing a blood spatter is a starting point. Classifying blood spatter, documentation, and factors affecting the formation of blood spatter in crime scenes will follow. Furthermore, CSR and its purpose using BSA is discussed. Moreover, the SAPS standard operating procedure (SOP) on identifying and documenting BSA and CSR are explored. The summarised feedback of the respondents from the survey questionnaire will also be presented in this chapter. Lastly, describing the murder crime is probed, with unpacking criminal elements.

### **3.2 BLOOD SPATTER**

“Blood spatters are a form of pattern evidence” (Siegel, 2011:100). According to Wonder (2015:37), confusion was caused by earlier attempts to define blood spatter as resulting only from an impact to a blood source. These definitions limit the term spatter to impact or forceful projection-ignored drips, defined as not having force but resulting in patterns comprising spots of the same size and shape as those resulting from the impact.

Therefore, because there is considerable overlap in size and shape for different dynamic acts, the term blood spatter is typically immediately applied to any spots seen. Defining blood spatter as any spot of blood followed by analysis to define the dynamic act that distributed the blood drop, is more reliable (Wonder, 2015:37). Attinger, Liu, Bybee and De Brabanter (2018:649) referred to blood spatter as a subset of bloodstain patterns, with stains generated by drops gone airborne before hitting the surface of a solid object called the target. Shen, Brostow, and Cipolla (2015:1) stated that blood spatters are formed or created when blood passively falls due to force being applied to a body. Moreover, Li (2015:35) proposed that blood spatters are formed by a complex event influenced by viscosity, surface tension, cohesion force, and gravity. During the formation, blood leaks or exits the source, and the surface tension causes it to hang from the opening of a blood source and form a pendant drop (Li, 2015:35).

According to Rivers and Dahlem (2014:238), when blood from inflicted wound struck a surface a distinct blood spatter will result. And the blood spatters resulting from violent crimes are interpretable, which in turn provide insights into the events of a violent act that allow reconstruction of the crime scene. Nordby (2013:624) described blood spatter as blood dispersed because of force applied to a source of blood, and patterns produced are often characteristic of the nature of the forces that created them. Houck and Siegel (2015:251) indicated that spatter is a technical term in BSA that describes a stain that results from blood hitting a target.

### **3.2.1 Classifying blood spatter**

The primary aspect of blood spatter analysis is to classify the various blood spatters (Gardner, 2012:339). According to Fish, Miller, Braswell, & Wallace (2014:166), historically, blood spatter could be classified based on the correlation between the velocity of the impact and the size of the spatter. Thus, blood spatter could be classified only after factors has been established that will determine the type of activity that would have created the spatter. It is classified as follows:

- Low-velocity spatter results when blood travels at about five feet per second.

A good example of low-velocity spatter is blood passively dripping into blood, such as a wound from an arm dripping into a pool of blood on the floor. The size of this type of blood spatter averages about 3 mm or more in diameter.

- Medium-velocity spatter forms smaller spatters and is produced when the velocity of the force is between 5 and 25 feet per second.
- High-velocity spatter occurs when the velocity of the force is above 100 feet per second and is generated by, for example, a gunshot, explosion, power tool, or automobile accident . Also, it is a mist-like spatter and less than 1 mm in size .

However, Gardner (2012:340) proposed that using the taxonomy concept, blood spatter can be grouped into spatter and non-spatter classes. Furthermore, the source noted that the spatter group is divided into linear spatters which are described as a series of related spatter stains dispersed over a surface linearly, with an evident interrelationship in shape, or impact angles, with an evident interrelationship of directional angles. And nonlinear spatters described as a series of related spatter stains dispersed over a surface other than linearly, with an evident interrelationship in the shape or impact angles. Moreover, linear spatters are divided into spurts, cast-off, and drip trails, whereas nonlinear spatters include impact spatter, expectorate, and drips (Walton, 2014:275).

### **3.2.1.1 Linear spatters**

Different linear spatters are discussed below.

#### **1. Spurt**

According to O'Block (2016:153), when blood leaves the body under extreme pressure, it creates a spurt or gush pattern on the surface it hits. And the spurt normally results from a damaged artery, whereby the pressure exerted on the blood forces it to leave the body under the same high pressure it exerts in the closed circulatory system. Taupin and Cwiklik (2011:81) proposed that arterial spurts will arise if the artery is not covered by clothing. They result when an artery is cut or severed and repeated spurts might cause a characteristic pattern corresponding to the diastolic and systolic pressure in the heart.

## 2. Cast-off spatter

Cast-off spatters are bloodstains that are results of blood being flung or projected from a bloody object in motion or one that stops suddenly (Houck & Siegel, 2015:252). Similarly, Nordby (2013:623) opined that they are created when blood is released or thrown from a blood-bearing object in motion.

## 3. Drip trail spatter

Walton (2014:275) described drip trail spatter as a pattern of individual spatters deposited on a surface, demonstrating the movement of the item from one point to another. In addition, White (2016:199) and Li (2015:44), believes that a trail of dripped bloodstains will inevitably develop if a bleeding person or an object sufficiently stained with blood moves. And drip trail spatters can be of particular interest if they lead away from a crime scene and if they persist they indicate that an individual (eg perpetrator) had been injured.

### **3.2.1.2 Nonlinear spatter**

The different nonlinear spatter is discussed as follows.

#### 1. Impact spatter

According to Taupin and Cwiklik (2011:79), an impact spatter is caused by an object directly striking a blood source. The resultant stain ranges from 0.01 mm to 3/4 mm in diameter. Furthermore, Walton (2014:275) and Dutelle (2022:187) agreed that an impact spatter is a radiating pattern of small individual drops or spatter stains created when a blood mass is broken up at a point source. The most common impact spatters are produced or created from blows or gunshot wounds, or other force that results in the random distribution of smaller drops of blood.

#### 2. Expectorate spatter

Expectorate spatter results when blood is blown or forced out of the nose, mouth, or a wound because of air pressure or airflow that is the propelling force (Nordby, 2013:623; Walton, 2014:275).

### 3. Drip

Siegel (2011:100) indicated that a drip spatters result from blood dripping from an object into the floor or another surface. Moreover, Dutelle (2022:183) insists that a drip spatter results from a falling drop that formed due to gravity. And the drip spatter may be solitary, or it may form a drip trail spatter. Furthermore, Barbaro (2018:42) wrote that when a passively dripping blood source does not move, and blood drips into itself, it creates a discernable drip spatter.

#### **3.2.2 Factors affecting the formation of blood spatter in murder scenes**

Prahlow (2010:29) noted that BSA encompasses evaluating blood drops at a crime scene. The source elaborated that based on the size, shape, character, density, and location of blood spatter, forensic scientists can determine causes or scenarios responsible for creating the spatter. The specific features that can be determined include the direction of travel, relative velocity, and the angle of impact of the blood droplets (Prahlow, 2010:29). According to White (2016:195), if a blood spatter shows diagnostic features, a trained observer should assign that bloodstaining to one of the main spatters, non-spatter, or composite groups.

According to Ramirez and Parish-Fisher (2012:158), the surface texture on which blood spatter lands and the type of blood spatter is the single most limiting factor related to BSA. For example, with the variables of blood drop volume, the distance fallen, and force applied to a blood source, blood landing on a hard, smooth, nonporous surface would look different from one landing on a rough, nonporous surface (Ramirez & Parish-Fisher, 2012:158). The source further indicated that blood spatter on the smooth surface would be circular, whereas the spatter on a rough surface would appear distorted and irregularly shaped. Harris and Lee (2019:85) noted that because of its make-up, viscosity, density, and other physical properties, blood forms predictable patterns when it falls or is projected through air and impacts a target surface.

Furthermore, White (2016:197) proposed that if a drop of blood in free fall is considered in more detail, three variables affect the resulting size and shape of the blood spatter formed when it lands onto a target surface. These variables are as follows:

- The volume of the individual drop. If the drop height and target surface remain constant; the resulting spatter size will increase with increasing volume.
- The distance the drop has fallen. If the drop volume and target surface remain constant, the resulting spatter size will increase with increasing drop height until the free-falling drop reaches terminal velocity. Terminal velocity is described as the point at which the effect of drag is equal to the force imposed on a falling body by gravity; in other words, the blood droplet is no longer accelerating towards the target.
- The target surface. If drop height and volume remain constant, larger spatters will form on non-absorbent surfaces, as the entire volume of the drop can spread unimpeded across the surface. Absorbent surfaces absorb a proportion of the blood and smaller spatters are produced (White, 2016:197).

### **3.3 BLOOD SPATTER ANALYSIS**

BSA is an application of scientific knowledge to the examination and interpretation of the morphology, sequence, and distribution of bloodstains associated with a crime (Li, 2015:35). The author further noted that this analysis determines the sequence of events, approximate blood source locations, the positioning of the victim, and the position, intensity, and the number of impacts applied to the blood source. Joris, Develter, Jenar, Suetens, Vandermeulen, Van der Voorde and Claes (2015:116) referred to BSA as a subspeciality of forensic sciences, dealing with analysing and interpreting bloodstain patterns in crime scenes. De Bruin, Stoel and Limborgh (2011:1476) described BSA as an effective approach for reconstructing events at a crime scene.

Furthermore, Nordby (2013:617) stated that BSA involves the scientific study of static consequences resulting from dynamic blood-shedding events. A detailed study of blood spatter at crime scenes develops invaluable evidence. Ballard (2010b:21) noted that BSA is a detailed process providing vital information about circumstances that led to a bloodied crime scene. Girard (2011:45) described BSA as interpreting bloodstain patterns to provide vital information about what happened at a crime scene. The size, shape, and pattern formed by bloodstains found at crime scenes can be used to reconstruct events.



According to Brodbeck (2012:51), BSA is a forensic discipline dealing with the physics of the blood and assesses bloodstains left at crime scenes using visual pattern recognition. It sheds light on various forensic matters, including reconstructing events, differential diagnosis of homicide/suicide/murder, and identifying areas with a high likelihood of offender movements for taking DNA samples. White (2016:191) noted that BSA is a discipline within forensic science examining and identifying blood spatter and interpreting and evaluating them to establish the activities that might have caused them. It can be powerfully applied within the context of CSR. Houck and Siegel (2011:244) and Birzer and Roberson (2012:122) agreed that BSA is accomplished or involves considering factors, such as the number of spatters dispersed, shape, size, volume, location, and surface textures.

Investigators of Mthatha Central and Madeira SAPS and crime scene investigators of Mthatha LCRC were asked how often they see BSA being done in murder crime scenes. That was question ten to approve or disapprove hypothesis three. Twenty-four out of 30 targeted respondents answered the questionnaire, specifically this question. Most respondents indicated that they never saw BSA being done in murder crime scenes (Annexure A). Moreover, other respondents claimed they have seen BSA done in certain murder crime scenes.

These are some answers from respondents.

- Respondent number three wrote, "*none*".
- Respondent number ten wrote, "*not at all*".
- Respondent four noted, "it is indeed rare, because, one SAPS does not have many analysts on blood spatter, secondly it is rare that these experts are used because not everybody understands them".
- Respondent 16 commented, "not always in all cases it depends who is the person it's all about the status because if it is a poor man/woman who is from a poor background then the state doesn't care that much but if it is a rich family they attend that".

The overall responses (Annexure A) are be summarised as follows.

- Ten respondents answered with none, not at all, or never.
- Eight respondents provided answers, such as very seldom, not often, or few occasions.
- One respondent answered with an unknown response.
- Two respondents indicated that it is rare to see BSA done in murder crime scenes.
- One respondent noted that he last saw BSA done once in a murder scene in 2008.
- Another respondent noted that it depends on the condition of the crime scene.
- One respondent claimed that BSA is only done when victims are well-known people.

### **3.3.1 Responsibility of BSA in murder crime scenes**

According to Baxter (2015:359), being an expert in BSA requires extensive training, conducting research, and experimenting. Rivers and Dahlem (2014:239) stated that understanding intimate details of the law of physics associated with blood in flight is required by an expert in BSA. Prahlow (2010:29) noted that persons performing BSA are from various backgrounds, including crime scene police officers. Furthermore, some of these persons are crime laboratory personnel with other responsibilities, such as trace evidence examiners. Baxter (2015:359) claimed that blood spatter analysts are restricted by their training and experience. Also, BSA is limited to the documentation of blood spatter at the crime scene (Baxter, 2015:359).

Furthermore, Shiri, Martin and Bird (2018:189) proposed that for over a century, forensic scientists have used BSA to reconstruct crime scenes. This evidence is used in court to provide missing details or challenge or support a witness's testimony. Franjic (2019:20) wrote that a trained forensic scientist interprets blood spatter and determines what did or did not happen. Simplistically, Comiskey, Yarin and Attinger (2018:2) cited that blood spatter experts accurately reconstruct crime scene events by understanding the formation of blood drops as an important prerequisite for predicting their trajectories because their initial size, quantity, and corresponding velocities influence trajectories.

In the survey questionnaire, respondents were asked about their understanding of the responsibility of doing BSA in murder crime scenes. That was question eight of the survey questionnaire to test hypothesis three. Of the respondents, 58% claimed that an expert is responsible for doing BSA in murder crime scenes, and 42% used different words or terms in answering this question.

These are some answers from respondents.

- Respondent number two wrote, “*expert*”.
- Respondent number ten noted, “*expert trained to do them*”.
- Respondent 19 commented, “blood spatter analyst that is trained”.
- Respondent 23 wrote, “it is a trained biology crime scene examiner”.

The results show that respondents do have an understanding of the responsibility of BSA in murder crime scenes. Their responses indicate that they share the same views as the literature discussed above. However, the researcher noticed that some respondents are confusing LCRC members who collect blood at crime scenes for DNA analysis at the FSL with BSA. The questions posed to the researcher by the respondents before distributing questionnaires indicated their confusion between BSA and collecting blood samples for DNA analysis. The summary (Annexure A) of responses are as follows:

- Fourteen respondents answered the question using the word expert.
- Three respondents referred to LCRC members as having the responsibility of BSA in murder crime scenes.
- Two respondents believe a trained member is responsible for BSA.
- Three respondents answered with blood spatter analyst.
- Two respondents referred to BSA as the responsibility of a crime scene examiner.

### **3.3.2 Documenting BSA**

The proper documentation of evidence is critical to successful evidence collection (Williams & Kahn, 2014:9).

The source further commented that in addition to documenting what was collected and how it was collected, it is also important to describe interventions that took place before collection began since intervention may be a source of contamination. James, Nordby and Bell (2014:88) highlighted that when documenting blood spatters, attention should be given to the following points:

- Accurately document the size, shape, and distribution of the individual stain and the overall patterns;
- Include measuring devices within the photographs;
- Use more than one mechanism for documentation (i.e. photographs, written reports or notes, sketches, video);
- If possible, collect articles of evidence that may contain significant or questionable blood spatters;
- Utilise overall, mid-range, and close-up photographs when documenting blood spatters; and
- Complete the documentation in such a manner as to allow a third party to utilise the photographs, notes, sketches and video to place the blood spatter and articles of evidence back in their original locations.

#### 3.3.2.1. Photography of blood spatter

According to Pasquali (2020:433), documenting a blood spatter can be accomplished by photographing the entire spatter in place and then moving in and document sections of the spatter at close range. And for appropriate photographing of blood spatters, a technique called sectoring should be used and it is explained as follows:

- Prior to documenting the blood spatter, place scales horizontally and vertically near the spatters showing its distance from immovable objects such as a wall and the floor;
- Using a tripod or other mounting device, document the blood spatter in its entirety;
- Separate the blood spatters into several sectors. The boundary can be marked using tape, markers, or string;
- Re-document the entire blood spatters to show the location of the sectors; and

- Move the camera closer to the blood spatter or zoom in, and document each sector individually. A smaller, more accurate scale should be placed in the photograph of each sector.

#### 3.3.2.2. Written reports or notes

Miller and Massey (2019:37) stated that the accurate crime scene reporting in the notes is essential in the successful completion of an investigation and case resolution from a relevancy and reliability viewpoint. Also, the written reports of the crime scene investigation is based in overall observations which includes a detailed description of the scene, and any items of physical evidence found there on. According to Ramirez and Parish-Fisher (2012:95), the mission of the crime scene investigator is to create notes and a report that are detailed, accurate, and understandable. Also, they should stay focused on the scene investigation, the evidence and the provable facts.

#### 3.3.2.3. Sketches of the scene

In addition to crime scene photographs, a scene sketch serves as the graphic documentation of the crime scenes (Pettler, 2016:268). And they are also very important to the reconstructive process because they help in hypothesis development and recreation of the crime scene. Equally important, Houck and Siegel (2015:31) argue that crime scene sketches may look crude at times, but they contain one very important element for reconstruction, which are numbers. And they complement photographs and vice versa.

#### 3.3.2.4. Collection

According to Fish et al (2014:163), in addition to the possible determination of the course and sequence of events, the reconstruction will allow the crime scene investigator to develop a plan for the collection of blood samples from the most logical sites after the scene has been documented. Also, careful analysis of the scene will result in accurate representative samples of blood being submitted to the crime scene laboratory for analysis.

Singh and Sharma (2022:410), stated that the collection of the liquid blood sample is done on disinfected cotton swab or white cloth; and dried blood stain can be collected by cutting the area with blood spatter, packed and transported to the laboratory.

### **3.3.3 SAPS bloodstain pattern identification and documentation SOP**

The SAPS bloodstain pattern identification and documentation SOP (SAPS, 2017:1) provide standard procedures for identifying and documenting bloodstains/spatters on crime scenes. This procedure applies to the crime scene examination environment where it is critical to identify and document different bloodstains/spatters on crime scenes for BSA and CSR. Furthermore, the SAPS bloodstain pattern identification and documentation SOP (SAPS, 2017:1) emphasises that crime scene examiners must ensure that all crime scenes are approached as per the criteria set out in this procedure, following the SAPS NI 1 of 2015. In documenting blood spatter, the analyst should always start at a specific predetermined point on the crime scene and work sequentially through the scene.

Furthermore, road mapping of the identified blood spatter must be done by measuring and plotting vertical and horizontal axes of the position on a crime scene. The analyst should also identify and document spatter and determine the impact area and must always work from the outside inward or from the bottom upward. The empirical research indicated a non-consideration of BSA. Some respondents confused BSA and collecting blood for DNA analysis in FSL. Respondents were asked how often they receive reports of BSA done in murder crime scenes.

This was question nine of the survey questionnaire, answered by all 24 respondents who returned the questionnaire to evaluate hypothesis three. Of the respondents, 54% indicated that they never received BSA reports conducted at murder crime scenes. These are some answers from respondents.

- Respondent number three wrote, “*none*”.
- Respondent number seven commented, “*receive it from lab*”.
- Respondent number eleven wrote, “*very seldom*”.

- Respondent number 23 commented, “within the 14 years of experience in SAPS I have seen and showed it once”.

Some respondents demonstrated confusion between BSA and collecting blood for DNA analysis. This was noticed by the researcher when he was distributing and observing the completion of the questionnaire. Some respondents referred to collecting blood using swabbing kits as BSA, 17% provided answers indicating confusion, and 25% provided answers that showed that BSA is not often done in murder crime scenes. The overall summary (Annexure A) of the responses is as follows.

- Thirteen respondents answered with words such as none, never, or not applicable.
- Four respondents answered with not often.
- Two respondents noted very seldom.
- One respondent commented that the report is always furnished by experts when they have attended to blood spatter because not all murders require the analysis.
- One respondent opined that the report is received from the lab.
- One respondent stated that after analysis, the report goes to the detective service or court.
- One respondent confusingly wrote statistics of a crime in your place.
- One respondent gave an unknown answer.

### **3.4 CRIME SCENE RECONSTRUCTION**

CSR requires a methodical and scientific examination of the relationship among the various evidence. It is the process of reproducing the actions and circumstances of an incident or crime based on examining and interpreting evidence (Brown & Davenport, 2016:370). Nordby (2013: xxxii) wrote that the methods used in CSR can be either scientific or unscientific. According to Miller (2014:167), CSR is the process of determining or eliminating the events and actions that occurred at the crime scene by analysing any crime scene patterns, the location and position of the physical evidence, and laboratory examination of the physical evidence. Blood spatter as a form of physical evidence, therefore, is critical in CSR.

The source further noted that CSR involves considering and incorporating all investigative information, with physical evidence analysis and interpretation moulded into a reasonable explanation of the crime and its related events. It is a process using the crime scene and its evidence to reach conclusions about the past; how the crime came to be (Miller, 2014:167). Bertino (2011:29) stated, "crime scene reconstruction involves forming a hypothesis of the sequence of events from before the crime was committed through its commission". Fish, Miller and Braswell (2011:1) concurred, referring to CSR as an essential phase in determining the events that occurred before, during, and after a criminal act.

Furthermore, Fish et al (2011:1) noted that physical evidence is critical in linking the suspect to the victims and the crime location and providing support or contradiction of witnesses/victim/suspect recollections of the incident. According to Miller and Massey (2019:179), CSR is about determining what happened or did not happen at the crime scene. CSR is accomplished by examining pattern evidence at the scene, its location and position, and the laboratory examination of the physical evidence found (Miller & Massey, 2019:179). Therefore, because blood can only be shed during the incident, CSR using BSA will be accomplished by noting the location of evidence that did not exist before the crime was committed. In addition, Chisum and Turvey (2011:9) defined CSR as determining the actions and events surrounding the commission of a crime. This reconstruction can be accomplished by using witness statements, the suspect's confession, the statement from a living victim, or by examining and interpreting physical evidence.

Saferstein (2011:377) proposed that CSR supports a sequence of events at a crime scene by observing and evaluating physical evidence and statements made by individuals involved in the incident. Pettler (2016:294) highlighted that the definitions using words such as process, analysis, physical evidence, laboratory, and statements signal that CSR uses victimology, crime scene and lab reports, autopsy results, suspectology, and statement analysis to support scientific testing.



Empirical research indicated that most respondents do not have full knowledge of what CSR entails. Detectives of Mthatha Central SAPS, Madeira SAPS, and crime scene investigators of Mthatha LCRC were asked their knowledge of CSR. This was question six of the survey questionnaire answered by all 24 respondents who returned the questionnaire. However, most respondents provided unconvincing answers different to the literature discussion presented above. Therefore, respondents failed to demonstrate their knowledge of CSR by describing it as a process of determining or eliminating events and actions that occurred at the crime scene through analysing certain patterns (Miller, 2014:167). These are some answers from respondents.

- Respondent number five wrote, “it is to revive crime scene to life”.
- Respondent number nine noted, “crime scene reconstruction is to revive the crime scene to its original”.
- Respondent number 21 commented, “its where the crime scene is revisited for victim to point out where crime occurred”.

The summary (Annexure A) of the responses is as follows.

- Seven respondents noted that CSR is to revive the crime scene to its originality.
- Eight respondents stated that CSR is about revisiting the scene and do it again.
- One respondent wrote that CSR is the process of finding out what occurred on the scene using forensic evidence.
- Seven respondents mentioned that CSR is reconstructing events on the crime scene, normally, what happened, where, and how, establishing where evidence or exhibits can be collected.
- One respondent wrote that CSR is the scientific method used to collect and analyse visible results on crime scenes and use it to prove or disprove sequential actions and events as they happened.

### **3.4.1 SAPS CSR SOP**

According to SAPS Crime Scene Reconstruction (CSR) SOP 1 reconstruction of crime scene is based on the fact that every action has a result.

This scientific method is used to collect and analyse results that are visible on crime scenes and use it to prove or disprove sequential actions and events as they happen. It further states that it is the responsibility of a competent crime scene examiner to ensure that all processes for reconstruction are followed to result in a valid peer-reviewed conclusion. The examiner shall use this procedure with all related SOPs and training provided. It is further noted that during formal CSR, the following information should be used:

- Crime scene photographs and plans
- Bloodstain or spatter report
- Ballistic report
- Post-mortem reports
- Crime scene reports
- Any results of the analysis performed
- Own observations derived from crime scene visits
- Specific information from investigation dockets (SAPS, 2015:1-3).

#### **3.4.2 Purpose of murder CSR using BSA**

Osterburg and Ward (2010:67) cited that CSR can be accomplished by studying blood groups and blood spatters. According to Hess and Hess-Orthmann (2010:149), blood spatters are also useful evidence because they are characteristics of certain physical forces and can help investigators determine how a criminal event played out. Likewise, White (2016:192) noted that BSA can assist an investigation in several ways, as it can be probative at scenes of violent incidents and used to establish the relative positions of individuals as blood was being distributed, the probable sequence of events, and whether blood had been subsequently distributed. White (2016:192) also noted that BSA can offer an insight into blood evidence that allows the activities associated with blood loss to be determined, and critically, from the court's perspective, can be probative when evaluating proposed alternative scenarios, such as he kicked versus he did not kick, but walked through the blood of the injured party. BSA can assist in revealing or determining:

- The distance between the surface bearing the stain and the origin of the blood at the time it was shed,
- The point(s) of origin of the blood,
- The type of impacting object (i.e., gunshot or hammer) that produced the blood spatter, and the direction of its force,
- The movement and direction of the person(s) or objects during blood-shedding,
- The number of blows or shots, with arterial gushing, the number of heartbeats,
- The position(s) of the victim or object(s) during blood-shedding, and
- The movement of the victim or object(s) after blood-shedding (Dutelle & Becker, 2019:102).

Fish et al (2014:169) indicated that BSA can determine information eliminating other avenues of investigation. Dutelle and Becker (2019:102) proposed that BSA can provide realistic and specific information, such as:

- The position of the victim or suspect (sitting, standing, or lying down),
- Evidence of a struggle,
- Areas where stains are absent (voids in patterns) indicating someone or something blocked the path of the blood,
- In-line stain patterns created by cast-off,
- Sequence of events (movements of suspect or victim),
- How many impacts and from which direction,
- Indication that the scene was altered before the arrival of crime scene investigators, and
- Whether stains or spatters are consistent with statements.

In the survey questionnaire, respondents were asked what significant role BSA can play in reconstructing murder crime scenes. That was question seven of the questionnaire, answered by 23 respondents, to prove or disprove hypothesis three. Fifty-three per cent of the respondents have limited knowledge about the significant role BSA can play in reconstructing murder crime scenes.

They mentioned two aspects that BSA can reveal, which were also highlighted by the above literature discussion. Moreover, 24% indicated a lack of knowledge about the purpose of BSA in reconstructing murder crime scenes. Another 22% did not answer this question, probably because they did not know the answer. These are some answers from respondents.

- Respondent number two wrote, “*do not know it*”.
- Respondent number eight wrote, “*not known*”.
- Respondent number 15 commented, “it can help in determining the position of the victim, the object used etc.”.
- Respondent number 20 noted, “it can determine between victim and suspect”.

The overall summary (Annexure A) of the responses is as follows.

- Five respondents answered with do not know.
- Twelve respondents stated that BSA can assist to determine the object or weapon used to commit murder and the distance between the suspect and victim.
- One respondent did not answer the question.
- Six respondents stated that BSA help in drawing a conclusion and provide details about the crime.

### **3.5 CRIME OF MURDER**

Commissioning a murder crime represents the gravest act in the world of criminal law (Nemeth, 2012:132). The source further noted that it is a terminal criminal act because of its irreversibility, its depraved effect on individuals, families, and communities, and its immoral control over another’s destiny. According to Cryer, Friman, Robinson and Wilmshurst (2010:246), crime of murder is well-known to all legal systems and an archetypal form of crime against humanity. The tribunal jurisprudence, consistent with jurisprudence in many national systems, indicates that the mental element is satisfied if the perpetrator intends to kill or intends to inflict grievous bodily harm likely to cause death and is reckless as to whether death ensues (Cryer et al, 2010:246).

Carlan, Nored and Downey (2011:77) agreed that at common law, murder is defined as the unlawful killing of another human being with malice forethought. Bergman and Berman (2018:262) opined that malice forethought does not mean that a suspect needed to act out of spite or hate. However, malice forethought exists if a killer intends to kill a person. The source also describe murder as an intentional killing that is unlawful (the killing is not legally justified) and committed with malice forethought. According to Joubert (2010:101), murder is unlawfully and intentionally causing the death of another human. Likewise, Kemp et al (2012:271) stated that X commits murder when they unlawfully and intentionally cause the death of Y, another human.

Stated differently, Gardner and Anderson (2015:285) commented that when one person participates in the death of another person, it might constitute a crime of murder. Nemeth (2012:131) stated that killing a human unlawfully and under circumstances constitutes murder. Moreover, Loveless, Allen and Derry (2020:230) alluded that murder carries a mandatory life sentence and is committed when a defendant unlawfully kills another person to kill or do serious bodily harm.

### **3.5.1 Elements of murder**

Every committed crime is unique, and an investigator must identify the elements constituting a certain offence. According to Joubert (2010:101), the specific conduct required to constitute murder is “causing the death of another human”. This conduct comprises three elements that each must be proven beyond a reasonable doubt: causing the death; of another; and human. However, Samaha (2011:286) claimed that proving murder beyond a reasonable doubt requires the following elements: the act of killing; purpose or knowledge or extreme recklessness; and causation, the act caused. Loveless et al (2020:230) and Jordaan, Mollema and van der Bijl (2010:131) presented the following elements of a murder crime:

- causing the death – it can be a voluntary act or omission causing the death of another human;
- of another person\_– the human must have been a live person;
- unlawfully – the killing must be unlawful, or it cannot be successfully justified; and

- intentionally – this involves direct intention and that the perpetrator merely foresees the possibility of killing the victim.

### **3.6 SUMMARY**

This chapter covered two critical disciplines in murder CSIs, namely, BSA and CSR. The chapter focuses on hypothesis three, referring to not considering BSA as a technique to reconstruct murder crime scenes by investigators in the Mthatha policing area. BSA has been described as applying scientific knowledge to examine and interpret the morphology, the sequence, and the distribution of bloodstains associated with crime (Li, 2015:35). Also, CSR is described as the process of determining or eliminating the events and actions that occurred at the crime scene by analysing any crime scene patterns, location, and position of evidence found at the crime scene (Miller, 2014:167).

The chapter started by describing blood spatter, highlighting different blood spatters. Factors affecting blood spatter formation, BSA, and their documentation were discussed. Furthermore, CSR and its purpose using BSA were unpacked. SAPS SOP about BSA and CSR were discussed in detail. The responses from the empirical research were also discussed. Lastly, the crime of murder and its elements were covered.

## CHAPTER 4: FINDINGS, RECOMMENDATIONS, AND CONCLUSIONS

### 4.1 INTRODUCTION

Research findings chapter organises and reports the study's main findings (Bloomberg & Volpe, 2016:np). The source further wrote that findings are often written up in different ways depending on the research tradition or genre adopted. In this section, researchers present their results after data analysis has been conducted (Hanneman, Kposowa & Riddle, 2013:13). This study explored whether police investigators understand the concept of using BSA in murder CSIs; evaluated investigators' level of knowledge of the theory of BSA in criminal investigations and police detectives' understanding of the significance of BSA in murder CSRs. The hypothesis was based on the research objectives. The respondents' cooperation was critical in achieving that objective. This chapter presents findings and recommendations relating to the research rationale, research objectives, and hypotheses.

- Hypothesis One: There is inadequate investigation of murder cases in the Mthatha policing area, where blood spatters are ignored.
- Hypothesis Two: There is improper investigation of murder cases in the Mthatha policing area, which might affect the criminal investigation.
- Hypothesis Three: Investigators in the Mthatha policing area do not consider the significance of BSA as a technique to reconstruct murder scenes.

These findings will be grouped into primary and secondary, obtained from respondents' responses to the survey questionnaire and the literature study. The frequency distribution data analysis technique was used to analyse data collected from respondents. Frequency distribution data analysis is a summary table for numerical data in which data are arranged into numerical ordering, either individually or in groups, and corresponding frequencies (Bishnu & Bhattacharjee, 2018:98). Recommendations are also emphasised based on primary and secondary findings. The findings are discussed below, followed by recommendations, and ending with conclusions drawn from this study.

## **4.2 FINDINGS**

The findings in this study are grouped into primary and secondary. The primary findings are associated with the research rationale, research objectives, and hypotheses one, two, and three. Secondary findings are based on other relevant discoveries that contributed to this study. Both primary and secondary findings originated from the data obtained from the empirical research and literature study.

### **4.2.1 Primary findings**

The primary findings are related to the research rationale, research objectives, and research hypotheses.

#### **4.2.1.1 Findings relating to the research rationale**

This study's rationale was based on the researcher who had never seen BSA being done in murder crime scenes in the Mthatha policing area. The researcher has been working in the Mthatha policing area as a crime scene investigator at the Mthatha LCRC. Furthermore, the successful investigation and testimony of Col van der Nest made the researcher realise the importance of researching this neglected investigation technique. Col van der Nest is the SAPS's blood spatter analyst who investigated the murder crime scene involving Oscar Pistorius and later testified at trial in March 2014 at the Pretoria High Court.

This study discovered that murder incidents increased in Mthatha policing area. This research also revealed that BSA could assist in CSR during the investigation phase of these murder cases, by, for example, establishing the relative positions of the suspect and victim when the incident was committed. Most respondents, however, demonstrated a lack of knowledge regarding BSA in the murder CSR. The lack of knowledge regarding BSA might result in poor murder CSI, which will result in insufficient evidence collected and presented in court, negatively affecting the conviction rate. This research also found that the success or failure of any murder investigation might depend on recognising and analysing blood at a crime scene (Wiid, 2016:iv).



The detective must be able to identify this evidential method, as BSA should be done immediately. One respondent indicated that BSA in the Mthatha policing area is only done in murder incidents involving high-profile people. This is of great concern because all murder cases should be handled and treated equally.

#### **4.2.1.2 Findings relating to the research objectives**

The following research objectives were formulated for this study.

- Explore whether police investigators understand the concept of using BSA in murder CSIs.
- Evaluate investigators' level of knowledge of the theory of BSA in criminal investigations.
- Investigate police detectives' understanding of the significance of BSA in reconstructing murder scenes.

This study revealed that crime scene investigators do not understand the concept of using BSA in murder CSIs. In the empirical study, some respondents confused BSA with collecting blood samples at murder crime scenes for DNA analysis. A lack of knowledge was proven. During the distribution of questionnaires, some respondents requested the researcher to explain and demonstrate how BSA is done. Furthermore, this study found that crime scene investigators confuse the theory of criminal investigation with CSI. When asked to indicate the objectives of criminal investigation, most respondents mentioned the objectives of CSI. Even though some respondents indicated a certain understanding of the two theories, their confusion of the objectives revealed a lack of understanding. The findings further showed that crime scene investigators lack an understanding of the significance of BSA in reconstructing murder scenes.

SOP documents of bloodstain pattern identification, documentation, and CSR, are available for crime scene investigators. The NI stipulating the role and responsibilities of crime scene investigators is available for them.

The abovementioned documents clearly explain what a crime scene investigator should do at murder crime scenes; however, this study proved that the respondents do not know the significance of BSA in the reconstruction of murder crime scenes.

#### **4.2.1.3 Findings relating to the research hypotheses**

➤ Hypothesis One: Proven

There is inadequate investigation of murder cases in the Mthatha policing area, where blood spatters are ignored. This hypothesis can be proven, since most respondents indicated that they never saw, or do not see, BSA done at murder crime scenes in the Mthatha policing area. A few respondents provided answers demonstrating their misunderstanding of the questionnaire.

➤ Hypothesis Two: Not fully proven

There is improper investigation of murder cases in the Mthatha policing area, which might affect the criminal investigation. This hypothesis could not be fully proved, as most respondents understand or have knowledge of the theory of CSI and criminal investigations.

➤ Hypothesis Three: Proven

Investigators in the Mthatha policing area do not consider the significance of BSA as a technique to reconstruct murder scenes. This hypothesis could be proven because most respondents indicated that they do not receive or have ever received, reports of BSA done in murder cases in the Mthatha policing area. A few respondents confuse the BSA with samples of blood collected for DNA analysis. They referred to receiving reports from the laboratory, which are normally DNA-related reports.

#### **4.2.1.4 Overview of key findings**

➤ Findings – Blood spatter

The literature study revealed that blood spatters are a form of pattern evidence. They are described as a subset of bloodstain patterns, with stains generated by drops gone airborne before hitting the surface of a solid object called the target (Attinger et al, 2018:649). Furthermore, blood spatters could be classified based on the correlation between the impact velocity and spatter size. Therefore, they can be classified only after factors determining the type of activity that would have created the spatter have been established.

➤ Findings – Blood spatter identification and documentation SOP

Findings reveal that an SOP for bloodstain/spatter identification and documentation exists in the SAPS, providing guidelines on identifying and documenting different bloodstains/spatters in crime scenes for BSA and CSR. Also, this SOP emphasises the importance of approaching crime scenes in accordance with the NI 1/2015.

➤ Findings – Criminal investigations

In the literature study, the researcher found that criminal investigation is one of the key functions of the police service, contributing to achieving various objectives at each policing level, from investigating anti-social behaviour in neighbourhoods to international counter-terrorism operations (Stelfox, 2013:1). The said concept is about determining whether a crime has occurred, collecting evidence to link or identify suspects, recovering property, and recording or documenting findings clearly and concisely for presentation to the prosecutor and use in the criminal justice system (Birzer & Roberson, 2012:28).

The data collected from the respondents via survey questionnaire were analysed using the frequency distribution data analysis method and indicated a confusion in their understanding of criminal investigations. The respondents were asked about their understanding of criminal investigations. Some respondents believe that criminal investigation is about investigating an alleged criminal offence or crime committed, showing that they slightly agree with what was discovered in the literature study.

However, other respondents confused this concept with CSI, as they noted that criminal investigation is about evidence collection at the crime scene. According to Hess, Hess-Orthmann and Cho (2017:11), the following are the objectives of criminal investigations:

- Determining whether a crime has been committed;
- Obtaining information legally and evidence to identify the responsible person;
- Locating and arresting the person(s) who committed the crime in question;
- Recovering of property associated with the crime;
- Present the best possible case to the prosecutor; and
- Ensuring a conviction in court.

The empirical study proved that most respondents believe that the objective of criminal investigations is only to bring a perpetrator or suspect to justice, ignoring other important aspects revealed by the literature study. Other respondents noted that it involves visiting the crime scene, identifying witnesses, collecting evidence, recovering stolen goods, and arresting suspects. The study, therefore, proved that most respondents do not have full knowledge of what criminal investigations entail, as they fail to mention other objectives highlighted by the literature, which are as important as what the respondents mentioned.

➤ Findings – Crime scene investigations

The literature study indicated that CSI is about finding the truth about the incident in question by searching, documenting, collecting, preserving, and interpreting physical evidence associated with an alleged crime scene (Dutelle, 2017:4). It is also a primary means of establishing linkages between the victim, suspect, and crime scene. It also reveals that for CSI to be effective, it should be free from outside influences, yet be able to work with stakeholders from other disciplines who have different work practices, needs, and expectations.

Furthermore, legal requirements in criminal investigations enforce the correct analysis of the evidence by crime laboratories (Miller & Massey, 2019:7). The careful processing, documentation, and collection of physical evidence by crime scene investigators form an integral part of the investigation process and CSI (Miller & Massey, 2019:7).

In other words, the integrity of any piece of evidence relies on how it was collected, preserved, and processed. Dutelle (2017:6) highlights the following objectives of CSI:

- Determining whether a crime has been committed. It can also be determined that there is no crime committed or if the issue is one for the civil courts, where law enforcement personnel have no responsibility.
- If a crime has been committed, determine whether it was committed within the investigator's jurisdiction.
- Discovering and documenting all facts about the complainant in question.
- Identify and eliminate suspect/s because of collected physical and testimonial evidence.
- Locate and apprehend the perpetrator.
- Maintain a proper chain of custody throughout the process to ensure that the evidence collected is admissible in court.
- Effectively testify as a witness to the collected evidence in court.

The literature further revealed that other objectives of CSI include (Shaler, 2012:5):

- reconstructing the crime scene,
- ascertaining the sequence of events,
- determining the modus operandi,
- disclosing the motive, and
- collecting and preserving physical evidence.

However, the empirical study proved that respondents are uncertain about the objectives of CSI, as they confused them with the objectives of criminal investigations. When asked about the objectives of criminal investigations, they mentioned the objectives of CSIs, indicating that they lack knowledge of the true meaning of CSI.

- Findings – Responsibility of crime scene investigators within SAPS

The researcher has found that CSI cannot be a single investigator's responsibility. From the literature study, several role players with different areas of expertise from different sections or components play a collective, significant role in CSI, such as (Baxter, 2015:3):

- an initial responding officer responsible for bringing an uncontrolled crime scene under control,
- a crime scene investigator responsible for documenting the crime scene using photographs, written reports, and evidence collection,
- a detective who is an overall manager of the case and responsible for the entire investigation,
- an analyst analysing the evidence, such as BSA, and
- a crime scene analyst or reconstructionist reconstructing events to answer additional investigative questions.

Moreover, the researcher found that most respondents in the empirical study believe that members from the LCRC or any other trained police officials are responsible for CSI. Other respondents believe that an investigator is responsible for CSI within SAPS. A few respondents indicated that the first responder and an investigating officer have the duty of CSI. Therefore, the respondents are unaware that CSI is the duty of different role players with different areas of expertise from different sections.

#### ➤ Findings – Crime scene

The literature study established that a crime scene refers to a place or area in which there is direct or indirect physical evidence that might prove that an unlawful deed has been committed (Houck et al, 2018:20). Furthermore, one criminal incident might have different crime scenes, which might be categorised as either primary or secondary scenes. A primary scene has been described as one where the incident occurred (Aggrawal, 2011:153) and secondary scenes as other locations containing evidence linked or related to the primary scene.

The researcher found that most respondents confirm the literature, indicating that a crime scene is a place or area where a crime or criminal incident has been committed or happened, and where evidence or exhibits that can help solve the crime can also be found. This proved that, as crime scene investigators, respondents have a knowledge of their duties in their field.

➤ Findings – SAPS NI 1/2015 and expert role in crime scene

The literature revealed that the NI 1/2015 on CSM was designed to direct the management of crime scenes, ensuring that they are properly controlled, managed, documented, and investigated and that the integrity of items with potential evidential value is maintained. In this NI, distinct phases of the crime scene are noted, including reporting, activating, responding, controlling, handing over, planning, investigating, processing, debriefing, restoring, releasing, and evaluating. Furthermore, the findings indicate that most respondents do not know of this NI.

Respondents were asked about their knowledge of the NI policy document 1/2015 regarding the experts' role in crime scenes. Most responded with either unknown, do not know, or no responses. Five respondents did not respond to or answer the question, indicating their lack of knowledge about the NI. Seven respondents provided answers unrelated to the question posed. The empirical research results proved that the respondents do not have any knowledge of SAPS NI 1/2015 regarding the experts' role at crime scenes.

➤ Findings - BSA

The literature study revealed that BSA is a forensic discipline dealing with the physics of blood and assesses bloodstains left at crime scenes using visual pattern recognition (Brodbeck, 2012:51). BSA is vital, as it can be used to highlight various forensic matters, including reconstructing events, differential diagnosis of homicide/suicide/murder, and identifying areas with a high likelihood of offender movements collecting DNA samples. In addition, the literature established that BSA is the interpretation of bloodstain patterns to provide vital information about what happened at a crime scene.

The size, shape, and pattern formed by these bloodstains found at crime scenes can be used to reconstruct events. This study proved that BSA is not performed in murder crime scenes. The respondents were asked how often they receive reports of BSA conducted in murder crime scenes. Most respondents answered with either none or never. Furthermore, some respondents confused blood sample collection for DNA analysis with BSA. One respondent claimed that after analysis, the report goes to the detective service or court, which is mostly the DNA analysis report of blood evidence from the biology section of FSL. Therefore, the researcher found that respondents believed that swabbing bloodstains (for DNA analysis) in crime scenes is a BSA. For example, one respondent wrote, "receive it from lab".

➤ Findings – Documenting BSA

The researcher found that documenting evidence is critical to successful evidence collection. Its purpose is to maintain a record of the scene's integrity as the analyst has found it. Proper documentation of blood spatter is defined by the following areas: detecting and collecting blood spatter and traces; photographing blood spatter, including videotape recordings; sketching techniques; and written reports for blood spatter documentation.

➤ Findings - Responsibility of blood spatter analysts in murder crime scenes

The literature has revealed that BSA in murder crime scenes should be conducted by an experienced trained individual (Franjic, 2019:20). It further established that personnel responsible for conducting BSA in murder crime scenes are from diverse backgrounds, including crime scene police officers. All respondents were asked about their understanding regarding the responsibility of blood spatter analysts in crime scenes. From the data analysis, of 24 respondents who answered the questionnaire, 14 wrote that an expert is responsible for BSA in crime scenes. The other eight wrote different answers, such as an LCRC member, forensic science specialist, and blood spatter analyst. Only two respondents indicated that BSA is the responsibility of a trained person.



### ➤ Findings - CSR

The consulted literature sources revealed that CSR is about reproducing the actions and circumstances of an incident or crime by examining and interpreting evidence (Brown & Davenport, 2016:370). It can also be described as a process of determining or eliminating the events and actions that occurred at the crime scene by analysing any crime patterns, the location and position of the physical evidence found at the crime scene, and laboratory examination of the physical evidence (Miller, 2014:167). Furthermore, CSR involves the consideration and incorporation of all investigative information, with physical evidence analysis and interpretation moulded into a reasonable explanation of the crime and its related events.

The empirical research disclosed that respondents had a fair knowledge of what CSR entails, as most wrote that CSR is about revisiting and re-doing the crime scene. One respondent described CSR as the process of finding what has occurred on the crime scene using forensic evidence, correlating with the consulted literature sources about defining CSR.

### ➤ Findings – Purpose of CSR using BSA

From the literature study, blood spatters are useful evidence because they are a characteristic of certain physical forces and can help investigators determine how a criminal event played out. Therefore, it has been established that BSA can assist in determining or revealing the following information in the crime scene:

- The distance between the surface bearing the stain and origin of the blood at the time it was shed;
- The point(s) of origin of the blood;
- The type of impacting object (i.e., gunshot or hammer) that produced the blood spatter and the direction of its force;
- The movement and direction of the person(s) and/or objects during blood shedding;
- The number of blows or shots, with arterial gushing, the number of heartbeats;

- The position(s) of the victim and/or object(s) during blood shedding; and
- the movement of the victim and/or object(s) following the blood shedding (Dutelle & Becker, 2019:102).

Some respondents indicated that they do not know the role of BSA in CSR. In the empirical study, all respondents were asked about the significant role BSA can play in CSR. Five respondents wrote that they do not know. Other respondents wrote that it could help in determining the positions of the victim and suspect, indicating a fair understanding of the role of BSA in reconstructing murder crime scenes. However, none could mention all the objectives of BSA in reconstructing murder crime scenes as stipulated by the consulted literature, indicating that they are not well informed about the significance of BSA in reconstructing murder crime scenes.

➤ Findings – CSR SOP

This study found that a CSR SOP exists at the SAPS criminal record and CSM component based on every action in a crime scene having a result. It was also discovered that the SOP confirms that a competent crime scene examiner must ensure that all reconstruction processes are followed to produce a valid peer-reviewed conclusion. Also, the SOP should be used with all related SOPs and training provided. Furthermore, SOP emphasises using all relevant information, reports, analysis, and observations during CSR.

#### **4.2.2 Secondary findings**

The secondary findings derived from other relevant discoveries in this study relate to the research topic.

➤ Findings – Locard's Principle

This study established that Locard's principle forms the foundation regarding why crime scenes are searched for physical evidence to be used in a criminal investigation (Miller and Massey, 2019:7). This principle states that whenever there is contact between two objects, there will always be a trace.

It was further discovered that Edmond Locard was a forensic scientist, postulating the Locard exchange principle, and the director of the first crime laboratory in existence in Lyon, France (Marcella & Menendez, 2010:12).

➤ Findings – CSM

The findings indicated that CSM should be in phases, as follows:

- crime scene preservation,
- crime scene survey,
- crime scene documentation,
- crime scene search, and
- CSR.

➤ Findings – Factors affecting blood spatter formation in murder scenes

Blood spatter formation is influenced by the following:

- the volume of an individual drop,
- the distance the drop has fallen, and
- the nature of the target surface.

➤ Findings – LCRC official registers

An LCRC official register called the information register is used to record details of attended crime scenes or cases. The plan register records photographs and plans drawn of crime scenes. The forensic register records forensic-related activities, such as BSA, DNA analysis, and fingerprint investigation. However, these registers reveal that BSA is not performed in murder cases by the Mthatha LCRC.

### **4.3 RECOMMENDATIONS**

The following recommendations are based on the primary and secondary findings.

#### **4.3.1 Recommendations relating to the research rationale**

To cope with the increasing murder cases in South Africa, the researcher recommends that SAPS management should support their crime investigation units using more resources. More entry-level police members should be recruited for crime investigation units to make them better future crime investigators. Other resources, such as vehicles, should be made available for crime investigation units, ensuring that they fulfil their mandate of crime investigation and bringing perpetrators to justice. The researcher further recommends training SAPS investigators. There should be more courses presented emphasising the significance of BSA in reconstructing murder crime scenes. All crime scene investigators should attend these courses. Improving crime investigators' expertise should be a priority.

#### **4.3.2 Recommendations relating to the research objectives**

Criminal investigations and CSI modules should form part of SAPS basic training programmes. The sooner entry-level police members are introduced to crime investigation, the better. Furthermore, the researcher recommends skill-sharing sessions or programmes. Therefore, experienced investigators should share their knowledge and expertise with other members in work environments. Equally important, the researcher recommends that BSA and CSR SOP documents should also be introduced to all crime scene investigators and form part of SAPS basic training programmes. Furthermore, crime investigation courses should prioritise BSA and CSR modules. Investigators should understand that these CSI techniques are the solution to ever-increasing murder cases.

#### **4.3.3 Recommendations relating to hypotheses**

- Hypothesis two: Not fully proven

Hypothesis two, which was not fully proven, refers to the improper investigation of murder cases in the Mthatha policing area, which might affect criminal investigations. However, the researcher recommends that crime scene investigators should read more about the difference between criminal investigation and CSI objectives. SAPS training facilities have libraries with books covering the concepts of criminal investigations and crime scenes.

Furthermore, SAPS academy training officers should include the differences between the two concepts in their teaching programmes so that all investigators can understand the difference between CSIs and criminal investigations.

#### **4.3.4 Recommendations on key findings**

- Blood spatter

All police officials that normally attend to crime scenes must be educated and sensitised about the importance of blood spatter in crime scenes. The parades conducted before the start of the shift should be used as platforms to educate police members about the importance of safeguarding crime murder scenes. In so doing, valuable evidence such as blood spatter will be preserved.

- Criminal investigations

A training manual should be developed and implemented in training programmes of both detectives and LCRC unit members. This training manual should clarify the confusion made by respondents when describing criminal investigations and CSIs. The objectives of a criminal investigation should be clearly stated in this training manual. Furthermore, detective and LCRC unit commanders should be instructed to have at least quarterly information-sharing sessions within their working environments where certain concepts about crime investigations are discussed.

- CSIs

A manual regarding CSI procedures should be developed and implemented in the training programmes of detectives and LCRC investigators. Also, this manual should clearly stipulate the objectives of CSIs. Furthermore, different role players in CSIs should be specified. Crime scene investigators must also equip themselves by studying or reading books or relevant material available in libraries to improve their investigation skills.

- Responsibility of crime scene investigators within SAPS

Police uniform members who are normally the first responders on murder crime scenes and detectives should be educated about the responsibilities of CSIs. There should be workshops and information-sharing sessions within SAPS where members are informed of different role players in CSI. More members of LCRC units should be trained to analyse blood spatters or at least each LCRC office should have two or more trained blood spatter analysts.

➤ Crime scene

Crime scene investigators of different SAPS sections or units should be informed of the NI on CSM. To make things easier, this NI should form the curriculum of the police basic training and investigator training programmes. Crime scene investigators should be encouraged to visit libraries and read more on the importance of CSM. In so doing, they will be well informed about the importance of crime scenes as a basic evidence source. Furthermore, information-sharing sessions are recommended and should be used as platforms to discuss the NI on CSM.

➤ SOPs, policies, and NIs

All crime scene investigators should familiarise themselves with SOPs, policies, and NIs regarding BSA, CSR, and CSIs, which provide guidelines about the procedures, available on SAPS Intranet.

➤ BSA

For BSA, the researcher recommends the following:

- a compulsory training manual, developed, implemented, or presented in detective-training programmes.
- BSA workshops for visible police (uniform) members who are first responders in crime scenes. That will sensitise or teach them about the importance of protecting or preserving the crime scene.
- self-development of crime scene investigators; for example, by studying further about the importance of BSA.

- morning parades within investigation units should be used to share information; for example, SOPs and cases or incidents where BSA contributed as part of evidence.
- unit commanders should equip themselves with knowledge about BSA. They should inspire or encourage their subordinates to improve their investigation skills by studying or researching the importance of BSA.

➤ CSR

Crime scene investigators should be work-shopped about the importance, objectives, and roles or responsibility of CSR and understand it is a vital technique that can assist them when presenting evidence in court. A training manual on CSR is available to all LCRC crime scene investigators. Trained crime scene reconstructionists from the forensic division should be tasked with CSR awareness at police stations and detective branches. CSI books in libraries have chapters focusing on CSR; therefore, crime scene investigators should study further about this concept.

#### **4.3.5 Recommendations on secondary findings**

➤ Locard's Principle

Crime scene investigators should familiarise themselves with Locard's principle, as it forms the foundation of investigating crime scenes for physical evidence. Public and police libraries have numerous books describing this principle. This principle proposes that whenever two objects come together, there will always be a trace.

➤ CSM

Crime scene investigators and first responders must gather knowledge regarding CSM phases. The NI (1/2015) stipulates the CSM procedure and is accessible on the Intranet and can guide those involved in murder crime scenes. Also, police and public libraries have books that might assist crime scene investigators regarding CSM.

➤ Factors affecting blood spatter formation in murder scenes

Crime scene investigators should approach different murder crimes with different mind-sets, as several factors can influence blood spatter formation. Therefore, SAPS should ensure that its crime scene investigators are well trained to deal with the dynamics of different murder crime scenes.

➤ LCRC official registers

Police detectives should familiarise themselves with LCRC official registers to assist them in knowing whether BSA was done when following up with certain cases. Furthermore, LCRC crime scene investigators should always ensure that activities, such as BSA, performed in murder crime scenes are recorded in these LCRC official registers. This information is critical to police detectives during murder indent investigations.

#### **4.4 CONCLUSION**

SAPS categorises the crime of murder as serious and violent. Constitutionally, it deprives people of one of the human rights, the right to life. This study has shown that murder incidents are increasing yearly in the RSA. SAPS has a constitutional mandate to ensure that crime is prevented and investigated within the RSA. However, if murder incidents are increasing yearly, a high probability exists that SAPS is not coping or failing to control crime, specifically murder incidents, in happening. If so, the second option in reducing murder incidents will be the proper investigation of crime scenes, increasing the conviction rate. Furthermore, it will reduce murder incidents, as most criminals will be behind bars for longer periods.

This study has also shown that CSI is critical in investigating murder incidents, as most clues that might lead to identifying a perpetrator can be found at a crime scene. Blood spatters are present in most murder crime scenes. BSA assists in the CSR process. SAPS crime scene investigators or detectives are responsible for identifying and analysing blood spatter, reconstructing the crime scene, and presenting a concrete case before the prosecution or court. However, empirical research has shown a challenge regarding BSA. Crime scene investigators or detectives confuse BSA and blood sample collection in crime scenes for DNA analysis.



In conclusion, this study revealed that SAPS crime scene investigators do not have the necessary knowledge about the significance of BSA in reconstructing murder crime scenes in the Mthatha policing area.

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**ANNEXURE A: SURVEY QUESTIONNAIRE**

**QUESTIONNAIRE SURVEY**

Participant number: \_\_\_\_\_

TOPIC: THE SIGNIFICANCE OF BLOOD SPATTER ANALYSIS TO RECONSTRUCT MURDER SCENES.

The reason for questionnaires is to determine your involvement in murder incidents investigations and also your knowledge of blood spatter analysis to reconstruct murder crime scenes. Your cooperation is highly appreciated.

**SECTION A: HISTORICAL INFORMATION**

1. NAME: \_\_\_\_\_

2. What is gender?

|      |        |
|------|--------|
| Male | Female |
|------|--------|

3. How long have you been working for SAPS?

|             |            |                 |
|-------------|------------|-----------------|
| 1 – 5 years | 5–10 years | 10 years & more |
|-------------|------------|-----------------|

4. How long have you been working as a crime scene investigator/detective?

|             |            |                 |
|-------------|------------|-----------------|
| 1 – 5 years | 5–10 years | 10 years & more |
|-------------|------------|-----------------|

5. Did you attend crime scene investigation/detective course?

|     |    |
|-----|----|
| Yes | No |
|-----|----|

6. Are you trained to analyse blood spatters?

|     |    |
|-----|----|
| Yes | No |
|-----|----|

**SECTION B: CRIMINAL AND CRIME SCENE INVESTIGATION**

1. In your understanding, what is criminal investigation?

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2. What is your knowledge about objectives of criminal investigation?

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3. In your understanding, what is a crime scene?

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4. Who is responsible for crime scene investigation within the SAPS?

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5. What is your knowledge of National Instruction policy document 1/2015, regarding expert role in crime scene?

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6. What is your knowledge of crime scene reconstruction?

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7. What significant role can blood spatter analysis play in reconstructing murder scenes?

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8. In your understanding, who is responsible for doing blood spatter analysis in crime scene?

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9. How often do you receive reports of blood spatter analysis done in murder incidents?

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10. How often do you see blood spatter analysis done in murder crime scenes?

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## ANNEXURE B: SAPS APPROVAL

*South African Police Service*



*Suid-Afrikaanse Polisie*

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

---

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**

Mr SS Sontundu  
**UNIVERSITY OF SOUTH AFRICA**

**RE: PERMISSION TO CONDUCT RESEARCH IN SAPS: EXPLORING THE SIGNIFICANCE OF BLOOD SPATTER ANALYSIS TO RECONSTRUCT MURDER SCENES: UNIVERSITY OF SOUTH AFRICA: MASTERS DEGREE: RESEARCHER: SS SONTUNDU**

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 offices:

The Divisional Commissioner: Forensic Service:

- **Contact Person:** Col NM Rababalela
- **Contact Details:** (012) 421 0440/082 378 3457
- **Email Address:** RababalelaM@saps.gov.za

The Provincial Commissioner: Eastern Cape:

- **Contact Person:** Colonel SN Ginya
- **Contact Details:** 040 608 7215
- **Email Address:** GinyaS@saps.gov.za

The Office of the Provincial Commissioner: Eastern Cape has stressed that research report must be shared with the SAPS Management at Provincial Level before publication.

Kindly adhere to paragraph 6 of our attached letter signed on the **2019-05-06** with the same above reference number.

**DR PR VUMA**

**MAJOR GENERAL**

**THE HEAD: RESEARCH**  
**2019-05-16**

**DATE:** 16-05-2019

# ANNEXURE C: UNISA ETHICAL CLEARANCE CERTIFICATE



## UNISA CLAW ETHICS REVIEW COMMITTEE

**Date** 20190319

**Reference:** ST1 of 2019  
**Applicant:** SS Sontundu

**Dear** SS Sontundu

**Decision: ETHICS APPROVAL**  
FROM 01 March 2019  
TO 31 January 2022

**Researcher:** Solethu Shepherd Sontundu

**Supervisor:** Dr D Pheiffer

Exploring the significance of blood spatter analysis to reconstruct murder scenes.

**Qualification:** M-Tech Forensic Investigation

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

*The CLAW Ethics Review Committee reviewed the **low risk application** on 19 March 2019 in compliance with the Unisa Policy on Research Ethics and the Standard Operating Procedure on Research Ethics Risk Assessment. The decision was ratified by the committee.*

The proposed research may now commence with the provisions that:

1. The researcher(s) will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.
2. 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.



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](http://www.unisa.ac.za)

3. The researcher(s) will conduct the study according to the methods and procedures set out in the approved application.
4. 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.
5. 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.
6. 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 require additional ethics clearance.
7. No research activities may continue after the expiry date 31 January 2022. Submission of a completed research ethics progress report will constitute an application for renewal of Ethics Research Committee approval.

*Note:*

*The reference number ST1 of 2019 should be clearly indicated on all forms of communication with the intended research participants, as well as with the Committee.*

Yours sincerely,



PROF T BUDHRAM  
Chair of CLAW ERC  
E-mail: budhrt@unisa.ac.za  
Tel: (012) 433-9462



PROF M BASDEO  
Executive Dean : CLAW

E-mail: MBasdeo@unisa.ac.za

Tel: (012) 429-8603.....

PROF V BASDEO

2019 -03- 2 8

COLLEGE OF LAW  
OFFICE OF THE EXECUTIVE DEAN  
UNISA

## ANNEXURE D: TURNITIN REPORT



### Digital Receipt

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

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Word count: **32,119**  
Character count: **182,990**  
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