

**A FEASIBILITY ANALYSIS OF MIGRATING EMERGENCY CARE PROVIDERS
TO THE NEW EMERGENCY CARE QUALIFICATIONS IN THE CAPRICORN
DISTRICT IN LIMPOPO, SOUTH AFRICA**

A dissertation submitted in fulfilment of the requirements for the degree of Master of
Health Sciences in Emergency Medical Care in the Faculty of Health Sciences at
the Durban University of Technology

Lekgowana Philimon Selahla

Student number: 21751722

28 May 2024

Department of Emergency Medical Care and Rescue

Durban University of Technology

Supervisor: Dr Simpiwe Sobuwa

Co-supervisor: Mr Ntuthuko Gift Chule

DECLARATION OF ORIGINALITY

This study was conducted under the supervision of Dr Simpiwe Sobuwa and Mr Ntuthuko Gift Chule at the Durban University of Technology in the Department of Emergency Medical Care and Rescue.

This is to certify that this work is entirely my own and not that of any other person unless explicitly acknowledged (including citation of published and unpublished sources). The work has not previously been submitted in any form to the Durban University of Technology or to any other institution for assessment or for any other purpose.

Name Lekgowana Philimon Selahla

Signed

Date 28 May 2024

ETHICAL CLEARANCE

This is to certify that the research studies which were conducted for the purpose of this dissertation were approved by the Institutional Research Committee (IREC) of the Durban University of Technology (DUT) in Kwazulu-Natal

Institutional Research Ethics Clearance Number: IREC 234/22

Researcher: Lekgowana Philimon Selahla Signed:

Supervisor: Dr Simpiwe Sobuwa Signed: _____

Co-supervisor: Mr Nthutuko Gift Chule Signed: _____

ABSTRACT

Introduction: Emergency care education and training has historically centred on short courses and on-the-job training, resulting in most emergency care providers lacking formal qualifications. The current legislative changes have restructured emergency care education, introducing a three-tiered qualification system, aligned with international and national standards. These encompass a one-year higher certificate, a two-year diploma, and a four-year professional degree in emergency medical care. Despite these changes, migration to formal emergency care qualifications has never been investigated. This study addresses this knowledge gap by evaluating the feasibility of migrating the existing emergency care providers in Limpopo emergency medical services to the new emergency care qualification structure.

Methodology: This study employed a retrospective, quantitative, descriptive design to analyse the feasibility of migrating the existing emergency care providers to the new emergency care qualifications. The study population comprised emergency care providers working for the Limpopo emergency medical services. The total population sampling, a purposive non-probability technique, included all qualified emergency care providers in the Capricorn District in Limpopo. The data collection method used involved extracting relevant documents for the study from employees' files in the archives storeroom. The data was analysed using the statistical package for social sciences® version 25.

Results: A total of 356 (93.68%) participants from a target population of 380 emergency care providers in the Capricorn District, Limpopo emergency medical services, were included in the study. However, 36 participants were excluded due to invalid data as their files did not have matric, identity or emergency care qualification documents. Consequently, the final sample size was 320 (84.21%) participants. Of the 320 participants, two participants were without a matric qualification, bringing about 318 participants in the matric qualification analysis. The findings revealed that most emergency care providers were males 195 (60.94%), with Africans 319 (99.69%) being the predominant racial group. The age distribution revealed that 181 (56.56%) participants fell within the 40 to 49 age range, and the mean age was 45. Regarding emergency care qualifications, the study found that 180 (56.25%) participants held basic ambulance assistant qualification, and 318 (99.37%) participants completed matric.

However, many participants lacked the performance levels and subject combinations to enter emergency medical care programmes. A mere 10 (3.14%) passed Mathematics, six (1.89%) passed Physical Science, and 36 (11.32%) participants passed Biology. None of the participants met the criteria for entry into diploma and bachelor's degree programmes. Only three participants met the entry criteria for the higher certificate programme.

Conclusion: The study's findings showed that most of the existing emergency care providers in the Capricorn District do not have the pre-requisite secondary school leaving subjects or the appropriate matric performance levels to enter various emergency medical care programmes. As a result, migration to formal emergency care qualifications through direct access will not be feasible for many of the emergency care providers. The matric results place a substantial number of them in a disadvantaged position.

ACKNOWLEDGEMENTS

I begin by expressing my profound gratitude to God Almighty for giving me the privilege to pursue a master's degree, and providing me with wisdom, strength, and courage to complete this dissertation.

My heartfelt thanks extend to my supervisors, Dr. Simpiwe Sobuwa and Mr. Gift Chule. Words fall short to express the depth of my appreciation for your expert guidance, support, and patience. Your invaluable insights from the beginning to the conclusion of this project have left an unforgettable mark. Dr. Simpiwe Sobuwa, your commitment and timely feedbacks were instrumental in fuelling my determination to navigate this academic journey. I am sincerely grateful for your indispensable contributions.

I extend sincere appreciation to my family, particularly my wife, Rarang Paulinah Selahla, for her unwavering love, understanding, and steadfast support. To my children, Bohlale and Katlego, and my mother, Raesetja Rosinah Selahla, who stood by me with encouragement – thank you from the depths of my heart.

Special thanks to Dr. Fikile Nkwanyana for invaluable assistance in data analysis.

I express my gratitude to the editor, Juanita Du Toit, for her meticulous editing of this document. May the good Lord continue to bless and keep you.

Lastly, to my friends, William, Kwena, and Collen, your unwavering support has been a constant source of strength throughout this challenging journey. I am deeply thankful for your friendship and encouragement.

TABLE OF CONTENTS

DECLARATION OF ORIGINALITY	i
ethical clearance.....	ii
abstract.....	iii
ACKNOWLEDGEMENTS.....	v
TABLE OF CONTENTS	vi
LIST OF TABLES	xi
LIST OF FIGURES	xii
LIST OF ANNEXURES.....	xiii
abbreviations and glossary OF TERMS	xiv
CHAPTER 1	1
INTRODUCTION TO THE STUDY	1
1.1 Introduction	1
1.2 Background.....	1
1.3 The new emergency care courses	3
1.4 Problem statement.....	5
1.5 Rationale for the study	6
1.6 Aims and objectives	7
1.6.1 Aim of the study	7
1.6.2 Objectives of the study.....	7

1.7 Structure of the dissertation	7
1.8 Conclusion	8
CHAPTER 2	10
LITERATURE REVIEW.....	10
2.1 Introduction	10
2.2 Search strategy	10
2.3 Migration of emergency care education and training abroad	11
2.3.1 Australia.....	11
2.3.2 Middle East	13
2.3.3 United Kingdom	15
2.3.4 United States	17
2.4 Training and education migration in other health professions.....	19
2.4.1 Migration in medicine: Internationally.....	20
2.4.2 Migration in nursing: South Africa	21
2.5 Emergency care education and training in South Africa.....	26
2.5.1 Emergency care education system development.....	27
2.5.2 Short-course training challenges.....	27
2.5.4 Limited access for emergency care providers to higher education	30
2.5.5 Challenges and opportunities in migrating from vocational to tertiary education in emergency care	30
2.6 Admission to higher education	31
2.6.1 Higher education admission policies.....	31

2.6.2	Minimum admission requirements for higher education programmes	32
2.6.3	Minimum admission requirements for new EMC programmes.....	33
2.6.4	Recognition of prior learning	36
2.6.5	Mature age-exemption	37
2.7	Conclusion	40
CHAPTER 3		41
RESEARCH METHODOLOGY		41
3.1	Introduction	41
3.2	Study design	41
3.3	Study setting	42
3.4	Target population and sample.....	44
3.5	Sampling method	45
3.6	Inclusion criteria	45
3.7	Exclusion criteria	45
3.8	Data collection procedure	46
3.9	Data collection period.....	46
3.10	Data collection tool.....	47
3.11	Reliability and validity of data collection tool	48
3.12	Data analysis	49
3.13	Ethical consideration	50
3.14	Conclusion	53
CHAPTER 4		54

RESULTS	54
4.1 Introduction	54
4.2 Sample	54
4.3 Demographic data	54
4.3.1 Sex status	54
4.3.2 Race distribution	55
4.3.3 Age distribution	55
4.3.4 Emergency care qualifications	55
4.3.5 The highest school qualifications	55
4.4 Descriptive statistics of matric results	56
4.5 The Admission Point Score	58
4.6 Conclusion	63
CHAPTER 5	64
DISCUSSION.....	64
5.1 Introduction	64
5.2 Demographics	64
5.3 Discussion.....	65
5.3.1 Emergency care qualifications	66
5.3.2 Matric requirements	67
5.3.3 Matric subject combination and performance levels obtained.....	68
5.3.4 Criteria for a higher certificate, diploma and bachelor's degree	72
5.4 Conclusion	73

CHAPTER 6	75
SUMMARY, RECOMMENDATION AND CONCLUSION.....	75
6.1 Introduction	75
6.2 Summary.....	75
6.3 Recommendations	76
6.3.1 Matric Upgrade Programmes.....	77
6.3.2 Human resource recruitment and placement strategy	77
6.4 Study Limitations.....	78
6.5 Recommendations for future research	78
LIST OF REFERENCES.....	80

LIST OF TABLES

Table 1.1: The new undergraduate emergency care qualifications.....4

Table 2.1: Legacy nursing qualifications.....23

Table 2.2: The new HEQSF-aligned qualifications.26

Table 2.3: Registration statistics for the HPCSA Professional Board for Emergency Care as at, 1996, 2018, 2019, 1 July 2021 and 30 June 2023.28

Table 2.4: Subjects and the minimum APS required for different EMC programmes. ...33

Table 4.1: Tabulation of demographics of participants.56

Table 4.2: Mean age, standard deviation (SD), minimum and maximum age in years..56

Table 4.3: Participants who passed, failed, or did not have compulsory subjects.58

Table 4.4: Descriptive statistics: Admission Points Score analysis.....58

Table 4.5: APS quartiles in a ranging order.....59

Table 4.6: Tabulation of criteria for each subject for a higher certificate in EMC60

Table 4.6.1: Tabulation of criteria for all four subjects for a higher certificate in EMC ...60

Table 4.7: Tabulation of criteria for each subject for a diploma in EMC.....61

Table 4.7.1: Tabulation of criteria for all four compulsory subjects for a diploma62

Table 4.8: Tabulation of criteria for each subject for a bachelor’s degree in EMC.....62

Table 4.8.1: Tabulation of criteria for all four compulsory subjects for a bachelor’s degree.
.....63

LIST OF FIGURES

Figure 3.1: Capricorn District map depicting four municipalities43

Figure 4.1: Histogram depicting the frequency distribution for APS score.....59

LIST OF ANNEXURES

ANNEXURE A: Letter to the Head of the Department of Health, Limpopo

ANNEXURE B: Letter of approval from the Limpopo Department of Health research and ethics committee

ANNEXURE C: Letter of approval from Durban University of Technology Research Ethics Committee

ANNEXURE D: Letter to the Chief Director of the Limpopo Department of Health, Clinical Support Services

ANNEXURE E: Data collection template

ABBREVIATIONS AND GLOSSARY OF TERMS

Advanced Life Support (ALS): A level of care provided within the Paramedic, Emergency Care Technician and Emergency Care Practitioner's scope of practice as determined by the Health Professions Council of South Africa. For this study, ALS refers to a level of care provided by emergency care providers, which includes invasive procedures such as; advanced airway management, advanced trauma management, use of defibrillators for cardioversion, pacing and use of mechanical ventilators.

Ambulance Emergency Assistant (AEA) course: A four-month emergency medical care course which includes basic and intermediate level of care capabilities such as; peripheral intravenous access, defibrillation in cardiac arrest and administration of inhalant medications. Holders of this qualification register with the Health Professions Council of South Africa under the auspices of the Professional Board of Emergency Care (PBEC). This course has been phased out, and the last intake was in 2020.

Bachelor of Health Sciences (BHSc) in emergency medical care: A four-year university-based emergency medical care professional degree achievable from higher education institutions in South Africa.

Basic Ambulance Assistant (BAA) course: A one-month emergency medical care short course which included basic skills and principles such as; Cardiopulmonary Resuscitation (CPR), stopping of bleeding and other non-invasive procedures. Currently, this course has been phased out, and it is no longer available in South Africa.

Critical Care Assistant (CCA) course: An emergency medical care short-course accredited by the Health Professions Council of South Africa. This course did not meet the requirements of the South African Qualifications Authority and was not assigned a National Qualification Framework level. The CCA course provided advanced emergency medical care skills, enabling graduates to register with the Health Professions Council of South Africa as 'Paramedics.' This course has since been phased out.

Emergency Care Providers: Persons registered with the Health Professions Council of South Africa under the auspices of the PBEC as Basic Ambulance Assistants, Ambulance Emergency Assistants, Emergency Care Assistants, Paramedic, Emergency Care Technicians, or Emergency Care Practitioners.

Emergency Care Technician (ECT): An emergency care provider with a two-year qualification in emergency medical care registered with the Health Professions Council of South Africa under the auspices of PBEC. An ECT offers an ALS level of care with a limited scope of practice.

Emergency Medical Care (EMC): An assessment, treatment and care of an injured or sick person in a situation in which such emergency evaluation, treatment and care is required and the continuation of treatment and care during transportation of such person to or between health establishments.

Emergency Medical Services (EMS): An organisation or body that is dedicated, staffed and equipped to operate an ambulance, medical rescue vehicle or medical response vehicle in order to offer emergency medical care.

Higher Education Qualification Sub-Framework (HEQSF): The revised HEQSF provides the basis for integrating all higher education qualifications into the NQF. It also provides a basis for standards development and quality assurance.

National Qualification Framework (NQF): A comprehensive which is used in South Africa to record the credits assigned to each level of learning achievement in a formal way to ensure the recognition of learnt skills and knowledge throughout the country. It comprises three coordinated components: Basic education, Further Education and Training and Higher Education.

South Africa Qualification Authority (SAQA): The overseeing body mandated by the NQF Act to register qualifications that meet criteria on the NQF.

The Health Professions Council of South Africa (HPCSA): A statutory body established in terms of section 2 of the Health Professions Act which provide guidance to registered healthcare practitioners through aspects of education and training, professional conduct, ethical behaviour and registrations.

CHAPTER 1

INTRODUCTION TO THE STUDY

1.1 Introduction

Emergency medical services (EMS) play a critical role in the healthcare system by effectively responding to disasters and emergencies. Emergency medical service professionals are responsible for assessing, stabilising, and delivering life-saving interventions in pre-hospital settings. The quality of EMS services hinges on the education and training of these professionals (Zayed Khalifah Al-Shaqsi 2010). In South Africa, as in many other countries, emergency care education has traditionally centred on short courses and on-the-job training rather than formal tertiary education (NECET 2017). This approach has faced challenges, particularly in meeting higher education standards set by the South African Qualifications Authority (SAQA). Legislative changes have restructured the emergency care education, moving from short courses to a more structured system that aligns with international and national education standards (Nell 2021).

This chapter offers a background to the study, presenting the problem statement, aim, and objectives. Additionally, it provides insight into the rationale for this study and outlines the thesis structure.

1.2 Background

Emergency medical services are a crucial component of the healthcare system, often serving as the first point of contact for patients during their most critical and vulnerable moments. These services are provided by emergency care providers who, far from being mere transporters, deliver essential medical and trauma-related care (Rifino and Mahon 2016). The role of emergency care providers is critical in responding to emergencies and ensuring prompt, appropriate care. Typically, these first responders assess and manage patient conditions, providing life-saving interventions at the scene before transporting patients safely to healthcare facilities (Afshari, Khodaveisi, and Sadeghian 2021). The quality of EMS services is directly linked to the education and training these professionals receive (Zayed Khalifah Al-Shaqsi 2010).

The training and education of emergency care providers in South Africa, like in many other countries, have long centred around vocational short courses and on-the-job training rather than formalised tertiary education (Nell 2021). Previously, South African emergency care education primarily followed a short-course training approach. In 1985, a three-tiered training system was implemented, comprising the Basic Ambulance Assistant (BAA) course, Ambulance Emergency Assistant (AEA) course, and Critical Care Assistant (CCA) course (NECET 2017: 3). While this approach aimed to enhance the quality of emergency care education and training, it became evident that the short-course model faced substantial challenges in aligning with the higher education requirements (Vincent-Lambert 2011).

The major challenge of aligning emergency medical care (EMC) short courses with the Higher Education Qualifications Sub-Framework (HEQSF) mandated by SAQA has been the main issue in South African emergency care education and training. This misalignment has arisen due to several factors. One of the primary contributors to this misalignment was the academic design of EMC short courses, which did not conform to the standards set by the National Qualifications Framework (NQF). This misalignment posed a significant obstacle to recognising these courses within the broader educational framework (Vincent-Lambert 2011). Furthermore, EMC short courses failed to meet SAQA requirements for formal qualifications, which added to the challenge. The SAQA, as the regulatory authority, sets specific criteria and standards for qualifications to ensure their credibility and relevance within the national education system.

Some authors suggested the most pressing issue was the substantial knowledge gap between the non-credit EMC short-courses and higher education EMC qualifications (Vincent-Lambert, Bezuidenhout and Van Vuuren 2014). This knowledge gap meant that individuals who completed short courses did not possess the comprehensive knowledge and skills expected at the higher education level, further complicating the alignment process.

In January 2012, a legislative decision was made by the National Department of Health (NDoH) to discontinue all EMC short courses in South Africa, particularly the BAA, AEA and CCA courses (Nell 2021). These short courses have played a vital role in emergency care training in the country since the early 1980s when the emergency care profession began to establish its distinct identity (NECET 2017; Nell 2021). This decision significantly

shifted the emergency care education and training landscape in the country. What started as a proposal became a reality on 27 January 2017 when the NDoH published a regulation relating to the qualifications for the EMC short courses. Published by the then minister of health, Dr Aaron Motsoaledi, the regulations stipulated that from January 2018, the BAA and the CCA qualifications will no longer result in registration with the Health Professions Council of South Africa (HPCSA), *GN49 GG40577/27-1-2017*. These regulations further indicated December 2019 as the last registration for the AEA qualification. The regulations signalled the end of an era of EMC short courses and advanced higher education emergency care qualifications (Sobuwa and Christopher 2019). The short course training model was discontinued in favour of higher education standards. Until then, there has been a dual registration system to become an emergency care provider: higher education and short course routes. Phasing out short courses meant that CCA and BAA graduates would no longer be permitted to register with the HPCSA from February 2018 and the AEA graduates from February 2020 onwards. However, individuals on these three registers before the closing date will remain on the relevant registers (Sobuwa and Christopher 2019).

1.3 The new emergency care courses

Recently, training and education in South Africa has been aligned to conform to the international standards. The historic short-course qualifications have been replaced with the three-tiered emergency care qualifications that are aligned with the relevant South African education legislations, i.e., the HEQSF, the Higher Education Act of 1997, National Qualification Framework Act of 2008, best practices and other national imperatives, such as the National Health Insurance (NHI) and the National Emergency Care Education and Training (NECET) policy (Nell 2021). These three-tiered qualifications have been developed to professionalise the emergency care profession and allow smooth vertical mobility from one qualification to another. The three-tiered emergency care qualifications are: the higher certificate in EMC, the diploma in EMC, and the bachelor's degree in EMC (Moodley 2016). Table 1.1 below depicts new undergraduate emergency care qualifications.

Table 1.1: The new undergraduate emergency care qualifications

New emergency care qualifications			
Qualification type	NQF level	Duration of study	HPCSA Registration category
Higher certificate in EMC	Five	One year	Emergency care assistant
Diploma in EMC	Six	Two years	Paramedic
Bachelor of health sciences degree in EMC	Eight	four years	Emergency care practitioner

Source: Moodley 2016.

The higher certificate in emergency medical care

The one-year higher certificate in emergency medical care (HC-EMC) is an introductory programme designed to train individuals to become competent emergency care providers within the emergency care setting (HPCSA 2019). This certificate programme supersedes the BAA course and serves as the new entry requirement for the field of emergency care (HPCSA 2019). Successful completion of the HC-EMC programme leads to registration as an emergency care assistant (ECA) with the HPCSA, serving as the initial step in an individual's career journey in the EMS field.

The diploma in emergency medical care

The two-year 240-credit diploma in emergency medical care (D-EMC) programme offers an entry point for individuals aspiring to pursue a career in emergency care. This qualification is designed to produce mid-level emergency care providers who can deliver EMS in diverse South African settings, from rural communities to highly developed urban areas (HPCSA 2019). The D-EMC programme serves as a valuable platform for self-improvement, catering for those already employed in the EMS sector and who are seeking to enhance their qualifications. It is also open to individuals lacking NQF-aligned qualifications, facilitating comprehensive personal growth while equipping them with the competencies needed to function independently and as integral members of EMS teams. This qualification is available as a full-time course at higher learning institutions, and it encompasses a total of 2400 notional hours, covering theoretical and clinical competencies by the HPCSA and the Professional Board for Emergency Care (PBEC) requirements.

The Professional Bachelor of Health Science Degree

The professional bachelor of health science degree (BHSc) in EMC is a comprehensive four-year full-time programme. This qualification is designed to enable graduates to register as emergency care practitioners (ECPs), who represent the highest level of emergency care providers in South Africa, accredited by the HPCSA (HPCSA 2019). The primary objective of the BHSc in EMC programme is to produce advanced life support (ALS) professionals capable of operating as independent clinical practitioners and experts in the pre-hospital milieu. This qualification is geared towards shaping professional practitioners who deeply understand the unique context of South Africa, strongly emphasising healthcare equity, promoting social upliftment, and reducing the disease burden.

1.4 Problem statement

The challenge at hand pertains to the prevailing situation in Limpopo EMS where the majority of emergency care providers have no formal qualifications and only a few weeks of training. The Limpopo EMS plans to migrate its personnel to the formal emergency care qualifications. However, the successful migration of the current EMS workforce hinges on these personnel accessing the newly established formal emergency care programmes. Specific minimum entry requirements must be met to secure entry into these programmes. Given the above-mentioned circumstances, this research investigated how emergency care providers within Limpopo EMS can fulfil these entry requirements and gain access to new formal emergency care qualifications.

The research problem highlights the need to understand how EMS providers meet the minimum entry requirements for these formal qualifications and how policy and recruitment strategies can be informed to facilitate a smooth and effective transition. The lack of literature on this critical topic impedes the progress of EMS within South Africa. It hinders the development of evidence-based strategies for enhancing the quality and capabilities of EMS services in the region.

1.5 Rationale for the study

The rationale of this study is grounded in the transformative changes occurring in emergency care education and training in South Africa, particularly the migration from short courses to formal emergency care qualifications' structure aligned with the NQF. This transformation is in line with the NECET policy, which aims to upgrade the qualifications of existing emergency care providers to meet higher education standards. As one of the provinces planning to migrate its personnel to these formal qualifications, the Limpopo EMS served as the focal point for this research.

Anecdotal evidence suggests that most emergency care providers in Limpopo EMS may face challenges in the migration process, due to their possession of non-credit-short course emergency care qualifications. These qualifications may not give them the necessary access to formal emergency care programmes. Therefore, the primary objective of this study is to evaluate the feasibility of migrating the Limpopo provincial EMS personnel to the NQF-aligned qualification structure.

The significance of this research lies in the limited research conducted on this specific subject within the EMS field. There is a growing concern that the existing body of published research related to emergency care education and training is insufficient. Therefore, this area has a pressing need for more comprehensive exploration. This study sought to fill this research gap by expanding emergency education and training knowledge. It will offer valuable insights into the challenges and opportunities associated with the migration process, thereby providing essential information and raising awareness regarding the education and training of EMS personnel.

Furthermore, this study has the potential to significantly affect emergency care education and training in South Africa. Enhancing the understanding of the migration process and its implications will contribute to the body of knowledge in emergency care. The insights gained from this study can inform policy decisions, educational practices, and training programmes, ultimately improving EMS services and, consequently, the quality of healthcare provided to the South African population.

1.6 Aims and objectives

1.6.1 Aim of the study

This study aimed to assess the feasibility of migrating emergency care providers within Limpopo EMS to the new emergency care qualifications.

1.6.2 Objectives of the study

To achieve this aim, the study outlines the following specific objectives:

1. Describe the demographic profile of emergency care providers in the Capricorn district in Limpopo.
2. Describe the emergency care qualifications of emergency care providers in the Capricorn district in Limpopo.
3. Determine how many emergency care providers are in a position to gain entry into the various new emergency care qualifications through direct access.

1.7 Structure of the dissertation

This section offers a concise overview of the structure of the dissertation and the contents of each chapter.

Chapter 1: Introduction

Chapter 1 introduced the research topic, offering insights into the background of emergency care education and training in South Africa. It delineated the research problem, elucidated the rationale of the study, and articulated the aim and objectives. Finally, the chapter was concluded by outlining the structure of the dissertation.

Chapter 2: Literature review

Chapter 2 extensively reviews the existing literature on migration within the local and global contexts and examines migration patterns within other health professions. This review is presented in a manner that directly addresses the objectives of the study.

Chapter 3: Research methodology

Chapter 3 outlines the research design and methodology applied in this study. It offers a detailed breakdown of the study design, research setting, the population under investigation, and the sampling method. Additionally, this chapter explores the data collection tool, delineates the data collection procedure, and clarifies the researcher's role within the study. The chapter also touches upon the critical aspects of study validity and reliability, the strategies employed for data generation and collection, and the methods used for data analysis and interpretation. Furthermore, it concludes by summarising the ethical considerations that were consistently considered throughout the research process.

Chapter 4: Results

Chapter 4 presents the findings of the study, aligning with the research objectives. This chapter begins by introducing the study sample and then proceeds to provide a thorough analysis of the demographic profile of the participants. It also delves into the emergency care qualification data, matriculation results, admissions points score (APS), and minimum admission requirements for higher education EMC programmes. The findings are meticulously described to address the main study objectives. To enhance clarity and comprehension, the results are presented using descriptive statistics, accompanied by visual aids such as tables and figures, and supported by detailed narratives.

Chapter 5: Discussion

Chapter 5, the penultimate chapter, discusses the findings of the study and relates these findings to the existing literature.

Chapter 6: Conclusions, summary, limitation and recommendations

Chapter 6, the final chapter, summarises the findings of the study, provides action recommendations, suggests areas for future research, and discusses the limitations of the study.

1.8 Conclusion

This chapter introduced the topic of the study and provided the background to emergency care education and training in South Africa. The chapter also presented the research

problem, the rationale of the study and the aim and objectives of the study. The chapter concluded by explaining the structure of this dissertation. The next chapter will review the existing literature on migration within the realms of local and global contexts. Additionally, the chapter will analyse migration patterns prevalent within various healthcare professions.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

To understand with some confidence migration of emergency care providers to formal emergency care qualifications, it becomes essential to review the emergency care education literature to ensure that the researcher has sufficient background knowledge and understanding of emergency care education and current debates. By looking at several authors' work to expand the topic, the following review provides an acumen of the relevant literature associated with the evolution of international emergency medical services and migration of emergency care education and training abroad and in South Africa. This was done to gain a broad understanding of the topic. While emergency medical services in South Africa are required to develop implementation strategies of the migration plan to ensure the alignment of their human resource and staff development strategies (NECET 2017), the review considered it necessary to also review the literature on admissions and admission policies in the South African higher education institutions to maximise planning and preparations of the existing emergency care providers for higher education emergency care programmes.

2.2 Search strategy

The researcher employed a continuous literature search process to ensure that new and relevant developments on the research topic are included in the study. Multiple sources were used to obtain and combine articles of potentially relevant data. The primary source used for the literature review was the Durban University of Technology (DUT) online libraries journal access site using keywords such as 'emergency care evolution', or 'paramedicine education', 'Emergency Medical Service evolution' or 'Paramedic education' or 'migration of paramedic education' or 'transition of EMS training' or 'Emergency Medical Technician training' or 'Paramedic training in the US' or 'Emergency care training and education in Australia' or 'Saudi Arabian EMS systems' 'EMS in the UK' or 'higher education admission' or 'recognition of prior learning' and 'mature age students'.

The secondary source was the Google Scholar search engine. PubMed was an additional source to locate articles using the same keywords. Databases were used to search for relevant journals and articles published within the past five years. Still, due to the paucity of research on the topic, some journals and articles older than five years were also used as references to support the research. Titles and abstracts of the texts found during the searches were reviewed for possible relevance. The researcher also searched the reference lists of any identified studies and review articles for relevant references not initially identified by the electronic search. Search results from different databases applicable to the study were downloaded. However, any article for which there was ambiguity about the relevance was discarded. The full-text articles that met the relevance criteria were downloaded and saved on the researcher's hard drive to be reviewed for importance later. Once thoroughly reviewed, texts were saved in a relevant category file or discarded if they did not apply to the study.

2.3 Migration of emergency care education and training abroad

A look at the past can assist us in understanding the present and planning for the future. The history of emergency care education is mostly identical to the history of EMS systems. The EMS pioneers who established the current emergency care education systems undoubtedly appreciated strong educational programmes and laid the foundation upon which future EMS generations can build. This section discusses the migration of emergency care education in some developed countries and issues of vital importance to the development of emergency care education.

2.3.1 Australia

From a historical viewpoint, in the 1800s and 1900s, the St John Ambulance crews took on a key role in providing pre-hospital emergency services in most Australian states. Various states established ambulance personnel and private providers, varying from state to state concerning operations. The Parliament merged different ambulance personnel and private providers into one ambulance service to provide better patient care, funding, and regulations. In 1972, the Ambulance Service of New South Wales (ASNSW) was formed, and in 1995, the South Australian Ambulance Service was also formed (Brooks *et al.* 2018).

Over the years, EMS has become an essential and important component of healthcare systems that organises all aspects of care provided to patients in the pre-hospital or out-of-hospital environment (Mehmood *et al.* 2018). Emergency medical service systems are similar globally; however, they vary from country to country regarding education and training provided to EMS workers (Vincent-Lambert 2011).

Munro, O'Meara and Kenny (2016) suggest that emergency care education is relatively new in Australia when compared to other more established healthcare disciplines, such as nursing, which migrated from hospital-based training to university-based education in the late 1970s and 1980s (O'Brien *et al.* 2014). Over the past couple of decades, as part of the government's response to economic and societal variables affecting the healthcare system, EMS underwent major changes to its practice and education. Following the educational migration of nursing and other healthcare disciplines in recent years, the emergency care profession has rapidly changed concerning education and training in Australia (Edwards 2011).

In the past, the educational requirements for the emergency care profession were minimal, requiring only first aid training; however, as the role of emergency care providers began to expand, different educational models were introduced. Currently, emergency care education in Australia combines a mixture of vocational training and tertiary education which are generally undertaken in either the vocational training or the tertiary sectors (Edwards 2011). In the vocational training model, students are generally employed as paramedic students and then undergo paramedic training on the job with block release classes over three years (O'Brien *et al.* 2014). After three years of training, a student gains a diploma qualification in paramedic training and continue to employment (Edwards 2011).

More recently, there has been a move towards a tertiary education model in emergency care education. Paramedic bachelor's degree courses are now offered in some universities in Australia (Dawson 2008). With the tertiary education model, students enrol for a paramedic bachelor's degree, study full-time at recognised higher education institutions (HEIs), then graduate after three years of study, after which they apply for an advertised graduate paramedic job, then complete a period of one to two years of internship in the state ambulance services (Edwards 2011).

Provision of EMS is territory- and state-based in Australia. As such, one of the state ambulance services and a major employer of paramedics 'Ambulance Victoria' requires that paramedics should at least have a minimum bachelor's degree in paramedicine (O'Brien *et al.* 2014). Consequently, emergency care education within five Victoria universities requires a bachelor's degree. Although the other four states and territories still have a mixture of vocational and tertiary education training models, Western Australia and South Australia have phased out all vocational training programmes and moved to tertiary education courses (O'Brien *et al.* 2014). This movement suggests that tertiary education will soon become the only entry point into the emergency care profession (Caffrey, Barnes and Olvera 2019; Edwards 2011).

Vocational training was dominant in the past years, incorporating non-structured mode lectures in vocational training institutions. Moreover, vocational training courses were practically orientated by design; that is, students were assessed for demonstrating particular skills or performing certain tasks (O'Brien *et al.* 2014). In contrast to vocational training courses, tertiary education courses aim to equip graduates with capabilities such as critical thinking, the ability to solve complex problems, communicate and become lifelong learners. Tertiary education emphasises developing graduates as critical thinkers to challenge, question and research.

Even though O'Brien *et al.* (2014) suggest that graduates of tertiary education may be less well developed when it comes to clinical skills as tertiary-based education provides less exposure to the clinical environment, prior research by Dawson (2008) indicated that by the end of the internship year, supervisors found that graduates of bachelor degree courses were as skilled as graduates of the vocational training courses. Moreover, bachelor's degree graduates had significant advantages regarding theoretical knowledge, problem-solving skills and critical appraisal.

2.3.2 Middle East

Emergency medical service was first brought into Saudi Arabia by a charitable aid society in 1953, the pre-formation of the Saudi Red Crescent Authority (SRCA) (Mutairi *et al.* 2016). Over time EMS in Saudi Arabia has experienced a series of positive changes concerning emergency care education as it sought to respond to the global demands for higher education qualifications in emergency care. Some of these changes include developing higher education programmes dedicated to teaching EMC studies. Despite

these positive changes, in the past there were no professional qualifications in the Saudi Arabian emergency care profession. AlShammari, Jennings and Williams (2017) indicate that between the years 1934 to 2005, emergency care education and training was primarily limited to courses such as first aid, basic life support (BLS) and first responder courses.

Industries usually provided training in these courses as this was the expectation at that time for industries to provide employees with basic first aid training. This model of training centred rather around practical skills than theoretical knowledge. Although training in BLS and first responder courses was relevant during that era, the scope of practice in these courses needed to be improved. Success in the BLS course allowed individuals to become BLS providers equipped with a non-invasive skill set, including basic airway management, oxygen administration, cardiopulmonary resuscitation (CPR), wound management and fracture splinting (Mutairi *et al.* 2016). Owing to the limited scope of practice offered by these courses, the EMS system in Saudi Arabia consisted of ambulances staffed with BLS crews; as such, this EMS system adopted an Anglo-American model which is based on a scoop-and-go approach (AlShammari, Jennings and Williams 2017). The Anglo-American model focused more on transporting patients to the hospital, with few patient interventions occurring in the field.

Following decades of no professional emergency care qualifications, the year 2005 brought about a stage of new developments in emergency care education in Saudi Arabia. This stage came with the design of the first diploma programme in the EMS field. The diploma programme was initially developed in the early twenty-first century to produce well-trained professional paramedics (AlShammari, Jennings and Williams 2017). By adapting the scope of emergency care education to a new model of ALS level of care, the diploma programme had a significant effect on the provision of emergency care in Saudi Arabia, such that the Saudi Commission for Health Specialties (SCFHS) recognised the level of professional accreditation for diploma graduates as that of technicians (AlShammari, Jennings and Williams 2017). This set a new phase for emergency care education and the provision of EMS in Saudi Arabia.

Although the diploma programme had a major effect on the provisioning of EMS in Saudi Arabia, the programme came to a sudden end. In 2012, SCFHS phased out all diploma programmes in the medical sciences, including the diploma in emergency care to pave

the way for the bachelor's degree programmes (Aljohani 2012). The SCFHS decision was influenced by a social dialogue involving the national media, as many health diploma graduates had faced substantial unemployment then. Moreover, such an issue combined with a recommendation by the World Health Organisation (WHO) to expect a bachelor's degree as the minimum requirement for health professionals, the SCFHS had to make sudden changes and introduce bachelor's degrees in health sciences (Aljohani 2012).

Following the phasing out of the diploma programme, a university or college-based bachelor's degree programme was developed. This programme was first established at King Saud bin Abdulaziz University for Health Sciences (KSAU-HS) and King Saud University (KSU). The main reason the bachelor's degree programme was developed was to address shortages of well-rounded Saudi emergency care professionals as well as to develop a model for emergency care education and to support research in the EMS field (Alanazi 2012). The first paramedic bachelor's programme that commenced in Saudi Arabia was adopted from Flinders University in South Australia. This choice was due to the unique approach in developing a student-based, patient-based and problem-based curriculum incorporated into the work practice (Alanazi 2012).

The provision of bachelor's degree programmes by universities is thought to have improved professionalism in the Saudi Arabian EMS. These programmes provide paramedics with advanced clinical and expanded management skills needed to provide necessary healthcare services to communities (Alanazi 2012). It should also be noted that a bachelor's degree qualifications may increase the accessibility of educational prospects and allow vertical mobility to higher academic qualifications such as master's and doctoral degrees. Emergency care education is considered a relatively new field within the medical tertiary education sector with few research publications (Hou, Rego and Service 2013). Therefore, a potential future approach to resolve the lack of research in emergency care education is to develop the research capacity by promoting enrolments in master's and doctoral programmes to study EMS issues empirically and develop plans to address them.

2.3.3 United Kingdom

The history of ambulance services in the UK can be traced back to the Knights Templar in the Crusades (Devenish 2014). Before 1890, taxi drivers, volunteers, police and firefighters transported injured and sick patients to the nearest medical facilities. In the

1890s, full-time ambulance personnel were established to transport injured and sick patients. These personnel fell under the authority of the metropolitan Asylum Board (Devenish 2014). In the 1930s, significant changes occurred to the local governments in the UK, which saw the move of ambulance personnel to the local councils. The structure of UK ambulance services was changed in 1948 after World War II when the *National Health Services Act* was passed in the British Parliament. From this point in time, the role of ambulance personnel was expanded to provide treatment and transportation for community members who needed medical assistance (Devenish 2014; Millar 1966). In the 1960s, the Millar report (Millar 1966) expanded the scope of ambulance personnel to provide higher levels of treatment such as spinal immobilisation, haemorrhage control, drug therapies and basic resuscitation (Devenish, Clark and Fleming 2016).

Until 1960, no framework regulated training or nationally recognised qualifications for paramedics in the UK. To become an ambulance personnel member, individuals were only required to be above the age of 21, possess a first aid certificate and a driver's license (McDonell, Burgess and Williams 2008). In 1966, Dr Millar chaired a working party on ambulance equipment and training whereby it was recommended that ambulance personnel should not only transport patients to the nearest facilities, but also provide first aid care to patients (Devenish, Clark and Fleming 2016; Millar 1966). Furthermore, an eight-week basic training course was recommended for ambulance personnel to provide intensive first-aid training with significant emphasis on practical work. After 12 months of working experience, a review would occur, and the student would be subjected to theory, practical and oral assessments. After completing these assessments, successful personnel were awarded the 'Ambulance Service Proficiency Certificate', the so-called 'Millar Certificate' (Kilner 2004). The Millar Certificate was the basic qualification for ambulance personnel at that time.

Following the Millar Report, the ambulance service proficiency course evolved into ambulance technician training defined by the Institute of Health Care Development (IHCD). The ambulance technician training course was highly practical and consisted of six weeks for the clinical component and three additional weeks for the driving training (Kilner 2004). The final award for this course was made when the student completed 12 months of clinical practice post-training in an operational role. In the 1980s, several locally based paramedic training schemes slowly developed. These were brought together when the national extended training for ambulance staff training scheme was launched by the

then National Health Service Training Authority. The Wright report was issued after an evaluation by the Department of Health and Social Security. This report outlined a training model that further increased the scope of ambulance personnel, and this model became the basis of the paramedic training (Kilner 2004).

The new era of paramedic training and education in the UK came in the 1980s with an expansion of paramedic training launched by the National Health Services Training Authority and centralised through the national extended training for ambulance staff scheme (Carney 1999; Devenish 2014). In the early 1990s, the National Health Service Directorate issued the updated ambulance staff training scheme, the ambulance service paramedic training course. This course was high on training paramedics to gain and practice certain skills, such as resuscitation skills. However, the course needed more background education content. In the late 1990s, several universities launched higher education courses at certificate and diploma levels for the existing paramedics to propel them towards an anticipated degree path (Carney 1999; Devenish, Clark and Fleming 2016). In pursuit of a pre-employment degree entry model and to implement a degree-level education for potential paramedics, Hertfordshire and Sheffield became the first universities to launch undergraduate degree programmes in paramedical science successfully (Devenish, Clark and Fleming 2016).

2.3.4 United States

Mortality rates were much higher during the civil war than in previous wars, because weapons had become more destructive. To decrease these mortalities, the military established the first ambulance service. This idea spread throughout cities in the US, and by the 1940s, some communities initiated volunteer ambulance services. Those who volunteered to drive ambulances during that time were known as 'ambulance attendants'. These volunteers were not medically trained, but they aimed to transport patients to hospitals without performing any medical care during transportation (Butcher and Zaidi 2018; Morton *et al.* 2015).

The 1960s challenged public health as many died on highways due to traffic accidents. This challenge was detailed in the infamous 1966 white paper titled "Accidental Death and Disability" (United States of America Division of Medical Sciences 1966). The paper prepared by the President's Commission on Highway Safety and the National Academy of Sciences detailed the lack of an organised system to treat traumatic, critical patients

and the lack of proper pre-hospital care. Reforms were highlighted in the national training and education, system design, and response of the ambulance services. The white paper and its endorsements for a standardised emergency response system ushered in the National Highway Safety Act of 1966 that established the Department of Transportation. The Department of Transportation and the National Highway Traffic Safety Administration (NHTSA) played a major role in pushing for the development of EMS systems while standardising education and curriculum standards. Consequently, this steered the establishment of a well-organised civilian EMS. As the civilian EMS and its operations continued to develop, so did the EMS training division (Devenish 2014; NHTSA 2009).

The National Highway Safety Act of 1966 provided a way for resolute efforts to train and equip ambulance personnel with appropriate skills for dealing with trauma. The Department of Transportation was responsible for developing an emergency medical technician (EMT) training programme for ambulance attendants. A significant accomplishment of the National Highway Safety Act of 1966 was developing a training programme for ambulance and emergency personnel in basic BLS techniques (Devenish 2014). The graduate of the training was certified as an emergency medical technician - basic (EMT-B). Initially, the EMT-B received around 80 hours of training. This was later extended to 120 hours and they were trained mainly by physicians and nurses, and therefore, very little of the training content was related to the pre-hospital care (Devenish, Clark and Fleming 2016). The training content could not provide an actual outline of pre-hospital scopes of practice and EMS standards of practice. Furthermore, their scope of practice was limited to rather simple and non-invasive interventions (NHTSA 2009).

Devenish (2014) indicates that paramedic training followed shortly after the EMT-B training was developed. Paramedics undergo approximately 1000–1200 hours of training and are the highest emergency care qualifications in the US. Their scope of practice is more complex than EMT-B, including invasive procedures such as advanced airway procedures, intravenous access and drug administration, etc. Paramedics begin by completing EMT training and gaining professional experience working as an EMT. Thereafter, individuals can select a paramedic training programme to further their medical knowledge and emergency care skills (Margolis, 2005). Due to the huge gap in competencies and training duration between the paramedic levels and the EMT-B, several states adopted a certification level between the two: EMT-Intermediate. EMT-Intermediate, also known as an advanced emergency medical technician (AEMT), is the

second level of EMT, which includes more advanced medical procedures than the EMT-B, but lower than the paramedic level.

Whilst the need for migration of emergency care education to tertiary sectors is rapidly growing globally, in the US, discussions of making a significant change to the current paramedic programmes by requiring an associate's degree have recently gained momentum, particularly with the look at the agenda for the future 2050 (Becker 2018). Even though these discussions advocate for an associate's degree in paramedic sciences, conversely, the main objective is to have a bachelor's degree in paramedic sciences (Becker 2018).

The National EMS Management Association, National Association of EMS Educators, and the International Association of Flight and Critical Care Paramedics in the US believe it is high time that paramedics are trained through a formal education process that ends with an associate's degree, as this will enhance emergency care as a health profession (Caffrey, Barnes and Olvera 2019). In addition, these collective 'associations' recommend that paramedics entering the emergency care profession should possess a bachelor's degree. They recommend EMS in the US pass this requirement by 2025 (Caffrey, Barnes and Olvera 2019). Currently, it is not a requirement for one to possess a paramedic degree in a majority of the states. However, Jensen (2020) indicates that as of 2018, two states in the US, Oregon and Kansas, require new paramedics to possess a bachelor's degree as part of the requirement for employment in EMS. This view is supported by Vincent-Lambert, Bezuidenhout and van Vuuren (2014), which suggests that many countries require emergency care providers to obtain bachelor's degrees which would meet the educational needs of EMS systems.

2.4 Training and education migration in other health professions

The trend of 'migration' or moving the education of health professions to the tertiary education level is not new; it occurred in the past centuries when other health professions moved into the tertiary education, beginning with medicine (Ten Cate *et al.* 2018). The trend has also accelerated in recent decades with health professions such as nursing, which migrated from vocational training to the academic sector (Blaauw, Ditlopo and Rispel 2014). Hence, it is now expected that all new entrants to these professions must begin by acquiring a tertiary education.

2.4.1 Migration in medicine: Internationally

Medicine is considered the first health profession to migrate to the academic sectors (Ten Cate *et al.* 2018). Even though accounts from ancient history show the existence of medical training, the formal medical education system began in the late Middle Ages with the rise of universities in countries such as Italy and Germany (Ten Cate *et al.* 2018). From around AD 1100 until the mid-nineteenth century, the medical profession was practised by two types of professionals, namely, academic doctors and practically trained surgeons. Academic doctors were educated individuals; their training was entirely theoretical, with no fixed schedule for academic medical education. Academic sectors offered programmes of lectures rather than fixed courses, as such education could be completed in as little as two years after a preparatory education which also took two years (Custers and Cate 2018; Ten Cate *et al.* 2018). In contrast, surgeons were trained by highly esteemed associations, which included botany, anatomy lessons and extensive supervised training practice for up to five years (Ten Cate *et al.* 2018).

After the French Revolution, associations were gradually abandoned; as medical education changed, university education migrated into curricula with required courses. Clinical schools were established in the Netherlands, but only existed for a few decades. In the second half of the nineteenth century, the national government started to require both practical training and university education to allow the opportunity of patient care (Ten Cate *et al.* 2018). Even though the content of medical education became well defined in European schools, its duration could have been more critical and left to however long it took students to complete the requirements, often with unlimited opportunities to retake exams. In contrast to medical education in the US, with its fixed classes and duration, an informal report from Dutch education showed a vast difference in training durations far from ideal completion rates until well after World War II (Ten Cate *et al.* 2018).

Ten Cate *et al.* (2018) state that medical education in the US has a shorter history than the European version and needed to be structured in associations like in the European countries. Until the nineteenth century, medical education was dominated by extended preceptorship, and medical schools offered two to three year programmes. Even though clinical training formed part of many programmes, it was compulsory in the early twentieth century. After World War II, medical schools standardised medical education to four

years. Still, since the 1950s, there were complaints that four years were inadequate, and therefore many students chose rotating internships after medical school to widen their experience. In 1975, an undergraduate medicine programme was extended to six years of practical and theoretical training, including suitable clinical experience in hospitals (Custers and Cate 2018; Ten Cate *et al.* 2018).

2.4.2 Migration in nursing: South Africa

Nursing education in South Africa began in 1899, and since then, several nursing programmes have been developed to meet the increasing need for appropriate and safe healthcare. Blaauw, Ditlopo and Rispel (2014) indicate that nursing education and training began as traineeship training in hospitals, and the training content was based on health needs. The nursing education system developed and went through changes over the years from a disintegrated, hospital-based system to an incorporated system with provincial colleges, private colleges and universities all contributing to the education of the nursing workforce. Some of these changes have been influenced by policies from the provincial health departments and, to a lesser degree, higher education. To maintain standardisation and quality control of nursing education, professional bodies such as the South African Nursing Council (SANC) established national board examinations and registered practitioners (Bezuidenhout, Human and Lekhuleni 2013). The SANC also played a significant role in migrating nursing education into higher education (HE), and as early as 1953, nurse learners could follow diploma programmes in tertiary sectors. Blaauw Ditlopo and Rispel (2014) indicate that in 1955 the University of Pretoria introduced the first degree programme to prepare professional nurses. By 1969, several higher education institutions (HEIs) were offering degree programmes for registration in general nursing. In addition to the development of degree programmes, disciplines such as community health nursing, psychiatric nursing and midwifery were included and offered as merged programmes.

In 1985 the Van Wyk de Vries Commission presented a view that nursing colleges could be affiliated with universities to offer post-secondary school programmes (NDoH 2019). As a result, the affiliation was endorsed. This was steered by the memoranda of understanding between the Department of Health, the controlling body of public nursing colleges, and the affiliated universities (Matlakala 2017). The main reason for such affiliation was for nursing science departments within universities to provide oversight and

mentoring on the quality and standards of diploma programmes offered by the nursing colleges. However, in this regard, nursing colleges retained the responsibility for the administration and management of the provisioning of the two certificate programmes and the three-year diploma programme. Even though the initiative of affiliation between universities and nursing colleges was crucial in migrating nursing education to the tertiary sectors, the arrangement consistently led to a parallel and a dual system for nursing education (Blaauw, Ditlopo and Rispel 2014).

Before 1994, four nursing programmes (commonly referred to as legacy nursing qualifications) were offered at various nursing education institutions (NEIs) on different levels (Mekwa 2000). The entry-level programme was a one-year certificate qualification allowing registration as an enrolled auxiliary nurse: R.2176 of 19 November 1993 (Matlakala 2017). This programme was mainly implemented through in-service training, and the duration sometimes differed depending on the institution. The second level was a two-year certificate qualification which allowed for registration as an enrolled nurse by SANC, according to Regulation R.2175 of November 1993 (Matlakala 2017). Completing the two-year certificate allowed enrolled nurses to enrol for a two-year diploma programme in general nursing, also called the bridging programme. This programme allowed for registration as a psychiatric or general nurse under the SANC Regulation R.683. The fourth and the highest qualification in nursing was a three-year diploma or a four-year degree qualification offered at nursing colleges or universities. This integrated programme included psychiatric, general and community health nursing, and midwifery under the SANC Regulation R.425 of 22 February 1985 (Matlakala 2017). Table 2.1 below depicts the legacy nursing qualifications.

Table 2.1: Legacy nursing qualifications.

Qualification type	Duration in years	Professional enrolment with SANC
Post-basic course (Specialisation)	One	Area of specialisation
University degree	Four	Nurse (general, psychiatry and community) and midwife
College diploma	Three-Four	Nurse (general, community and psychiatric) and midwife
Basic midwife	One	Midwife
Basic psychiatry	One	Psychiatric nurse
Bridging course for enrolled nurses	Two	General nurse/psychiatric nurse
Certificate	Two	Enrolled nurse
Certificate	One	Enrolled nursing auxiliary

Source: NDoH 2019.

The integrated four-year nursing programme commenced in 1984 in line with establishing a nurse-based primary healthcare approach in South Africa. The main motivation for initiating this programme was to prepare a generalist nurse-midwife who may well function in hospital and primary healthcare settings (Bezuidenhout, Human and Lekhuleni 2013). The generalist nurses previously were trained for three years before they could achieve the three additional qualifications (psychiatric, midwifery and community health nursing), taking one year for each, making the total duration to prepare a generalist nurse-midwife six years. Although, at first, there was some debate about whether the separate registration for psychiatric, community health and general nursing should be retained or one single registration implemented, the separate registrations were maintained at the end (Bezuidenhout, Human and Lekhuleni 2013). This led to beginner nurses entering the profession with an epaulette and three bars, a significant transformation for the profession (Bezuidenhout, Human and Lekhuleni 2013).

As previously stated, all the legacy qualifications in nursing education were offered by various providers. However, these providers had different governance models, settings and student management systems. Furthermore, some of the programmes offered by these providers were not designed around sound education principles regarding admissions into programmes. In contrast, their articulation and progression were not designed to meet the national needs nor to respond to the new realities (NDoH 2019). The common lack of a nationally firm educational minimum entry requirement into enrolled nurse (EN) and enrolled nursing auxiliary (ENA) programmes generated several

problems for these students (NDoH 2019). Furthermore, the lack of internal quality control mechanisms has led to the overproduction of ENs and ENAs. The inappropriate articulation and progression pathways also limited their ability to achieve the necessary competencies needed to complete programmes leading to registration as a nurse (NDoH 2019).

Following some of the requirements associated with SANC regulations, universities and colleges produce registered nurses through diploma programmes designated for colleges and degree programmes designated for universities. However, these separate and parallel qualifications for colleges and universities caused tension in the service. They did not lead to smooth transfers between institutions nor horizontal or vertical articulation between programmes (Matlakala 2017). As the governor of the nursing programmes, Government Notice No. R.425 of 22 February 1985 made it compulsory for nursing education institutions (NEIs) to prepare this group of nurses to produce a nurse qualified in psychiatric, midwifery, community and general nursing within a four-year programme (NDoH 2019). However, concerning midwifery training, the duration of training is thought to be inadequate and does not offer student midwives the requisite competencies, consequently limiting their ability to function within the prescribed scope of practice for midwives.

On the contrary, post-basic specialisation programmes in nursing were designed to train and educate nurses to function at a higher level in specific fields of practice. However, these also encountered challenges. There are different educational paths leading to an additional qualification. Still, regarding registrations, SANC does not distinguish the qualification obtained through one of the paths leading to a post-basic qualification. Instead, registration is only determined by the area of speciality, irrespective of whether it was obtained through a master's degree, bachelor's degree, diploma or any other qualification (NDoH 2019). This has led to uncertainties regarding the classification and status of advanced practice nurses in South Africa. In addition, it also had a negative effect on the clinical career paths and remuneration of the advanced practice nurse (NDoH 2019).

Following the provision of the NQF Act, 2008 regulations (RSA 2008), the legacy nursing qualifications were revised. As part of the transformation, the strategic plan for nursing education and training was released (NDoH 2019). This paved the way for the new Higher

Education Qualification Sub-framework (HEQSF) aligned nursing qualifications (Matlakala 2017). The process of phasing out the legacy nursing qualifications was initiated in 2015. Government Notice 40123 of July 2016, gazetted by the Minister of Higher Education and Training, stipulated 2019 as the last date for the intake of all nursing programmes leading to qualifications not aligned with the regulations of the NQF Act, 2008 (RSA 2008).

The proposed new HEQSF-aligned nursing qualifications, as illustrated in Table 2.2, begins with an NQF level 5 higher certificate in nursing. This one-year programme leads to registration as an auxiliary nurse and will produce nurses who deliver basic nursing care in different settings (Matlakala 2017). This is followed by the three-year NQF level 6 diploma in nursing, which leads to registration as an independent general nurse who will be service orientated, clinically focused, and able to provide general nursing care. Holders of a diploma qualification may further enrol for the NQF level 7 advanced diploma in midwifery. This is a one-year programme leading to registration as a midwife and is intended to produce independent, competent and critical-thinking midwives who will provide an extensive variety of midwifery healthcare (Bezuidenhout, Human and Lekhuleni 2013). The three-year comprehensive diploma course offered at nursing colleges and one offered as a university degree have been consolidated into an NQF level 8 professional bachelor of nursing degree. This four-year bachelor's degree is designed to produce a nurse and midwife who will improve the health outcomes of families, groups and communities through providing midwife health services and evidenced-based nursing (Bezuidenhout, Human and Lekhuleni 2013). The one-year NQF level 8 post-graduate diploma programme leading to registration as a nurse or midwife specialist is intended to produce a nurse or midwife specialist who is clinically focused and will render comprehensive scientific nursing or midwife care (NDoH 2019). Completing a bachelor's degree or post-graduate diploma may enable candidates to enrol for NQF level 9 and 10 qualifications, which applies to the master's and doctoral nursing programmes. These are either research-based or professional (clinical) qualifications. At this stage, there are no determined professional registrations with SANC for these programmes. Still, SANC will have to consider keeping information on graduates from these programmes (NDoH 2019).

Table 2.2: The new HEQSF-aligned qualifications

The new nursing qualifications			
Nursing category	Qualification type	NQF level	Minimum Duration
Registered auxiliary nurse	Higher certificate	5	One year
Registered general nurse	Diploma	6	Three years
Registered midwife	Advanced diploma	7	One year
Registered professional nurse and midwife	Bachelor's degree	8	Four years
Nurse specialist/midwife specialist	Post graduate diploma	8	One year
Advanced specialist nurse	Master's degree	9	One year
Doctorate in nursing	Doctoral degree	10	Three years

Source: NDoH 2019

2.5 Emergency care education and training in South Africa

In South Africa, the education and training provided to EMS workers varied from other countries. Before 1980 there were no professional qualifications or a regulatory body for pre-hospital emergency care. Several standardised short courses were introduced in 1985, namely a three-week BAA, an eight-week AEA and a four-month CCA courses (HPCSA 1999; Vincent-Lambert 2011). Initially, these three short courses were offered as in-service training by the provincial ambulance training colleges (ATCs). The model of education and training offered by these short courses centred more around clinical skills than theoretical knowledge (Vincent-Lambert 2011).

As time passed, a need developed for a formal HE qualification in emergency care. The first qualification was a three-year national diploma in ambulance and emergency technology (N. Dip AET), which commenced in 1987 (Cermak 2016). This three-year full-time HE qualification, which later changed to the national diploma in EMC, provided an appropriate standard of clinical care and imparted an appreciation for academic development and research. In 2003, a bachelor of technology degree in EMC was introduced and could be obtained by completing an additional two years of part-time study after obtaining a three-year national diploma qualification (SAQA 2009).

2.5.1 Emergency care education system development

The need to comply with the SAQA Act requirements allowed the emergency care education system to be reviewed, and central to the debate were important issues of lifelong learning, career-pathing, academic progression and further professional development. To meet the SAQA Act requirements and align emergency care education, the HPCSA, a statutory body guided by the Health Professions Act, 1974 (HPCSA 2004), reviewed the learning outcomes of short courses. The outcome of this review was the design of a two-year NQF-aligned national certificate in emergency care, also known as the emergency care technician (ECT) qualification, introduced in 2007 (HPCSA 2011; Sobuwa and Christopher 2019). Provincial ATCs and some HEIs offered the ECT course.

2.5.2 Short-course training challenges

While efforts were made towards professionalising emergency care education and training, both provincial and private ATCs continued to offer short courses, and ultimately, private ATCs became significantly involved in short-course training, especially in the offering of a four-week BAA course (Vincent-Lambert 2011). This led to the HPCSA becoming overwhelmed with requests from numerous private ATCs wishing to offer these short courses. An increased number of accredited short-course providers meant controlling emergency care education and training would nearly become impossible. This made the quality of short-course training questionable (HPCSA 2009). In the past two decades, short-course training significantly increased the number of trained and registered emergency care providers in the HPCSA register (Sobuwa and Christopher, 2019). However, with the closure of short courses in 2018 and 2019, the registrations have dropped (Tiwari *et al.* 2021b). Table 2.3 below depicts registration statistics for the HPCSA PBEC as at 1996, 2018, 2019, 1 July 2021 and 30 June 2023 (HPCSA 2023; Sobuwa and Christopher 2019; Tiwari *et al.* 2021b).

Table 2.3: Registration statistics for the HPCSA Professional Board for Emergency Care as at, 1996, 2018, 2019, 1 July 2021 and 30 June 2023.

Registration category	Statistics in 1996	Statistics in 2018	Statistics in 2019	Statistics in 2021	Statistics in 2023
BAA	1267	50,604	43,171	29,879	23,433
ECA	0	0	0	7	133
ANA	400	10,063	10,683	11,365	10,733
ANT	79	1,527	1,489	1,584	1,674
ECT	0	1,124	1,123	1,083	1,035
OECO	Unconfirmed	Unconfirmed	462	395	351
ECP	0	623	731	900	1,058
Total	1,746	63,941	57,659	45,210	38,417

ANT: Paramedic; ANA: Ambulance Emergency Assistant; BAA: Basic Ambulance Assistant; ECA: Emergency Care Assistant; ECT: Emergency Care Technician; ECP: Emergency Care Practitioner; OECO: Operational Emergency Care Orderly.

As illustrated in Table 2.3, as of 30 June 2023, 61% of emergency care providers registered with the HPCSA PBEC are basic ambulance assistants (BAAs), while ambulance emergency assistants (AEAs) comprise 28%. BAAs and AEAs together comprise 89% of emergency care providers registered with the HPCSA PBEC. It follows that short-course bearers remain the backbone of EMS in South Africa, yet the knowledge gap between short courses and HE qualifications grows ever wider (Cermak 2016). Short-course-based training was sufficient during the shaping of EMS in South Africa. However, with the continued research developments in the South African health care and HE systems, the short-course-based training has been deemed inadequate and unsustainable (Cermak 2016), therefore the need for more sustainable SAQA-compliant and NQF-aligned courses in emergency care became more urgent.

2.5.3 Migration from short courses to the NQF-aligned courses

As stated above, previously in South Africa, emergency care training and education programmes, such as BAA, AEA and CCA, were focused on emergency medical response with inadequate emergency care education. However, the current requirement is that emergency care education evolve into higher certificate, diploma and professional four-year degree programmes comparable to other health professions, such as psychology and nursing. When emergency care education is structured holistically, it will compare with wide-ranging programmes, such as nursing and other allied health professions (O'Meara *et al.* 2015). For this reason, emergency care education needs to be more credible by leading to a graduate profession (Cooper 2005).

As early as 2002, partnerships in the HE system were proposed by the South African Ministry of Education (Daniels 2010). As a result, the NDoH and the HPCSA decided to replace all emergency care short courses with NQF-aligned programmes. Following this decision, all future emergency care courses would be structured in the form of the SAQA and HE recognised programmes. The HPCSA, as a legislative body and quality assurer, reviewed and aligned emergency care education and training with the HEQSF, thereby ensuring competent and professional practitioners. This review came as a result of the requirements set out by the SAQA Act to transform emergency care education and provide professional status in the emergency care field (HPCSA 2010; Nell 2016).

As a statutory body, the HPCSA guides the registered healthcare professions and protects the public by setting contextually relevant standards for healthcare training and practice (Nell 2016). Therefore, a need exists for emergency care providers to achieve high standards of education. The standard and the duration of emergency care short courses were inadequate to meet the demands of the pre-hospital environment, more especially if one has to consider that the majority of ambulance crews in the South African EMS field are made up of emergency care providers with three to four weeks BAA training, who sometimes treat and transport critically injured and ill patients (Vincent-Lambert 2011). Therefore, the HPCSA, as a quality assurer, had an obligation to ensure that South African citizens are in the hands of well-trained and qualified professionals in any emergency medical situation (Nell 2016). The HPCSA expect healthcare training institutions to adhere to evidence-based levels and standards of care. However, the short-course training model could not address and adhere to the changing requirements of the profession. To address this challenge, formal emergency care qualifications aligned with the NQF are required for further professional development of emergency care providers within the health sector (NECET 2017).

With the recent NECET policy that advanced the three-tiered formal emergency care qualifications (a one-year higher certificate in EMC, two-year diploma in EMC and a four-year professional degree in EMC), the South African emergency care education and training is experiencing a significant transformation, from a post-employment and in-service training to higher education-based, pre-employment professional programmes (Sobuwa and Christopher 2019). Emergency care education is entering a phase of being defined as an academic body with its literature, knowledge, and research base. In this way, emergency care education will provide evidence-based clinical practice comparable

to other health professions, thus transforming into a profession with professional status (Joyce *et al.* 2009; Nell 2016).

2.5.4 Limited access for emergency care providers to higher education

As mentioned, most emergency care providers in South Africa have no formal qualifications and are bearers of non-NQF-aligned short-course emergency care qualifications (NECET 2017). This creates a barrier for many of these providers towards accessing HE, leading to emergency care providers being disadvantaged compared to other healthcare professionals (NECET 2017). Moreover, due to the ever-growing knowledge gap between non-NQF-aligned short-courses and HE qualifications, the articulation between short courses and HE qualifications becomes difficult. The short course system focuses only on skills-based training, which needs to be revised to support career pathing, development and lifelong learning opportunities. Hence, access to the NQF-aligned formal qualifications thus becomes a requirement to support the further development of emergency care providers in South Africa (Vincent-Lambert 2011).

While the NECET policy makes provision for access to the emergency care profession for all successful matriculates and creates the opportunity for recognition of prior learning, especially for the existing emergency care providers with non-NQF aligned emergency care short courses (NECET 2017), migration into formal emergency care qualifications depends on emergency care providers gaining access into HE emergency care programmes.

2.5.5 Challenges and opportunities in migrating from vocational to tertiary education in emergency care

Migrating from vocational training to tertiary education presents several challenges. Vocationally trained emergency care providers often face a gap in foundational knowledge and struggle to adjust to the academic rigor of tertiary education, which emphasises theory, evidence-based practice, and critical thinking. Financial constraints and the challenge of balancing work, study, and personal life add to the difficulty of this transition, potentially leading to high-stress levels and burnout (Bok 2021). Furthermore, the shift in professional identity and the lack of robust support systems, such as academic counselling and mentorship, can create additional hurdles for these students.

Despite these challenges, migrating to tertiary education offers significant opportunities. It opens doors to advanced clinical roles, leadership positions, and specialised fields within EMS, enhancing career prospects and earning potential. Tertiary education also promotes evidence-based practice, improving patient outcomes and the efficiency of emergency care systems (Schulz, Solga and Pollak 2023). Additionally, engaging in research and fostering a culture of lifelong learning can be personally fulfilling and professionally advantageous. Networking and collaboration opportunities provided by tertiary education can broaden perspectives and lead to innovative approaches in emergency care, ultimately benefiting both the providers and the healthcare system as a whole (Schulz, Solga and Pollak 2023).

2.6 Admission to higher education

Moore (2005) argues that there is a misunderstanding of the issues of ‘admission’ and ‘eligibility’. As she records, the first step in the admissions process is to determine the eligibility of applicants. This refers to the listed requirements that students must meet to be considered for admission to tertiary institutions. On the other hand, admission has to do with the set of criteria tertiary institutions employ in deciding which students will be accepted. These can include academic results, knowledge of the field, age and so on. Although there are different opinions as to whether there should be any automatic right to admission based on academic results, not limited by social or constitutional imperatives, nor the needs of society, a more open and broad admissions policy has greater forecasts of eliminating the existing social inequalities (Badat 2008).

2.6.1 Higher education admission policies

Some authors assume that admission policies provided by tertiary institutions can negatively or positively affect access to HE (Epple *et al.* 2017; Gaertner and Hart 2013). A study by Dias (2015) indicated that a new admission policy paved the way for easy access and admissions to HE and widened the recruitment pool in Portugal. This policy aimed at expanding access to HE made it possible to reverse the decrease in student numbers seen over the past years. Moreover, studies indicate that enrolments increased by approximately 14% in the year 2007–2008 in Portugal after the implementation of the admissions policy (Dias 2015).

Previously, in South Africa, admissions to tertiary institutions were only reserved for specific races and ethnic groups (Jappie 2020). Still, with the dawn of democracy, the constitution prohibited discrimination of any form. The Higher Education Act, 1997 (RSA 1997) proclaimed the interest in redressing past discrimination, ensuring equal access, and promoting the full realisation of the potential of every student. To further this interest, section 37 of the Higher Education Act, 1997 (RSA 1997) mandated the Council of Higher Education (CHE) to decide on the admission policies of public tertiary institutions. Furthermore, such policies should advance the objectives of the NQF and the Higher Education Act of 1997, which refers to redress, quality in HE and equity. These policies must, however, be consistent with the Minister's policy (RSA 1997).

Subject to this, section 37 of the Higher Education Act highlights that HEIs have the authority to set specific minimum entry requirements and selection methods and decide how many students may be accepted to a particular HE programme (RSA 1997). The Act granted tertiary institutions the authority to decide who and how to accept students based on the published criteria and policies. According to the Act, the CHE must publish and avail the admission policies on request. Moreover, the admission policies must provide proper measures to redress past inequalities and may not discriminate against applicants in any way (RSA 1997).

2.6.2 Minimum admission requirements for higher education programmes

While the NECET policy made provision for emergency care providers to access HE programmes, on the other hand, to be eligible for admissions to HEIs, applicants ought to meet the minimum entry requirements. As defined in the Department of Higher Education's policy made under the Higher Education Act, 1997, on the minimum admission requirements for higher certificate, diploma and bachelor's degree programmes requiring a national senior certificate published in Government Gazette, No. 27961 of 26 August 2005, the minimum entry requirements are the appropriate subject combinations and levels of achievements (RSA 1997). Having effect from January 2009, the HE policy outlined the legislative minimum admissions to HE as the national senior certificate (NSC). With the NSC replacing the senior certificate (SC) in 2008, the development of this policy was aided by general discussions and consultations within and outside of HE. Even though this policy outlined the legislative minimum admission into HE as the NSC, the setting of the admission requirements is made in terms of section 74

of the Higher Education Act, 1997 and section 16(7) of the General and Further Education and Training Quality Assurance Act, 2001 by Higher Education South Africa (HESA) (RSA 2001). Moreover, HESA, the successor to the South African University Vice-Chancellors Association (SAUVCA) and the Committee of Technikon Principals (CTP), approved this policy.

As explained above, applicants should meet specific minimum requirements to be eligible for admission into HE programmes. The Department of Higher Education policy, Government Gazette, No. 27961 of 26 August 2005, clearly explains minimum admission requirements as the criteria for enrolment in HE programmes, with HEIs being permitted to specify the relevant compulsory subjects and levels of achievement required for entry into the respective programmes.

2.6.3 Minimum admission requirements for new EMC programmes

Currently, three formal emergency care undergraduate programmes exist in South Africa. These include the one-year higher certificate, two-year diploma, and four-year bachelor's degree. The minimum entry requirement for these programmes is the NSC/SC with subject combination and levels of achievement based on the type of qualification. Table 2.4 depicts subjects and the minimum admission points score required for the respective emergency care programmes based on the senior certificate (obtained before 2009).

Table 2.4: Subjects and the minimum admission symbols and points score required for different emergency medical care programmes.

EMC programmes	Compulsory matric subjects	HG	SG
Higher certificate (APS 21)	Mathematics	E symbol	D symbol
	English	E symbol	D symbol
	Biology/Physical science	E symbol	D symbol
Diploma (APS 26)	Mathematics	D symbol	C symbol
	English	D symbol	C symbol
	Biology/Physical science	D symbol	C symbol
Bachelor's degree (APS 30)	Mathematics	D symbol	B symbol
	English	D symbol	B symbol
	Biology/Physical science	D symbol	B symbol

HG; Higher grade, SG; Standard grade and APS; Admission Point Score

Source: (DUT 2023; SMU 2021; University of Johannesburg 2021b)

While applicants must have a specific subject combination and appropriate levels of achievement, it is worth noting that the selection criteria for EMC programmes differ between HEIs in South Africa. For admission in the one-year higher certificate programme, the University of Johannesburg (UJ) Department of Emergency Medical Care and Rescue (EMCR) stipulated that in addition to adherence to the student admission policy of the university, the applicant with a SC (before 2009) must have at least a minimum of an E (adequate achievement) symbol on higher grade or a D (moderate achievement) symbol on standard grade pass for all of the following subjects: (University of Johannesburg 2021c)

- English
- Mathematics
- Biology and/or Physical Sciences

In addition to the combination of the subjects and levels of achievements, the department of EMCR utilises admission point score (APS) as selection criterium once the minimum admission requirements are satisfied. Both the UJ and Sefako Makgatho University (SMU) require an applicant to have a minimum of 21 subject points/APS for admission into the higher certificate programme (SMU 2021; University of Johannesburg 2021c). For the two-year diploma programme, the applicant must have a minimum of a D symbol on higher grade or a C (substantial achievement) symbol on standard grade pass for all above-mentioned subjects and a minimum APS score of 26 points (University of Johannesburg 2021b). For the four-year bachelor's degree programme, both the Durban University of Technology (DUT) and the UJ requires the applicant to have at least a minimum of D on higher grade and B (Meritorious achievement) on standard grade for all of the above subjects and a minimum APS Score of 30 points (DUT 2023; University of Johannesburg 2021a). The admission requirements for the one-year higher certificate programme are the NSC for applicants who obtained a Grade 12 after 2009, with APS of 21 points and the combination of the following subjects: (University of Johannesburg 2021c)

- English: 5 (Substantial achievement)

- Mathematics: 3 (Adequate achievement)
- Physical Sciences: 3
- Life Sciences: 4 (Moderate)

For the two-year diploma programme, applicants need to have at least 26 points, with the above combination of subjects and the ratings of four on all subjects except for English which requires a minimum rating of five (University of Johannesburg 2021b). For the four-year bachelor's degree programme, the applicant ought to have all of the above-mentioned subjects with a minimum APS of 30 points and subject ratings of four except for English which must have a rating of five (DUT 2023)

The selection criteria utilised by the DUT and UJ are inconsistent with what Cape Peninsula University of Technology (CPUT) requires. In addition to the subject combination and levels of achievement, the Department of EMCR at the CPUT requires an applicant to have a minimum of the following on the APS: (CPUT 2020)

- Higher Certificate: 26+ points
- Diploma: 28 points
- Bachelor's degree: 35 points

Even though the NSC/SC is the main gateway between school and HE, this does not guarantee a person's admission to any programme of study in HE. Moreover, meeting the minimum requirements does not guarantee admission into EMC programmes. Hence, in the setting of the higher education policy, the right of tertiary institutions to set specific admission requirements to particular programmes was established in section 37 of the Higher Education Act, 1997 (RSA 1997) to guide HEIs concerning selection criteria.

Alternatively, adult learners who have not achieved NSC/SC or equivalent qualification may benefit and gain entry to HE through various access routes available at tertiary institutions. The Ministry of Higher Education in South Africa supports wider and various entry routes to HE and there are impartial progression pathways in the system. This is in keeping with the objectives of the NQF. The Higher Education Policy indicates that institutional policies must allow for other alternative routes of entry to HE that are

equivalent to the NSC/SC. Some entry routes in tertiary institutions include “recognition of prior learning” and “mature age exemption”.

2.6.4 Recognition of prior learning

Different conceptions of recognition of prior learning (RPL) exist in the literature. In different countries, RPL is known by different names, such as accreditation of prior learning or APEL in the UK, RPL in New Zealand and prior learning assessment in Canada (Hlongwane 2019b; Wheelahan *et al.* 2003). In Australia, RPL is defined as “an assessment process that evaluates formal and non-formal learning of a learner to determine the degree to which that learner has attained the required standards for entry, learning outcomes, competency outcomes and partial or total completion of a qualification” (Garnett and Cavaye 2015).

In South Africa, RPL compares a person’s previous learning and experiences to whatever extent gained against the required learning outcomes for a particular qualification (Hlongwane 2019b). It is used to identify a person’s skills, knowledge and competencies, notwithstanding how, when and where the learning occurred. Although RPL can be applied in different settings, other authors stated that RPL aims to evaluate a person’s skills gained through work experience formally to award credit towards a SAQA-recognised qualification (Aggarwal 2015; Hlongwane 2019a). Moreover, RPL is a fundamental part of access and equity strategies, intended to improve access to HE and outcomes from vocational training for previously disadvantaged groups (Hlongwane 2019b). These strategies are similar to the NQF of SAQA principles of redress, access and equity. Conversely, according to the guidelines and criteria for the implementation of RPL in South Africa (SAQA 2002), the purposes of RPL are as follows:

- Access – to provide ease of access to appropriate levels of education for eligible learners in such a way that facilitate mobility;
- Placement – determine the appropriate level for learners wishing to enter HE;
- Advanced standing – to award credits towards a qualification for which a learner has registered;
- Advanced status – to allow access to a level of a qualification higher than the reasonable next level following on the previous qualification;

- Credit – to award transferable formal credits for the previous learning that meets the requirements of the part of full qualification; and
- Certification – for qualification to certify credits attained.

Recognition of prior learning offers the student the benefit of recognising his or her informal education and avoiding the repetition of learning. This may assist RPL learners to complete the course faster and reduce the cost of education (Hlongwane 2019b).

2.6.4.1 Recognition of prior learning in emergency medical care: A pathway for South African emergency care providers

In the EMS context, South African vocationally trained emergency care providers possess extensive practical experience and often serve as mentors to undergraduate students. This hands-on experience equips them with a deep understanding of emergency care setting (Winstanley and Cunningham 2023). However, the migration to tertiary education can be challenging without formal recognition of their prior learning and experience. Recognition of Prior Learning provides a valuable mechanism for acknowledging and accrediting this practical experience, facilitating the educational and career progression of these providers (Winstanley and Cunningham 2023).

Recognition of Prior Learning assesses and validates the skills and knowledge acquired through vocational training and practical experience, mapping them to the competencies required in tertiary education programmes (Aggarwal 2015; Hlongwane 2019a). By doing so, RPL allows experienced emergency care providers to receive academic credits for their prior learning, allowing them access to tertiary programmes. This approach ensures that their extensive practical experience is formally recognised, enabling them to advance more seamlessly into HE and, subsequently, into more advanced clinical roles, leadership positions, and specialized fields within EMS. As highlighted by Winstanley and Cunningham (2023), the implementation of RPL in the EMS sector not only supports the professional development of emergency care providers but also enhances the overall quality of EMS by leveraging the practical expertise of seasoned practitioners.

2.6.5 Mature age-exemption

Mature-aged adult students fall under the broad category of non-traditional students and have been under-represented in HE in the past (Fragoso *et al.* 2013). The term “non-

traditional students” refers to students who do not fit the category of traditional students and include students with disabilities, adults or mature aged, immigrants and first-generation students (Kashedi 2021). However, Hardin (2008) argues that not all non-traditional students are adults. Hardin (2008) believes that “non-traditional” can include traditionally-aged students with similar characteristics to their adult counterparts. These characteristics include “enrolling part-time, delaying enrolment into HE until adulthood, working full-time, and having family responsibilities. On the contrary, Yin and Lim (2020) suggest that a traditional student is a learner who graduated from high school, is enrolled full-time at a university or college, and sometimes depends on family for financial support.

While defining an adult by legal age is common, it is not simple to define an adult learner using the same principle. For instance, an 18-year-old undergraduate may already be a parent with adult responsibilities, whereas a 24-year-old undergraduate may still be a student who never left school (Yin and Lim 2020). The definition of an adult student is subjective and differs across HE national systems. In some countries, the legal adult age is 18 years and older, which means that even traditional university students are considered adults (Kashedi 2021). However, Kasworm (2018) argues that mature-aged students in HE cannot be treated the same as traditional or younger students; therefore, making general statements about them is difficult and should be avoided. This is because mature-aged students are more different than younger students in their needs, motivations and expectations of HE (Kasworm 2018). Moreover, mature-aged students cannot be considered the same as younger students because their different circumstances and backgrounds require social independence, work and family commitments, and personal identities that have developed beyond traditional students (Kasworm 2018).

Usually, a person is considered a mature student if they are at least 23 years of age on the first of January, the year they start university or college for the first time (Yin and Lim 2020). Kashedi (2021) further states that mature-aged students in HEIs are adults of 24 years and older who are financially independent and are assuming adult roles such as employment in society and parenting, as well as having a vital leadership role. This group includes those with work commitments, families and those beginning or continuing their HE at 22 years or later (Kashedi 2021).

While matriculation exemption is a legal requirement for first-time degree studies at South African universities, candidates who have not passed matric with university exemption or with bachelor entry and are 23 years or older at the time of registration, may qualify for mature age exemption based on the requirements listed below.

- They are holders of a NSC, SC or equivalent certificate, but lacks the minimum entry requirements for admission to the degree programme.
- They are holders of the SC (before 2009).
 - Four SC subjects passed with the symbol E (adequate achievement) or better.
 - One subject must be passed on HG.
 - Three subjects must be passed in the same exam sitting.
- They have a senior certificate and FET (Further Education and Training)
 - One HG subject with the symbol E or better.
 - Three N4 subjects.
- A complete exemption is issued to:
 - holders of the senior certificate and national diplomas issued by the former Technikons, now Universities of Technology;
 - holders of a three-year diploma regardless of the senior certificate, but no credits may be granted;
 - Two SC languages on HG plus four N5 subjects, including a SC subject; and
 - Individuals who completed a qualification evaluated at level 5 of the SAQA NQF with a credit value of 120 or more and quality assured by the CHE.

Candidates of 45 years or older are allowed by law to study towards a degree programme (subject to faculty entry requirements) (Kashedi 2021).

2.7 Conclusion

This chapter reviewed emergency care education literature that discusses the migration of emergency care providers to formal emergency care qualifications. The review resulted in a greater understanding of the emergency care education specific to the South African and global contexts. It is noted from this review that EMS underwent major changes to its education. Following the educational migration of nursing and other healthcare disciplines, scholarly articles highlight a shift in emergency care providers' training and education from vocational to tertiary-based education. With tertiary-based education becoming the entry point into the EMS profession for future candidates, in the past, the educational requirements for the emergency care profession were minimal, requiring only first aid training.

While the NECET policy made provision for migrating the existing emergency care providers with non-NQF-aligned emergency care short courses to the formal emergency care qualifications in South Africa, it is apparent from this literature review that entry and admissions to higher education programmes hinge upon multiple factors. Applicants should meet the minimum entry requirements defined in the Department of Higher Education policy. Even though the policy outlined the minimum admissions requirements to HE programmes as the NSC or SC, HEIs can specify the relevant compulsory subjects and levels of achievement required for entry into different HE programmes. Hence, the selection criteria for EMC programmes differ between HEIs.

One must have completed and obtained a matriculation certificate to enter tertiary education. However, RPL and mature-age pathways are already in existence and are a requirement for all emergency care education providers who offer NQF-aligned programmes. The subsequent chapter provides a comprehensive overview of the research design and methodology employed in this study.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

Research methodology refers to the approach in which research problems are solved systematically. It is a scientific approach adopted by the researcher for conducting research methodically; as a result, the various steps usually taken to study the research problem are explained by the researcher (Mishra and Alok 2022). This chapter thoroughly explains the methodology for achieving the empirical research study or subject of examination. Firstly, the researcher describes the idea of the study design, together with the different ways in which the study was laid out, such as study settings, population, sampling strategy, approach and research procedure for data collection and analysis. Lastly, validity, reliability, and ethical considerations are explained in detail. This chapter is about strategies and methodologies used to address the aim and objectives of the study.

3.2 Study design

The researcher can employ a research design to articulate significant research questions and choose research tools that support the goal of the study (Coleman and Briggs 2015). This allows for more research questions that support the study methodology and tool selection. Put differently, the study design can be considered a wide-ranging strategy for approaching the crucial research problem, providing a general structure for the process used, data collected, and the analysis performed (Leedy and Ormrod 2015).

According to McMillan and Schumacher (2010), study design is the approach the researcher follows and employs to address the research question effectively. In agreement, Reis and Judd (2016) define a study design as the systematic planning of research that includes the description of the study population, study methods to be used, and dependent variables to be measured. The study design affects the researcher's internal validity and decision-making ability. As a result, it may be assumed that the research design is an appropriate plan and procedure to be carried out to test a particular hypothesis under stated conditions. To address the aims and objectives of this study, the researcher used a retrospective quantitative, descriptive research design to analyse the

feasibility of migrating emergency care providers to the new emergency care qualifications in the Capricorn district in Limpopo, South Africa. A retrospective study looks backward and performs an assessment using the existing information to make decisions on events that have already occurred. Instead of recording data going forward, the researcher uses participants' recollections and data already gathered for reasons related to the project and collects data using the existing records (Nickson 2017; Powell and Sweeting 2015).

The purpose of quantitative research is to assist the researcher in understanding and describing an already formed hypothesis or a research problem by collecting numerical data, which is then analysed using mathematics, statistics, or numbers with the aid of a computer to test fundamental relationships and generalise the findings to larger populations (Bhandari 2020). Quantitative research answers questions regarding observable variable relationships to determine, predict and control occurrences (Leedy and Ormrod 2015). The quantitative strategy is usually based on the logical positivist philosophy, which supports the natural scientific method in human behavioural surveys, which holds that research should be restricted to what can be observed and measured empirically (Rossouw 2000). Quantitative research indicates significant variables for data collection, analysis and interpretation using symbols, numbers, measures and statistics. A quantitative strategy can involve two groups: (1) analysis of humans and behaviours through interviews and surveys, and (2) studying human beings and behaviours indirectly through computer simulation studies, retrospective secondary data analysis and statistics (Mouton, 2011: 52)

A descriptive research design was considered most suitable for this study as it describes the distribution between variables regardless of any contributory or other hypothesis (Aggarwal and Ranganathan 2019; Baker 2017).

3.3 Study setting

Named after the Limpopo River, the province of Limpopo forms a gateway between Zimbabwe, Mozambique, and Botswana. This province has five districts: Waterberg, Sekhukhuni, Mopani, Vhembe and Capricorn (Mashaphu 2021). This study was set in and conducted at Capricorn district as a desktop exercise of all emergency care providers. The Capricorn District is named after the Tropic of Capricorn, which runs

through the northern parts of the district, and it is situated as a stopover between Gauteng and the northern areas of Limpopo. This district is located at the centre of Limpopo, and it is considered the economic development centre of the province as it is home to the provincial capital city, Polokwane (Matlala *et al.* 2021). The district has the highest population density in the province, estimated at 1 372 355 million people, representing about 23% of the total population and 2.3% of the South African population. It covers an area of 21 705 km² which represents 12% of the total surface area of Limpopo (Meso 2021). Figure 3.1 is a map of the Capricorn District reflecting its four municipalities (Maponya 2021).

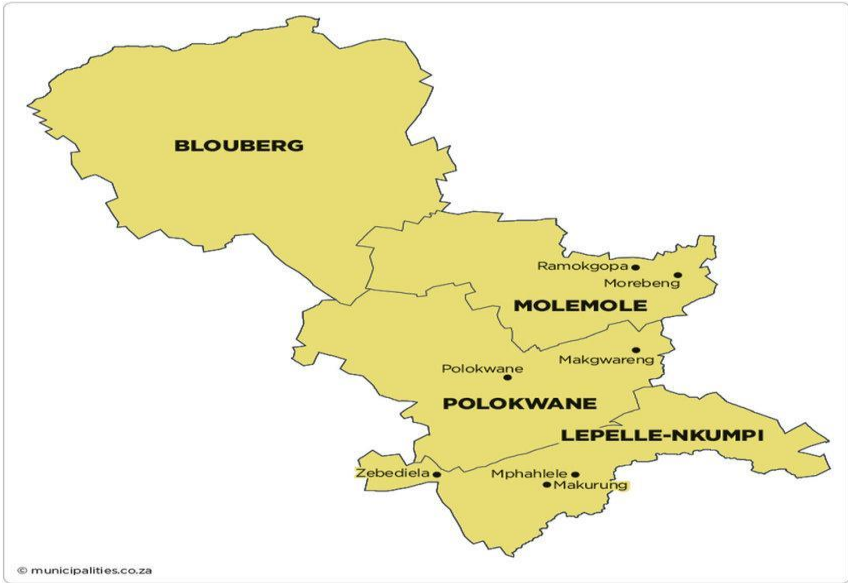


Figure 3.1: Capricorn District map depicting four municipalities

Emergency medical care services in the Capricorn District area are generally provided to the residents by private and government EMS. For this study, the focus was on the government EMS. Private EMS providers were excluded because they were outside the scope of this study, as their standard operating procedures (SOPs) are different from government EMS. The purpose of this research was to undertake a descriptive analysis of the matriculation results of emergency care providers to determine whether these emergency care providers meet the admission requirements for direct entry into the formal emergency care programmes.

The Capricorn District EMS employed 380 emergency care providers to render emergency care services to the community, including shift supervisors and station managers, most of whom hold short-course qualifications in emergency care. The

Capricorn EMS workforce works from 11 stations and/or bases and one EMS communication centre rotating through shifts (Shift A to D) controlled by shift supervisors. Emergency care providers in the Capricorn District provide basic and intermediate life support pre-hospital level of care, transportation, inter-facility transfers, and planned patient transportation (PPT) within and outside the province. Moreover, the district has 13 personnel registered with the HPCSA under the categories emergency care practitioner (ECP), paramedic, and emergency care technician (ECT) who provide advanced life support (ALS) level of care.

All of the information relating to the Capricorn EMS staff can be accessed from the human resource department (HRD), which provides support services to the EMS operations. The HRD has an organised information storage system in place, whereby all the records with personal information of emergency care providers in physical documents are securely and sequentially stored in the archives storage room. In addition, other personal information of EMS personnel can also be accessed via the personal and salary system (PERSAL), an electronic database. Access to the archives storage room and PERSAL is limited to specific HRD personnel. Most of the information used for this study was accessed from the archives storage room, whereas other information was accessed from PERSAL.

3.4 Target population and sample

According to Vanderstoep and Johnson (2016: 65), a population refers to individuals whom a study can use, while a sample is a part of individuals from the population that joins the survey. Similarly, Leedy and Ormrod (2015: 84) explain a population as a group of individuals with the same characteristics, subject to a survey. According to Johnson and Bhattacharyya (2019: 300), a target population is the group from which inferences are to be obtained. While employees of the Department of Health in Limpopo EMS made up the population, the target population for this study included all emergency care providers employed by the Department of Health, Capricorn District in Limpopo EMS, who hold short-course qualifications in emergency care. At the time of the study, there were 380 emergency care providers in the Capricorn District. Even though the target population for this study was 380 emergency care providers, the researcher only managed to obtain 356 employees' files. Of these, 36 had invalid data such as no matric

or emergency care documents were found in their files. As a result, the final study sample comprised 320 personnel.

3.5 Sampling method

While Nieuwenhuis (2007: 79) suggests that sampling denotes the method of selecting a subset of the population of the study, the study used a total population sampling which is a purposive and non-probability sampling technique that involves examining the entire population of interest that have a particular set of characteristics (Etikan, Musa and Alkassim 2016). This method was selected to ensure that the results from the sample apply to the entire population, to eliminate bias and to assure an appropriate degree of accuracy. Purposive and non-probability sampling are usually used in qualitative and quantitative research (Etikan and Bala 2017). As the name implies, purposive sampling refers to selecting participants for a specific purpose whereby members of the population are selected to cover significant attributes relevant to the required data. Therefore, since total population sampling involves all participants within the population of interest, units are non-randomly chosen to provide the relevant data to address the research aim. In this study, all emergency care providers in the Capricorn District were selected non-randomly. The matriculation results of all participants who met the inclusion criteria were included for analysis.

3.6 Inclusion criteria

The study included all station managers, shift supervisors and operational emergency care providers working in the Capricorn District, who are current holders of short-course qualifications in emergency care registered with the HPCSA as BAA, AEA, ECT, or CCA and have the following retrospective data: age, gender, and highest grade passed at school.

3.7 Exclusion criteria

Participants were excluded from the study if they had formal emergency care qualifications. Emergency care providers not based in the Capricorn District and those who did not have the required data were excluded from the study.

3.8 Data collection procedure

Once ethical clearance to collect data had been received from the Durban University of Technology Institutional Research Ethics Committee (IREC) Chairperson (see Annexure C), a request for permission to collect data was submitted to the Limpopo Department of Health Research Committee. Supplementing the request was a copy of the research proposal (PG2a) outlining the purpose of the study, methods and the intended outcomes. Soon after the request to conduct the study was approved by the Head of the Department of Health (see Annexure B), the researcher sent the approval letter (see Annexure D) to the Chief Director, Director, Deputy Director and HRD manager in EMS, which served to inform them of the study to be undertaken at their facility.

Receiving secondary data from records is one of the techniques researchers use to collect much-needed data from hospital records, institutional records, and incident reports while eliminating the need for researchers to seek cooperation from participants (Brink and Van der Walt 2006). Before collecting data, the researcher requested the district manager's list of all Capricorn emergency care providers. This list was presented to the HRD manager for permission to access their files. As indicated previously, files of all emergency care providers in Limpopo are stored in a secured archives storage room and PERSAL. Entry to the archives storage room is limited only to authorised individuals. This helps to ensure control of information and accountability.

3.9 Data collection period

After access had been granted, data collection for this study was conducted from the 27th of February 2023, to the 2nd of March 2023. The researcher worked closely with HRD personnel in the archives store room searching for files and documents of those appearing on the list. This was done to facilitate quick access to files and to ensure that the research aligns with the policies and procedures of the Limpopo Department of Health. There were no challenges during data collection period as the researcher prepared and informed the Limpopo Department Health in advance about the intentions to collect data.

3.10 Data collection tool

The identity, matriculation certificates and emergency care qualifications documents for the study were physically extracted from employees' files and then scanned using a CamScanner application from the researcher's tablet device, which was password protected. The CamScanner application, primarily used for scanning and digitalising documents, was used in this study to scan physical documents and convert them into digital pdf documents. Once the documents were converted into pdf files, they were transferred to the researcher's password-protected laptop for capturing. The relevant data was entered into the password-protected data collection template designed by the researcher using the Microsoft Excel[®] 2016 spreadsheet (see Annexure E). The spreadsheet was designed in such a way that it indicated whether a participant passed or failed matric. In this context, a pass or fail in matric typically refers to the outcomes of the final examination candidates take in their matriculation year.

The study included participants who underwent secondary education using the previous senior certificate (SC) syllabus (before 2009). To earn the SC under this syllabus, candidates needed to meet specific criteria, as detailed below.

1. Complete six subjects offered by the SC programme.
2. Achieve a passing grade (at least 40%) in three subjects, one being an official language at the home language level.
3. Obtain a passing grade (at least 30%) in two subjects, one being an official language at the first additional or home language level.
4. Attain a minimum aggregate of 720 marks (equivalent to 40%), referred to as the S-symbol (Senior Certificate).

Not meeting the requirements mentioned above constituted a failure. However, candidates who scored 950 marks (equivalent to 50%) or more overall, and achieved a subminimum of 20% in the sixth subject, were considered to have passed with endorsement. This endorsement, previously known as university exemption, indicated that a candidate met the fundamental criteria for pursuing higher education. An endorsement with merit, signifying a candidate's exceptional achievement, was granted for scores ranging between 1260 and 1679 marks (equivalent to 60–79%). An

endorsement with distinction, reserved for outstanding performance, was awarded for 1680 marks and above (80%) or higher scores (Attwel 2004; Department of Basic Education 2017: 4).

Regarding subject categorisation, the researcher designed two distinct groups of subjects per a predefined framework: compulsory subjects and non-compulsory subjects. The category of compulsory subjects encompassed Mathematics, Physical Science, Biology, and English. Conversely, the non-compulsory subjects comprised the home language and various supplementary subjects. A dedicated column was generated for every subject, accompanied by corresponding cells. Within these cells, the symbols and grades attained by participants throughout the matriculation examination were meticulously recorded in preparation for subsequent analysis.

The researcher operated from a secure and controlled environment to carry out this process. In this setting, the raw data was systematically entered into a structured template, a task performed personally by the researcher. The researcher's supervisor conducted random audits of the collected data to ensure data accuracy and integrity. After the data collection phase, the raw information underwent a phase of consolidation, during which it was aggregated and organised. This consolidated dataset was then subjected to a comprehensive analysis to address the overarching purpose of the study and specific objectives. This analysis encompassed interpreting the data patterns and drawing meaningful conclusions from the collected information.

3.11 Reliability and validity of data collection tool

In research, the reliability and validity of the data collection hold significant importance as they affect the quality and credibility of the data. These fundamental aspects are commonly employed to gauge how effectively and consistently the data collection tool measures the intended aspects. When exploring the meanings of reliability and validity in data collection tools within research, reliability refers to the steadiness and consistency of a measurement instrument (Coleman and Briggs 2015: 97). In simpler terms, high reliability is achieved when the same data collection tool is employed repeatedly under similar conditions and yields consistent outcomes. Similarly, validity pertains to the relevance and accuracy of a data collection tool in gauging a specific variable or concept it is meant to assess (Coleman and Briggs 2015; Maree *et al.* 2007). An accurate tool

precisely captures the true occurrence it intends to evaluate. Ensuring the reliability and validity of the researcher's data collection tool was crucial for generating meaningful and precise results. Therefore, the researcher deemed it necessary to devise the data collection tool (see Annexure E) before initiating the data collection process. This tool was meticulously designed with particular criteria in mind, aligning with the objectives and goals of this study. All the required data for completing the template was directly extracted from existing physical records, then scanned and converted into digital pdf files.

Ensuring the authenticity of research holds great significance as it plays a pivotal role in gauging the calibre of the study. Moreover, it aids in choosing the study's approach and plan (Coleman and Briggs 2015: 92). The tool employed for gathering data in this research was verified by the researcher's supervisor and co-supervisor. Furthermore, it underwent assessment and endorsement by the Faculty Research Committee at the Durban University of Technology while submitting the research proposal. Addressing the reliability of data, academic records from secondary schools, qualifications in emergency care, and identification documents of emergency care providers were extracted from existing physical and digital records captured and stored by the HRD in the Limpopo Department of Health. The physical records were converted into digital pdfs after being scanned by the researcher. Regarding data capturing, the researcher assumed sole responsibility for entering information into the data collection template.

3.12 Data analysis

The raw data extracted from physical records was captured into a Microsoft Excel© 2016 data collection template (see Annexure E) on the researcher's laptop, secured with a password. A professional statistician analysed the data using the statistical software, statistical package for social sciences (SPSS)[®] version 25 (IBM[®] Corp 2016). The study employed a methodology centred around descriptive analytics, and an analytical approach that focused on systematically summarising and interpreting data to reveal meaningful insights and patterns. Descriptive analytics involves the systematic examination of the available data in order to derive a deeper understanding of the inherent characteristics, trends, and distributions present within the dataset.

Through the perspective of descriptive analytics, the researcher was able to construct visualisations, tables and charts that vividly depicted the distribution of grades, symbols,

and achievements across the different subjects. These visual representations enabled an intuitive comprehension of the data, making it easier to discern trends, anomalies, and possible areas of interest. Moreover, descriptive analytics allowed for the presentation of key statistical measures such as means, medians, and standard deviations. These measures provided valuable insights into the central values and levels of dispersion within the data, offering a solid foundation for drawing conclusions and formulating interpretations.

The process of determining whether participants met the entry requirements for higher certificate, diploma, and degree programmes in EMC involved a multifaceted assessment. This assessment encompassed factors such as confirming whether participants have successfully completed their matriculation, evaluating if they possessed the requisite minimum APS points, and verifying their satisfactory completion of specific mandatory subjects at the appropriate level relevant to the particular emergency care programme.

While the exact conditions can differ based on the educational institution and the programme in question, the researcher adopted specific eligibility criteria used by DUT and UJ for the degree programme. Meanwhile, for the diploma and higher certificate programmes in EMC, the criteria employed in this study were in alignment with those of both UJ and SMU.

In the fourth chapter of this study, a comprehensive breakdown of the minimum APS points required and the compulsory subjects stipulated for each respective EMC programme is provided.

3.13 Ethical consideration

Before the study could be undertaken, the researcher sought and obtained approval of the research proposal from the Faculty of Health Sciences Research Committee. Subsequent to this, ethical approval to conduct the study was granted by the DUT Institutional Research Ethics Committee (IREC 234/22). The researcher also obtained gatekeeper permission from the Head of the Department of Health in Limpopo to access the files of emergency care providers in the Capricorn district. The DUT guidelines and research conduct policy in the Faculty of Health Sciences were strictly followed by the researcher when conducting the study. The four principles of ethics in research, namely

beneficence, non-maleficence, justice and respect for human dignity were observed throughout the study duration (Beauchamp and Childress 2019; Jahn 2011).

- Beneficence pertains to the researcher's responsibility to maximise advantageous outcomes while minimising potential harm to participants (Beauchamp and Childress 2019). The principle of beneficence is a crucial ethical notion emphasising the responsibility to enhance individuals' well-being and welfare and act in their best interest. It is commonly viewed as a primary ethical guideline, particularly in research, wherein it mandates that the potential benefits of a study outweigh any conceivable risks to the participants. This principle deeply promotes good and reduces harm (Beauchamp and Childress 2019). Adhering to this principle, the researcher ensured that any personal information gathered during data collection remained accessible solely to the researcher and supervisors. Additionally, meticulous steps were taken to guarantee the utmost confidentiality of the collected data.
- The principle of non-maleficence, often expressed as 'do not harm', requires individuals to refrain from causing harm to others, especially through deliberate or avoidable actions (Beauchamp and Childress 2019; Emanuel *et al.* 2004). To ensure protection from potential harm, the researcher implemented comprehensive measures during the data collection phase. All collected data was securely stored on the researcher's laptop, which was safeguarded by a password. The researcher possessed exclusive administrative privileges over this laptop, effectively preventing any remote access by unauthorised third parties. For further security, data was stored within an encrypted folder to maintain confidentiality. Throughout the entire research process, strict confidentiality measures were upheld, and the well-being of the study participants was not compromised either in the short or long term. Only data that directly contributed to the advancement of the research field was incorporated into the outcomes of the study, with sensitive information strictly protected from disclosure. Access to the raw data was restricted solely to the researcher and the study supervisors, ensuring that confidentiality remained uncompromised. Following the completion of the study, the data was transferred to an encrypted file for safekeeping. This encrypted file will be retained for a period of five years, after which it will be securely disposed of to maintain data privacy and security.

- The ethical idea underlying the principle of justice in research pertains to the fair and equitable treatment of all individuals involved. Its purpose is to safeguard against exploitation, bias, discrimination, or unwarranted harm during the research process. This principle guarantees that the choice of study participants remains impartial and equitable (Jahn 2011). In this study, there were no prejudice or biases in participant selection, given that the research employed a total population sampling approach.
- Respect for human dignity stands as a critical ethical notion underscored in research, underscoring the intrinsic importance and value of individuals involved. This principle underscores the entitlement of every person to fair, considerate, and equitable treatment solely by virtue of their humanity (Beauchamp and Childress 2019). In this study, the researcher ensured the exclusion of any identifiable participant's information such as names, identity numbers, and PERSAL numbers. The entirety of the original data gathered is securely stored in an encrypted file on a password protected laptop and will be kept confidential without exception. Only the researcher has access to this file.
- The research undertaken was retrospective, implying that the data had been previously gathered for different objectives. Acquiring explicit consent from individual participants was not deemed necessary for this investigation, given that the data had already been stored within institutional records. Nevertheless, adhering to the ethical guidelines governing research practices, the researcher obtained permission to carry out the study from the Durban University of Technology Institutional Research Committee Chairperson and the Head of the Department of Health in Limpopo. While the documents extracted from physical and digital records contained personal particulars like names, identities, and PERSAL numbers, this data was compiled and captured into a Microsoft Excel® 2016 spreadsheet. During this process, it was meticulously de-identified or anonymised to safeguard individual identities. Each participant was assigned a unique numerical identifier, and no identifiable information was retained. Consequently, any linkage between the data and specific individuals was precluded. All scanned files and collected data were stored on a laptop protected by a password to enhance security. This data will be preserved for five years; after which it will be permanently erased.

3.14 Conclusion

The study was a retrospective, descriptive, quantitative study which aimed to determine the feasibility of migrating emergency care providers within the Limpopo EMS to formal emergency care qualifications. The study was conducted as a remote desktop exercise, encompassing all emergency care providers working for Limpopo EMS in the Capricorn district. Ethical clearance was granted by both the DUT Institutional Research Ethics Committee and the Limpopo Department of Health Research Committee. The next chapter presents an analysis of the results employing tables and graphs for descriptive representation.

CHAPTER 4

RESULTS

4.1 Introduction

The purpose of this chapter is to present detailed findings obtained from the data analysis concerning the aim and objectives of the study. The results will be presented in such a way that it addresses the objectives of the study in the form of tables and a histogram chart, as well as a brief descriptive analysis. Lastly, the chapter deals with the descriptive statistics for the emergency care providers, which will include the demographics, matric results, admission point score, higher certificate criteria, diploma criteria, and bachelor's degree criteria.

4.2 Sample

A total of 356 (93.68%) participants from a target population of 380 emergency care providers in the Capricorn district, Limpopo EMS, were included in the study. However, invalid data were collected from 36 participants, as no matric or emergency care documents were found in their files. These 36 participants were therefore removed from the study resulting in a total sample size of 320 (84.21%) participants.

4.3 Demographic data

This section describes the demographical characteristics of the participants as well as their emergency care and high school qualifications as they relate to the study objectives to establish how these characteristics influence the results. Table 4.1 was developed to provide a statistical description of the study group concerning the demographical and qualification information of the participants.

4.3.1 Sex status

As depicted in Table 4.1, the participant distribution per biological sex status shows that the majority of the participants, 195 (60.94%), were male, while 125 (39.06%) were females. No other sex classification was noted.

4.3.2 Race distribution

As displayed in Table 4.1, the two race groups with which the emergency care providers identified, the majority, 319 (99.69%), were Africans. In contrast, Whites were the least represented among the participants 1 (0.31%), and no participants identified with other racial groups within South Africa.

4.3.3 Age distribution

As displayed in Tables 4.1 and 4.2, the sample consisted of 320 participants with the age distribution ranging from 20 to 65 years, providing a mean age of 45 years, with the minimum age of 33 years and the maximum age being a male participant at 60. More than half of the participants, 181 (56.56%), were between the ages of 40 and 49 years, followed by 84 (26.25%) participants who were between 50 and 59 years of age, 54 (16.88%) were between 30 and 39 years, and only 1 (0.31%) participant was in the age category of 60 to 65 years. No participant was noted to be at the age of less than 30 years of age.

4.3.4 Emergency care qualifications

The findings in Table 4.1 illustrate that more than half of 180 (56.25%) of the participants were BAA qualification holders. This was followed by 136 (42.5%) participants with AEA qualification, whilst 3 (0.94%) participants were CCA holders, and 1 (0.31%) participant was an ECT qualification holder.

4.3.5 The highest school qualifications

The results show that approximately 318 (99.37%) participants completed matric, whereas only two (0.63%) had no matric qualification.

Table 4.1: Tabulation of demographics of participants.

Demographics of the study population	Frequency	Percentage
Biological sex		
Male	195	60.94
Female	125	39.06.
Total	320	100.00
Race		
African	319	99.69
White	1	0.31
Total	320	100.00
Age group		
30-39 years old	54	16.88
40-49 years old	181	56.56
50-59 years old	84	26.25
60-65 years old	1	0.31
Total	320	100.00
Emergency care qualifications		
BAA	180	56.25
AEA	136	42.5
CCA	3	0.94
ECT	1	0.31
Total	320	100.00
Highest standard/grade obtained		
Grade 12	318	99.37
Below grade 12	2	0.63
Total	320	100.00

Table 4.2: Mean age, standard deviation (SD), minimum and maximum age in years

Variable	Observations	Mean	Standard deviation	Minimum	Maximum
Age	320	45	6.2	33	60

4.4 Descriptive statistics of matric results

The following section will review the matric results on each compulsory subject to show whether the participant passed, failed, or did not have the required subject. Of the 320

participants, two participants were excluded from this analysis because they were without a matric qualification, bringing about 318 observations.

Table 4.3 presents the number of participants who have either passed, failed, or did not have compulsory subjects required for gaining entry into various formal emergency care programmes. These compulsory subjects include mathematics, biology/physical science, and English. The findings from this study indicated that 277 (87.11%) participants did not have mathematics as one of their subjects, whereas 31 (9.75%) participants failed mathematics, and only 10 (3.14%) participants passed it.

The findings further indicated that more than half, 175 (55.03%) of the participants passed English. In comparison, 139 (43.71%) participants failed it, followed by 4 (1.26%) who did not have English as one of their compulsory subjects. Regarding Biology, the participants who passed contributed 36 (11.32%), whereas more than half, 175 (55.03%), failed it, followed by 107 (33.65%) participants who did not have Biology as one of their subjects. Concerning Physical Science, the findings indicated that only 6 (1.89%) participants passed this subject, followed by 33 (10.38%) of those who failed. Furthermore, the results showed that the majority, 279 (87.73%) of participants, did not have Physical Science as one of their subjects.

Table 4.3: Participants who passed, failed, or did not have compulsory subjects.

Participants' results of compulsory subjects		Frequency	Percentage
Mathematics			
	Pass	10	3.14
	Fail	31	9.75
	Not available	277	87.11
	Total	318	100.00
Biology			
	Pass	36	11.32
	Fail	175	55.03
	Not available	107	33.65
	Total	318	100.00
Physical Science			
	Pass	6	1.89
	Fail	33	10.38
	Not available	279	87.73
	Total	318	100.00
English			
	Pass	175	55.03
	Fail	139	43.71
	Not available	4	1.26
	Total	318	100.00

4.5 The Admission Point Score

Table 4.4 presents descriptive statistical results of the APS variable. As shown in Table 4.4 below, the mean APS score is 17.19, with the minimum APS ranging from eight to a maximum of 34 points.

Table 4.4: Descriptive statistics: Admission point score analysis

Variable	Observations	Mean	Standard deviation	Minimum	Maximum
APS	318	17.19	±4.16	8	34

APS= Admission Points Score

Table 4.5 presents quartiles of the APS scores in ascending order. This indicates that if APS scores are arranged in ascending order, the first 25% (P25) of the first quarter of data ranges from the minimum APS of eight to APS scores of 14. The second quarter of data is between 25 to 50% (P25 to P50), represented by 14 and 17 APS scores, and the third quarter of data ranges from P50 to P75, represented by scores of 17 and 20 and the

fourth quarter of data ranged from 75% (P75) to a maximum APS of 34. The frequency distribution of the APS scores revealed that most participants had APS scores between 16 and 18. This is represented in Figure 4.1.

Table 4.5: Admission point score quartiles in a ranging order

Variable	N	P25	P50	P75	Maximum
APS	318	14	17	20	34

APS= Admission Point Score

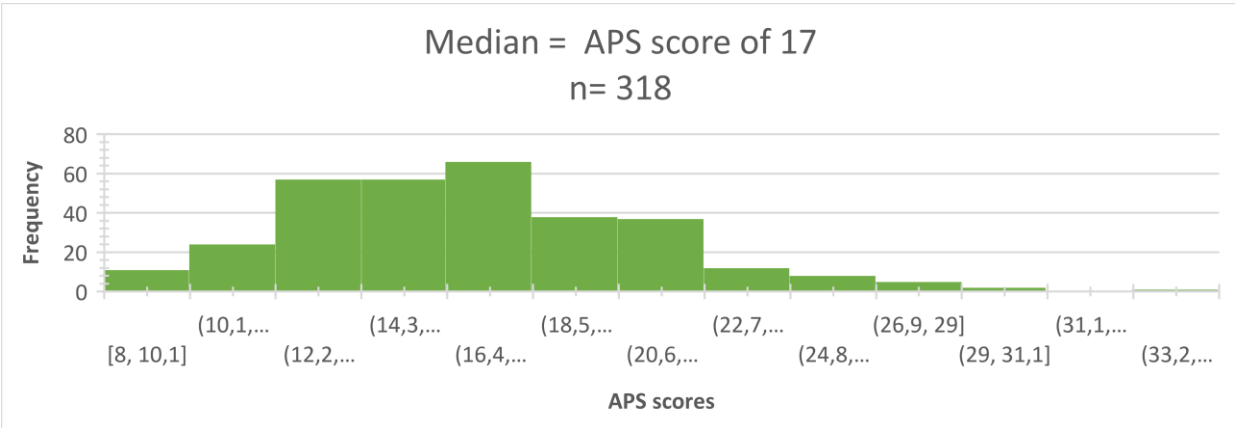


Figure 4.1: Histogram depicting the frequency distribution for APS score.

Table 4.6 illustrates whether a participant met the criteria for the higher certificate in each compulsory subject. Regarding Mathematics, 309 (97.17%) participants do not meet the criteria for admission, followed by only 9 (2.83%) who meet the criteria. For Biology, 281 (88.36%) participants do not meet the criteria, whereas 37 (11.64%) meet the criteria. In Physical Science, the results show that 312 (98.11%) do not meet the criteria, while 6 (1.89%) of participants meet the criteria. In English, 143 (44.97%) participants do not meet the criteria, whereas 175 (55.03%) meet the criteria.

Table 4.6: Tabulation of criteria for each subject for a higher certificate in EMC

Criteria for higher certificate	Frequency	Percentage
Mathematics		
Does not meet criteria	309	97.17
Meets criteria	9	2.83
Total	318	100.00
Biology		
Does not meet criteria	281	88.36
Meets criteria	37	11.64
Total	318	100.00
Physical science		
Does not meet criteria	312	98.11
Meets criteria	6	1.89
Total	318	100.00
English		
Does not meet criteria	143	44.97
Meets criteria	175	55.03
Total	318	100.00

Table 4.6.1 is an added-up criterion for four subjects to determine the number of participants who met or did not meet the criteria for gaining entry into the higher certificate programme. Based on the results, 126 (38.99%) participants did not meet the criteria in all four subjects. However, more than half 165 (51.89%) of the participants met the criteria for at least one subject, followed by 26 (8.18%) participants who met the criteria in two subjects. The results further indicate that two (0.63%) participants met the criteria in three subjects. However, only 1 (0.31%) participant met the criteria in all four subjects. Therefore, based on these findings, only three participants are in a position to gain entry into the higher certificate EMC programme.

Table 4.6.1: Tabulation of criteria for all four subjects for a higher certificate in EMC

Higher certificate	Frequency	Percentage
Did not meet criteria in all four subjects	124	38.99
Meet criteria in one subject	165	51.89
Meet criteria in two subjects	26	8.18
Meet criteria in three subjects	2	0.63
Meet criteria in four subjects	1	0.31
Total	318	100

Table 4.7 presents the criteria for each subject for a diploma in EMC. Only 5 (1.57%) met the criteria in Mathematics, whereas 313 (98.43%) participants did not. In Biology, four (1.26%) participants met the criteria, but 314 (98.74%) did not. In Physical Science, only one (0.31%) participant met the criteria, but the remaining 317 (99.69%) did not. In English, 42 (13.21%) participants met the criteria, whereas 276 (86.79%) did not meet the criteria.

Table 4.7: Tabulation of criteria for each subject for a diploma in EMC

Criteria for diploma	Frequency	Percentage
Mathematics		
Does not meet criteria	313	98.43
Meets criteria	5	1.57
Total	318	100.00
Biology		
Does not meet criteria	314	98.74
Meets criteria	4	1.26
Total	318	100.00
Physical science		
Does not meet criteria	317	99.69
Meets criteria	1	0.31
Total	318	100
English		
Does not meet criteria	276	86.79
Meets criteria	42	13.21
Total	318	100.00

Table 4.7.1 presents the criteria for all four subjects for a diploma in EMC. The findings in this study revealed that 270 (84.90%) participants still need to meet the requirements for admission in all four subjects. In comparison, 44 (13.84%) participants meet the requirements for only one subject, followed by four (1.26%) of those who meet the criteria with at least two subjects. No participant met the criteria for three or four subjects. In summary, the results indicated that no participant met the requirements for admission into the diploma programme.

Table 4.7.1: Tabulation of criteria for all four compulsory subjects for a diploma in EMC

Diploma	Frequency	Percentage
Did not meet criteria in all four subjects	270	84.90
Meet criteria in one subject	44	13.84
Meet criteria in two subjects	4	1.26
Total	318	100.00

Table 4.8 presents the criteria for each subject for a degree programme in EMC. Only two (0.63%) in Mathematics met the requirements, whereas 316 (99.37%) participants did not. In Biology, four (1.26%) participants met the criteria, but 314 (98.74%) did not. In Physical Science, 318 (100%) participants did not meet the criteria. In English, 41 (12.90%) participants met the criteria, whereas 277 (87.10%) did not.

Table 4.8: Tabulation of criteria for each subject for a bachelor's degree in EMC

Criteria for Bachelor's Degree	Frequency	Percentage
Mathematics		
Does not meet criteria	316	99.37
Meets criteria	2	0.63
Total	318	100.00
Biology		
Does not meet criteria	314	98.74
Meets criteria	4	1.26
Total	318	100.00
Physical Science		
Does not meet criteria	318	100.00
Total	318	100.00
English		
Does not meet criteria	277	87.10
Meets criteria	41	12.90
Total	318	100.00

Table 4.8.1 presents the criteria for all four subjects for a bachelor's degree in an EMC programme. The findings revealed that 273 (85.85%) participants did not meet the criteria for admission in all four subjects. Furthermore, 43 (13.52%) participants met the criteria with only one subject, followed by two (0.63%) who met the criteria with two subjects. These results revealed that no participant met the criteria for gaining entry into the bachelor's degree programme.

Table 4.8.1: Tabulation of criteria for all four compulsory subjects for a bachelor's degree.

Bachelor's degree	Frequency	Percentage
Did not meet criteria in all four subjects	273	85.85
Meet criteria in one subject	43	13.52
Meet criteria in two subjects	2	0.63
Total	318	100.00

4.6 Conclusion

Data analysis identified that more than half of the participants, 181 (56.56%), were between the ages of 40 and 49 years, with a mean age of 45. Moreover, these participants were BAA qualification holders, and the majority, 318 (99.37%), had a matric qualification. This analysis also revealed that participants had a mean APS score of 17.19, with the minimum ranging from eight to a maximum of 34 points. Lastly, the analysis further revealed that participants did not meet the criteria for gaining entry into diploma and bachelor's degree programmes. Only three participants met the criteria for gaining entry into the higher certificate programme.

The next chapter will provide a detailed discussion and interpretation of the results as they apply to the aim and objectives of the study.

CHAPTER 5

DISCUSSION

5.1 Introduction

The preceding chapter explored and presented the results of the study in line with the research objectives. This chapter discusses the results in the broader context of the study objectives and the existing literature. The discussion aims to contribute to the understanding of the subject matter by dissecting the study objectives stated in Chapter 1, namely: to describe the demographic profile of emergency care providers in the Capricorn district, Limpopo; to describe the emergency care qualifications of emergency care providers in the Capricorn district, in Limpopo; to determine how many emergency care providers can gain entry into the various new emergency care qualifications through direct access; and to make recommendations regarding staff development and recruitment strategies.

5.2 Demographics

The findings of the study highlight a notable disproportion in the sex composition within the Capricorn EMS. Males were significantly overrepresented, accounting for $n = 195$ (60.94%) of the sample. The finding is consistent with earlier research, particularly from the Sibanda (2017) study in the North West of South Africa, which reported a 65.7% male majority. The Mothibi, Jama and Adefuye (2019) study in the Free State EMS further reflects this trend, with 66.7% males among EMS personnel. This pattern of male predominance may have historical roots, such as the historical connection of the EMS sector to physically demanding roles, like firefighting (Sibanda 2017). Current data from the HPCSA as of 31 July 2023, further confirms this trend, with 23 274 males compared to 15 195 females among a total of 38 442 emergency care providers (HPCSA 2023).

The demographic breakdown of race categories in South Africa comprises four main groups: Africans, whites, Indians, and coloureds (mixed race). This classification system reflects the complex history and diverse population of the country. The present study revealed a dominant presence of Africans ($n = 319$ (99.69%)), which may be attributed mainly to the geographical location of the study in the Capricorn district, where approximately 97% of the local population were Africans (Meso 2021). Although most

participants were Africans, this does not accurately reflect the racial distribution within the emergency care provider community in the South African EMS sector. In a previous study by Tiwari *et al.* (2021a), a general survey was conducted on all registered emergency care providers in South Africa, using data from the HPCSA database from 2002 to 2019. The findings depicted a picture of the typical emergency care provider in South Africa as an African male. Tiwari *et al.*'s study revealed that, out of a sample size comprising 56 894 individuals, a substantial majority of 45 423 (79.8%) were classified as Africans. This proportion was slightly lower than what was observed in the present study.

The age distribution within the sample provides insights into the participants' demographics. Notably, the mean age of 45 suggests that the EMS workforce tends to be relatively ageing. Most participants (n = 181 (56.56%)) fell in the 40–49 age group, indicating a concentration of individuals in middle adulthood. Additionally, n = 84 (26.25%) are in the 50–59 age group, while 16.88% are in the 30–39 age range. Interestingly, there was only n = 1 (0.31%) participant aged 60 to 65 and none under 30, possibly highlighting the scarcity of older individuals and younger, less experienced emergency care providers in the Limpopo EMS. This finding differs from the study by Tiwari *et al.* (2021a), which indicated that the typical age profile of an emergency care provider in South Africa was between 30 and 39 years. Moreover, a recent study in Saudi Arabia by Al-Wathinani *et al.* (2023) reported a different age profile, with most (58.5%) registered emergency care providers falling within the 25–35 age range, further emphasising potential shifts in demographic differences across different regions and contexts.

5.3 Discussion

This discussion explores the distinctive features of the study cohort qualifications, highlighting four critical categories: emergency care qualifications, matric requirements, matric subject combination, performance levels, and criteria for the higher certificate, diploma and degree qualifications. While emergency care qualifications equip individuals with the knowledge and skills needed to respond effectively in emergency medical situations, matric qualifications provide the academic foundation necessary for pursuing higher education and a wide range of future career options. Therefore, exploring the defining features of these qualifications was essential for this study to navigate both the dynamic emergency care setting and the educational realm of EMS in the Capricorn

district. This exploration offers insight into the essential characteristics defining these qualifications, emphasising their significance in the study objectives.

5.3.1 Emergency care qualifications

When examining the EMC qualifications, the results revealed that most participants ($n = 180$, 56.25%) held BAA qualification, while $n = 136$ (42.5%) possessed the AEA qualification. In stark contrast, those with CCA qualifications were a mere $n = 3$ (0.94%) of the sample, and ECT qualification holders constituted just $n = 1$ (0.31%). Although the BAA and AEA qualifications held a significant presence in this study, it is worth noting that these findings differ slightly from those of Tiwari *et al.* (2021a). Their study reported an even more pronounced dominance of the BAA qualification, which stood at 76%, followed by AEAs at 18% within the South African emergency care landscape. The findings highlight the prevailing trends in the qualifications held by emergency care providers in South Africa. These trends are further substantiated by recent statistics reported by the HPCSA as of July 31, 2023. The HPCSA data indicated that out of 38 417 registered emergency care providers, the majority ($n = 23,433$ or 61%) held a BAA qualification while $n = 10,733$ (28.9%) held an AEA qualification. Conversely, the number of emergency care providers having qualifications as CCA or ECT, which enable the provision of advanced life support (ALS) level of care, was at 7.05% (HPCSA, 2023).

The observation of the limited presence of ALS-qualified emergency care providers in this study is no surprise, given the ongoing shortage of such professionals. This shortage is compounded by the ongoing challenge of losing qualified individuals to international employment opportunities. This dilemma, characterised by a need for more skilled personnel and a continuous outflow of qualified professionals, exacerbates the existing resource constraints within the healthcare system. These challenges have been well-documented in previous studies (Govender *et al.* 2012; Makkink and Barnard 2022). Hence, it is crucial to migrate existing emergency care providers with short-course qualifications into formal EMC programmes to address and rectify this scarcity gap. This is vital in strengthening the South African healthcare system, particularly in response to concerns raised by scholars regarding the closure of short EMC courses. Sobuwa and Christopher (2019) emphasised the critical importance of recognising the consequences resulting from the discontinuation of these short courses in 2018. This view highlights the critical need to prioritise migrating the existing emergency care providers with short-

course qualifications into formal EMC programmes as a strategic approach to mitigate the scarcity gap and strengthen the nation's healthcare system.

The dominance of BAAs and AEAs in the present study highlights a substantial challenge in migrating these professionals into higher education qualifications. The BAA dominance in the current study can be ascribed to historical factors. Historically, the BAA course lasted four weeks, equipping individuals with the basic skills required to deliver basic life support (BLS) level of care to patients. This course was an entry point into the EMS profession until 2016 (Rosslee 2020). Notably, before 2012, there was no compulsory requirement for the BAA course applicants to possess a matric certificate; consequently, anyone with or without secondary school qualifications could enrol for the BAA course (Rosslee 2020). Furthermore, Rosslee (2020) highlights that specific subject prerequisites were not compulsory for matric certificate holders seeking admission to the course. These historical circumstances likely accounted for the substantial presence of BAA participants observed in the present study.

5.3.2 Matric requirements

As discussed in Chapter 2, the Department of Higher Education policy, as outlined in Government Gazette No. 27961 of 26 August 2005, clearly explains minimum admission requirements for enrolment in HE programmes. The policy mandated tertiary institutions to specify the requisite subject combinations and performance levels needed for entry into their respective programmes. In the context of higher certificate, diploma, and bachelor's degree programmes in EMC, minimum entrance requirements include: 1) possession of a matric qualification, 2) specific subject combinations inclusive of English, Mathematics, Physical Science, and Biology, and 3) meeting academic performance levels (RSA 1997).

This aspect explores the breakdown of matric distribution, a crucial entry requirement directly related to achieving study objectives. The results showed that most ($n = 318$, 99%) participants passed matric, while a minimal fraction comprising $n = 2$ (0.63%) participants did not have a matric qualification. In a similar context, these findings exhibited a subtle variation compared to the study conducted by Malatjie (2023), investigating the impact of the performance management and development system (PMDS) on service delivery within the Limpopo EMS. His study revealed that

approximately 80% of participants held matric qualifications, while the remaining 20% did not.

Considering the set minimum entry requirements by tertiary institutions, it is important to note that the two participants who did not have a matric in this study did not meet the criteria for entry into HE programmes. Most tertiary institutions require a matric pass that meets pre-determined criteria, such as achieving a pass with an exemption or attaining a specific number of distinctions. These are then converted into an APS (Ndlovu 2019). Notably, within this study, participants had a mean APS of 17.19, indicating that the majority did not possess an adequate APS required for entry into EMC programmes. Some participants generally had sufficient APS and matric qualification to grant them access to HE, but they still needed the requisite subject combination for EMC programmes. Most (n = 269, 85%) of these participants had subjects irrelevant to the emergency care field. These findings align with the observations made by Nell (2021), who highlighted that most existing emergency care providers lack the subject combinations such as Mathematics, Physical Science, Biology and English required for EMC programmes. Hence, many still need to meet the criteria for entry into EMC programmes. This situation can be attributed to historical factors when vocational certificate qualifications were the primary gateway to the EMS profession. The increased number of BAAs and AEAs mentioned earlier suggests that most people entering the EMS field followed the vocational qualification route for training. This circumstance emerged primarily because the EMS profession still needed to be professionalised. As a result, those who entered this field were not obligated to have the required subject prerequisites that are now mandatory for the current EMC programmes (Rosslee 2020). Drawing from this, one can assume that this historical context has led to the present challenge of emergency care providers lacking the required matric background to gain entry into various EMC programmes.

5.3.3 Matric subject combination and performance levels obtained

Chapter 4 has already elaborated on subject combination and performance level requirements for entry into different EMC programmes. Among these compulsory subjects, Mathematics presents a significant barrier to entry. Other institutions offering EMC programmes, such as DUT and UJ, require candidates to have passed this subject (DUT 2023; University of Johannesburg 2021c). The results of the study show that of the

total sample, only $n = 10$ (3.14%) participants passed Mathematics. This suggests that most participants do not meet the entry criteria, particularly with the Mathematics requirement. The results are consistent with previous studies by Jameel, Ali and Phil (2016) and Sharma *et al.* (2019), which showed that, despite its recognised importance as a pre-requisite for science stream courses, Mathematics poses a challenge to many schools, as many learners fail it or do not take it in their matric final year. The poor performance and lack of interest in Mathematics could be due to the language barrier. Learning processes become complicated when learners are taught in a language that is not their mother tongue (Jameel, Ali and Phil 2016). Sharma *et al.* (2019) have shown a correlation between lower achievement levels in Mathematics, Science, and the home language being different from the school language. Learning in a second language challenges content literacy, hindering proficiency in mastering both practical and theoretical content in a subject (Jameel, Ali and Phil 2016). This view is relevant to the present study, as most participants were Africans and predominantly used English as a second language.

The results were found to be worse with Physical Science. Only $n = 6$ (1.89%) participants passed this subject, and $n = 33$ (38%) participants failed it. Furthermore, a significant majority ($n = 279$ (87.73%)) did not have it. These results are not surprising as it has been noted that South Africa produces few learners who pass Physical Science every year. This issue stands as a national challenge demanding immediate attention, given the growing concerns surrounding the poor academic performance of South African learners in this particular subject (Simelane 2019). The poor performance in Physical Science is attributed to learners' challenges in providing explanations and descriptions, converting spoken information into written form and representing it diagrammatically, as well as effectively summarising written content for use in examinations or projects (Simelane 2019). This is particularly unsettling, given that Physical Science is a key subject in the health sciences (Mokiwa 2014).

Expanding upon this aspect, another remarkable finding in this study was that the majority, 279 (87.73%) of participants, did not have Physical Science as part of their Senior Certificate curriculum. In a similar context, it is noteworthy that the mean age of participants was 45 years. Additionally, it is important to acknowledge that all the participants in this study completed their secondary education under the previous Senior Certificate syllabus. As highlighted by Dhurumraj (2013), before 1994, only some students

opted for Physical Science as a subject for their Senior Certificate, while the majority did not include it. This view could be true in the context of the present study, as most participants did not have this subject in their Senior Certificate. This trend continues, whereby few learners choose Physical Science as a core subject (Heeralal and Dhurumraj 2016). Fear and a lack of confidence play crucial roles in this trend. The fear surrounding Physical Science has led to a decline in the number of students pursuing this subject, both in high school and at the university level. This fear often results in poor performance, making it challenging for students to meet the requirements for university admission (Heeralal and Dhurumraj 2016).

Regarding Biology, only 36 (11.32%) participants passed, while more than half ($n = 175$ (55.03%)) failed. The results further revealed that 107 (33.65%) did not study Biology as part of their Senior Certificate. These results corroborate with a study conducted in Thohoyandou schools by Ramutumbu (2012). In her research, it was found that out of a sample of size comprising 3 197 matric learners, the largest proportion ($n = 1 012$, (31.65%)) achieved an F (33.3%) symbol. While this symbol is technically considered a passing mark, it is a poor symbol which does not satisfy the conditions of admissions at tertiary institutions, particularly for EMC courses, where a pass in Biology is a prerequisite.

In Limpopo, Biology is a subject pursued by learners following both a general curriculum and those enrolled in a science subjects' curriculum. The high failure rate in Biology contributes to the overall high failure rate among Matric learners in the province (Ramutumbu 2012). Several factors contribute to this high matric failure rate and poor performance, one being the geographical area where learners attend school. As already indicated, the present study was conducted in Limpopo, the most predominantly rural province in South Africa, where over 80% of the population live in rural areas (Malatji 2020). Academic performance in many rural schools tends to be a major challenge as compared to urban schools. This difference became evident through nationwide pass rate evaluations conducted by the Department of Education, specifically focusing on subjects like languages, Mathematics, and Natural Science. The results of this evaluation revealed substantial differences: in urban areas, 64% passed a language, 46% passed Mathematics, and 58% passed Natural Science.

In contrast, in rural areas, only 29% passed a language, 22% passed Mathematics, and 35% passed Natural Sciences (Gardiner 2018). These findings highlight the performance challenges prevalent in rural schools, primarily attributed to socio-economic issues. The academic success of learners is mainly influenced by the socio-economic factors. In certain underprivileged areas of Limpopo, learners daily face long journeys to reach schools without access to food, and some of these schools lack essential facilities such as proper sanitation and electricity. Poor service delivery previously seen in Limpopo involving delays in textbook distribution and the dependence on mud schools in certain areas, adds to the challenges rural schools face, directly impacting the quality of education and available resources (Baloyi 2020). This resource deficit impedes the creation of a conducive learning environment, placing rural Limpopo learners at a disadvantage when compared to their urban counterparts.

Another contributing factor to the high failure rate is the shortage of quality teachers in rural schools, which further worsens the problem and hampers learners' ability to comprehend challenging subjects, ultimately affecting matric performance. This issue is evident as many of these learners struggle to understand questions in English; consequently, many fail to provide the expected answers (Lebata 2014). This could be true in the context of the present study looking at the geographical location of the study and the race distribution of the participants which revealed a dominant presence of Africans (n = 319, or 99.69%).

Previously, it was indicated that the majority 318 (99%) of participants, successfully obtained their matric qualifications, while a small fraction, comprising only 2 (0.63%) participants did not achieve this qualification. However, it is important to note that these results do not accurately represent the overall matric performance in Limpopo. In contrast, South African matric statistics for the year 2022 reveal a different picture. Out of the 725 146 individuals who wrote the matric exam in South Africa, 580 555 (80.1%) successfully passed. Limpopo, in contrast to other provinces, recorded the lowest matric results (Matric College 2023). Among the 110 295 candidates who sat for the exam, only 79 493 (72.1%) passed. This figure falls slightly below the 2022 national average pass rate of 79.8%. Despite the Limpopo results being the lowest compared to other provinces, it is worth highlighting that this marks a significant improvement because the province had consistently recorded matric pass rates below 70% since 2010 (Matric College 2023). While this percentage may appear higher than in previous years, it is important to

recognise that many of those who passed matric may still not meet the eligibility criteria for entry into tertiary institutions, particularly in terms of subject performance. This is because many learners, mainly in Limpopo, pass their subjects with the minimum pass mark of an F (33.3%) symbol according to the Senior Certificate syllabus, or a 30% pass mark according to the National Senior Certificate syllabus (Ramutumbu 2012; Shepherd and Van der Berg 2020). This pass mark, as indicated, does not satisfy the conditions of admissions at tertiary institutions, particularly for courses in the EMC field. For instance, the EMC course requires higher than F symbols in subjects such as English, Mathematics, Biology and Physical Science.

5.3.4 Criteria for a higher certificate, diploma and bachelor's degree

The main findings of this study revealed that most the participants did not meet the criteria for entering diploma and bachelor's degree programmes. However, only three participants met the criteria for entering the higher certificate programme. These findings concur with Sobuwa and Christopher (2019: 4), who indicated that many emergency care providers do not meet the HE admission criteria. This view is also evident in the Free State EMS, as seen in the Free State College of Emergency Care report (2021), indicating that out of 878 personnel, only 261 (30%) meet the admission criteria for the diploma in EMC programme. This implies that very few of the existing emergency care providers in the Free State meet the requirements for admission to EMC programmes (Nell 2021). In the light of these findings, most emergency care providers with matric qualifications do not meet the minimum admission requirements for EMC programmes.

While the matric subject combination and performance levels play a crucial role for individuals seeking to enter tertiary education, particularly in specialised fields like the emergency care profession, given all the findings of the study so far, one may suppose that most emergency care providers in the Capricorn District will face significant educational barriers when seeking access to higher education EMC programmes. This view aligns with that of Sobuwa and Christopher (2019: 4), who indicated that a significant challenge in EMS is migrating the existing emergency care providers without the necessary HE admission criteria, for example, not having the required school-leaving subjects or pre-requisite performance levels. Based on the results of this study, it is evident that it might not be feasible to migrate most of the emergency care providers to the formal emergency care qualifications through direct access to HE programmes, as

only a few meets the entry criteria. The results revealed a stark reality of the status of the Limpopo EMS about migrating the existing emergency care providers to formal EMC qualifications. This is despite the development of the NECET policy, which aimed to assist with aligning EMC education and training with current HE legislation, national training needs, and requirements.

While it is notable that most emergency care providers in the Capricorn District holding matric qualifications do not satisfy the minimum admission requirements for EMC programmes, this circumstance should not be regarded as an insurmountable impediment. These individuals can still improve their matric performance levels by participating in a matric upgrade programme. This programme caters to individuals who have already completed matric exams and seek to improve their subject performance levels or modify their subject combinations to meet the eligibility criteria for enrolment in tertiary educational institutions. As previously mentioned, pursuing EMC courses requires specific APS and subject combinations. Therefore, a matric upgrade programme can effectively assist individuals in meeting these requirements. Presently, there is yet to be any available data regarding the number of emergency care providers in the Capricorn District who have enrolled for matric upgrade programmes. However, further investigation is necessary to ascertain this information as this was beyond the scope of this study.

5.4 Conclusion

The results show that many participants failed the pre-requisite subjects Mathematics, Biology, and Physical Science. Participants either had the correct subjects, but needed the correct performance levels or needed the pre-requisite subjects. The study reflects the current situation in the Capricorn District, where most of the existing emergency care providers do not have the pre-requisite secondary school leaving subjects or the appropriate matric performance levels to enter various EMC programmes. Despite efforts by the NECET policy to enhance the emergency care profession, in the same vein, one would suggest that migration to formal emergency care qualifications through direct access would not be feasible for many of the emergency care providers as the matric results place a substantial number of them in a disadvantaged position. This is a major challenge that leaves the existing emergency care providers with limited options of accessing the higher education EMC programmes. The subsequent chapter concludes

this study by presenting a summary, recommendations for future research and the study's limitations.

CHAPTER 6

SUMMARY, RECOMMENDATION AND CONCLUSION

6.1 Introduction

This chapter summarises the study, and addresses the research objectives outlined in Chapter 1. To the researcher's knowledge, this is the first study in South Africa, set and conducted as a desktop exercise to quantify the feasibility of migrating the emergency care providers to the formal emergency care qualifications. As such, the study will contribute to the paucity of literature by expanding the existing body of knowledge on quantifying the migration of the existing emergency care providers in the EMS field. Following the summary, there is a discussion of the study's recommendations, limitations and recommendations for future research.

6.2 Summary

The migration of the existing emergency care providers to formal emergency care qualifications signifies a shift from the historical educational and qualification frameworks to the structured formal HE system. This transition is driven by several factors, including the need to keep pace with advancements in medical knowledge and technology, conform to evolving healthcare standards, and improve the quality and efficacy of emergency care services. Furthermore, it seeks to equip the existing emergency care providers with the necessary skills and knowledge to meet current and future patient care needs, responding to the growing healthcare landscape and the demands it places on emergency care providers.

The NECET policy made provision for migrating the existing emergency care providers with non-NQF-aligned emergency care short courses to formal emergency care qualifications. Nonetheless, the migration into formal emergency care qualifications hinges on these providers' entry to HE emergency care programmes. Entry into tertiary education programmes is determined by various factors, including completing a matric certificate with specific subject combinations and required subject performance levels.

Therefore, the migration process is not without its challenges. According to the NECET policy (NECET 2017: 5), a significant challenge identified is the migration of existing

emergency care providers to the formal qualifications, particularly since most of these providers registered with the HPCSA possess non-formal qualifications, highlighting the importance of addressing this issue. This study, therefore, conducted a feasibility analysis of migrating the existing emergency care providers to the formal emergency care qualifications within the Capricorn District of Limpopo, South Africa.

The first research objective was to determine the demographic profile of emergency care providers in the Capricorn District. Of the sample size of 320 participants, the study found a gender imbalance in the Capricorn EMS, with males (60.94%) comprising the majority, which aligns with previous research. The racial distribution largely reflects the local population's demographics, with Africans (99.69%) being the predominant group. The average age of participants was 45 years, suggesting an ageing workforce with a concentration in middle adulthood, and a standard deviation of 6.2.

The second research objective was to determine the emergency care qualifications of emergency care providers in the Capricorn District. The results highlighted the dominance of BAA (56.25%) and AEA (42.5%) qualifications. The scarcity of CCA and ECT qualifications highlights the need to address the shortage of ALS providers in the field.

The third research objective was to determine how many emergency care providers could enter the various formal emergency care qualifications through direct access. The main findings of this study revealed that matric requirements were a significant barrier, with many participants lacking the necessary subjects and performance levels for entry into higher education EMC programmes. Mathematics, Physical Science, and Biology posed challenges. Regarding Mathematics, a mere 10 (3.14%) participants passed this subject. In the case of Physical Science, only 6 (1.89%) passed, whereas 36 (11.32%) of participants passed Biology. Regarding the diploma and bachelor's degree programmes, this study revealed that few participants met the criteria for entering these programmes. Only three participants met the criteria for entering a higher certificate programme.

6.3 Recommendations

To create an enabling environment that will facilitate migrating the existing emergency care providers to the formal EMC qualifications, this study suggests a proactive approach to support aspiring emergency care providers who currently do not meet the entry requirements for EMC programmes. It cannot be over-emphasised that migration and

transformation cannot be effective without the following strategic decisions being made and implemented:

6.3.1 Matric Upgrade Programmes

Aspiring emergency care providers must be encouraged to consider enrolling for Matric Upgrade Programmes (MUPs). These programmes can play a key role in bridging the gaps and facilitating the attainment of the needed qualifications. Furthermore, it is important to conduct an in-depth investigation into the effectiveness and accessibility of MUPs, particularly regarding subject combinations required in EMC programmes within the Capricorn District. This will ensure that the MUPs are not only accessible but also designed to meet the needs of the existing emergency care providers.

The MUPs will not only open up educational opportunities for aspiring emergency care providers but will also emphasise the importance of creating pathways for those who are committed to improving their skills and knowledge in the field of emergency care. It will also align with the broader goal of enhancing the quality of emergency care services in the region and supporting individuals in pursuing HE and career advancement in the field.

6.3.2 Human resource recruitment and placement strategy

Transformation of the Limpopo EMS will not be achieved by only relying on the existing emergency care providers migrating to the formal qualifications. The EMS management should strive to ensure that, as much as possible, when individuals resign or retire, their vacant positions are filled by individuals who possess the necessary NQF-aligned qualifications. Moreover, advertisements for such positions should explicitly state the required qualifications for prospective candidates. In the same vein, transformation initiated by external factors tends to progress slowly, as it depends on factors like expansion, the creation of new positions, staff resignations, and retirements. Therefore, it is imperative to pay careful attention to how the existing BAAs, AEAs, and CCAs within the service can be supported in pursuing further education and attaining qualifications such as HC-EMC, D-EMC, and BHSc degrees.

Of particular importance is the matter relating to the Occupational Specific Dispensation (OSD) framework for EMS personnel. The existing OSD structure lacks designated placement levels for formal qualifications, such as the HC-EMC and D-EMC. This makes

migration to these qualifications less desirable as there are instances where AEA and CCA emergency care providers, who hold non-NQF-aligned qualifications, earn more than providers with D-EMC qualifications. This inconsistency undermines the principles of transformation and migration. Therefore, this study recommends a comprehensive review of the current OSD structure to incorporate formal EMC qualifications.

6.4 Study Limitations

1. **Geographical scope:** The study focused on the Capricorn District in Limpopo, which may limit the generalisability of findings to other regions or districts.
2. **Matric Upgrade Programmes:** The study suggested MUPs as a potential solution, but it did not investigate the availability or effectiveness of such programmes in the Capricorn District.
3. **Data on Matric Upgrade Enrolment:** The study mentioned the possibility of emergency care providers enrolling in MUPs but did not provide specific data or insights into the extent to which this is happening.

6.5 Recommendations for future research

While a notable number of emergency care articles addressed emergency care education in South Africa, no study was found that addressed migrating emergency care providers to formal emergency care qualifications. It is therefore recommended that future research be conducted into this area to address the gap in the migration of emergency care providers. Topics for future research are listed below:

- **Multi-district study:** To enhance the generalisability of the findings, future research should consider expanding the study to multiple districts or regions within South Africa.
- **Longitudinal study:** Consider a longitudinal study to track the progress of emergency care providers who enrol in MUPs and subsequently apply for formal emergency care qualifications. This would provide insight into the effectiveness of MUPs in facilitating migration to formal qualifications and the long-term impact on the workforce.

- **Comparison with other countries:** Compare the South African situation with other countries that have faced similar challenges in migrating their emergency care providers to formal qualifications.
- **Survey of EMS managers:** Conduct a survey or interviews with EMS managers and administrators to gather their perspectives on the challenges and opportunities in transforming the workforce. This could include their views on recruitment, training, and qualification requirements.
- **Surveys on subject performance:** Conduct surveys or assessments to understand the specific challenges faced by emergency care providers in meeting subject performance requirements for entry into formal emergency care qualifications. This can help identify areas where additional support or remedial programmes may be needed.
- **Educational Partnerships:** Establish partnerships with universities to create a pipeline of graduates entering the EMS field. Offer internships and apprenticeships to students in emergency medical care programmes.

LIST OF REFERENCES

Afshari, A., Khodaveisi, M. and Sadeghian, E. 2021. Exploring the educational challenges in emergency medical students: A qualitative study. *Journal of Advances in Medical Education & Professionalism*, 9 (2): 79.

Aggarwal, A. 2015. Recognition of prior learning: Key success factors and the building blocks of an effective system. Pretoria: ILO

Aggarwal, R. and Ranganathan, P. 2019. Study designs: Part 2—descriptive studies. *Perspectives in clinical research*, 10 (1): 34.

Al-Wathinani, A. M., Alghadeer, S. M., AlRuthia, Y. S., Mobrad, A., Alhallaf, M. A., Alghamdi, A. A., Althunayyan, S. M. and Albaqami, N. A. 2023. The characteristics and distribution of emergency medical services in Saudi Arabia. *Annals of Saudi medicine*, 43 (2): 63-69.

Alanazi, A. F. 2012. Curriculum design of emergency medical services program at the College of Applied Medical Sciences, King Saud bin Abdulaziz University for Health Sciences. *Advances in Medical Education and Practice*: 7-18.

Aljohani, A. 2012. Closure of Medical Institutes. *Almedina Newspaper*,

AlShammari, T., Jennings, P. and Williams, B. 2017. Evolution of emergency medical services in Saudi Arabia. *Journal of Emergency Medicine, Trauma and Acute Care*, 2017 (1)

Attwel, P. 2004. Senior Certificate symbols - What they mean (online). 1 Western Cape. Available: [https://wcedonline.westerncape.gov.za/comms/press/2004/70b_symbols.html%23:~:text=%3DM%2520%252D%2520Endorsement%2520\(Merit\),and%2520grade%2520%2520requirements%2520for%2520Endorsement.&ved=](https://wcedonline.westerncape.gov.za/comms/press/2004/70b_symbols.html%23:~:text=%3DM%2520%252D%2520Endorsement%2520(Merit),and%2520grade%2520%2520requirements%2520for%2520Endorsement.&ved=) (Accessed 21 August 2023).

Badat, S. 2008. Redressing the colonial/apartheid legacy: Social equity, redress and higher education admissions in democratic South Africa. In: Proceedings of Conference on Affirmative Action in Higher Education in India, the United States and South Africa. New Delhi, India. 19-21.

Baker, C. 2017. Quantitative research designs: Experimental, quasi-experimental, and descriptive. Evidence-based practice: An integrative approach to research, administration, and practice: 155-183.

Baloyi, M. E. 2020. An analysis of how socioeconomic issues affect the performance of learners in rural schools: a case study of Ga-Sekgopo high schools grade 8-10 learners.

Beauchamp, T. L. and Childress, J. F. 2019. Principles of biomedical ethics. USA: Oxford University Press.

Becker, D. 2018. Is a Degree for EMS Providers Needed to Advance the Profession. Available: <https://www.iafc.org/on-scene/on-scene-article/is-a-degree-for-ems> (Accessed 29 August 2022).

Bezuidenhout, M., Human, S. and Lekhuleni, M. 2013. The new nursing qualifications framework. Trends in nursing, 2 (1): 14-25.

Bhandari, P. 2020. What is quantitative research?| Definition, uses and methods. Scribbr Official Portal,

Blaauw, D., Ditlopo, P. and Rispel, L. C. 2014. Nursing education reform in South Africa – lessons from a policy analysis study. Global Health Action, 7 (1): 26401.

Bok, G. I. 2021. Adult learners” challenges in distance learning: A case study in Universiti Sains Malaysia. *Issues in Educational Research*, 31 (1): 19-36.

Brink, H. and Van der Walt, C. 2006. Fundamentals of research methodology for health care professionals. South Africa: Juta and Company Ltd.

Brooks, I. A., Grantham, H., Spencer, C. and Archer, F. 2018. A review of the literature: the transition of entry-level paramedic education in Australia from vocational to higher education (1961–2017). *Australasian Journal of Paramedicine*, 15 (2)

Butcher, J. and Zaidi, H. 2018. *EMS Essentials*. Dallas: Emergency Medicine Residents' Association.

Caffrey, S. M., Barnes, L. C. and Olvera, D. J. 2019. Joint Position Statement on Degree Requirements for Paramedics. *Prehospital Emergency Care*, 23 (3): 434-437.

Cape Peninsula University of Technology (CPUT) Handbook. 2020. Start your future career in Emergency Care with Bachelor of Emergency Medical Care, Diploma in Emergency Medical Care and Higher Certificate in Emergency Medical Care (Course brochure)

Carney, C. 1999. Prehospital care-a UK perspective. *British medical bulletin*, 55 (4): 757-766.

Cermak, R. 2016. An investigation into recognition of prior learning within the National Certificate: Emergency Care Programme in the Western Cape. Masters Thesis, Durban University of Technology.

Coleman, M. and Briggs, A. R. 2015. *Research methods in educational leadership and management*. London: Sage publications.

Cooper, S. 2005. Contemporary UK paramedical training and education. How do we train? How should we educate? *Emergency Medicine Journal*, 22 (5): 375-379.

Custers, E. J. and Cate, O. T. 2018. The history of medical education in Europe and the United States, with respect to time and proficiency. *Academic Medicine*, 93 (3): S49-S54.

Daniels, F. M. 2010. Response to national policy imperatives for nursing education: A Western Cape case study. *Curationis*, 33 (1): 42-48.

Dawson, D. 2008. Evaluation of the Bachelor of Health Science (Paramedic) degree program at Victoria University. Masters Thesis, University of Melbourne.

Department of Basic Education. 2017. A Resume of subjects for the Senior Certificate, Report 550 (2017/08) Pretoria: Government Gazette 41024. Available: <https://www.education.gov.za> (Accessed 21 August 2023).

Devenish, A., Clark, M. and Fleming, M. 2016. Experiences in becoming a paramedic: the professional socialization of university qualified paramedics. *Creative Education*, 7 (6): 786-801.

Devenish, A. S. 2014. Experiences in becoming a paramedic: a qualitative study examining the professional socialisation of university qualified paramedics. Doctoral Dissertation, Queensland University of Technology.

Dhurumraj, T. 2013. Contributory factors to poor learner performance in Physical Sciences in KwaZulu-Natal Province with special reference to schools in the Pinetown District. Masters Dissertation, UKZN.

Dias, D. 2015. Has massification of higher education led to more equity? Clues to a reflection on Portuguese education arena. *International Journal of Inclusive Education*, 19 (2): 103-120.

Durban University of Technology (DUT) Handbook. 2023. Career information 2024: Bachelor of Health Sciences in Emergency Medical Care (Brochure) Available: www.dut.ac.za/entry-requirements/ (Accessed 12 July 2023).

Edwards, D. 2011. Paramedic preceptor: work readiness in graduate paramedics. *The Clinical Teacher*, 8 (2): 79-82.

Emanuel, E. J., Wendler, D., Killen, J. and Grady, C. 2004. What makes clinical research in developing countries ethical? The benchmarks of ethical research. *Journal of infectious diseases*, 189 (5): 930-937.

Epple, D., Romano, R., Sarçça, S. and Sieg, H. 2017. A general equilibrium analysis of state and private colleges and access to higher education in the US. *Journal of Public Economics*, 155: 164-178.

Etikan, I. and Bala, K. 2017. Combination of probability random sampling method with non-probability random sampling method (sampling versus sampling methods). *Biometrics & biostatistics international Journal*, 5 (6): 210-213.

Etikan, I., Musa, S. A. and Alkassim, R. S. 2016. Comparison of convenience sampling and purposive sampling. *American journal of theoretical and applied statistics*, 5 (1): 1-4.

Fragoso, A., GonçAlves, T., Ribeiro, C. M., Monteiro, R., Quintas, H., Bago, J., Fonseca, H. M. and Santos, L. 2013. The transition of mature students to higher education: Challenging traditional concepts? *Studies in the Education of Adults*, 45 (1): 67-81.

Gaertner, M. N. and Hart, M. 2013. Considering class: College access and diversity. *Harv. L. & Pol'y Rev.*, 7: 367.

Gardiner, M. 2018. Education in rural areas. *Issues in education policy*, 4: 1-33.

Garnett, J. and Cavaye, A. 2015. Recognition of prior learning: opportunities and challenges for higher education. *Journal of Work-Applied Management*,

Govender, K., Grainger, L., Naidoo, R. and MacDonald, R. 2012. The pending loss of advanced life support paramedics in South Africa. *African Journal of Emergency Medicine*, 2 (2): 59-66.

Hardin, C. J. 2008. Adult students in higher education: A portrait of transitions. *New directions for higher education*, 2008 (144): 49-57.

Health Profession Council of South Africa (HPCSA). 1999. Curriculum for the Basic Ambulance Assistance Course Pretoria: HPCSA.

Health Profession Council of South Africa (HPCSA). 2011. EC News: Newsletter of the Professional Board for Emergency Care. Pretoria: HPCSA.

Health Professions Council of South Africa (HPCSA). 2004. Health Professions Act 56 of 1974. Pretoria: HPCSA. Available:
www.hpcsa.co.za/Uploads/editor/UserFiles/downloads/legislations/health_professions_ct_56_1974.pdf
(Accessed 10 October 2022).

Health Professions Council of South Africa (HPCSA). 2009. EC News: Newsletter of the Professional Board for Emergency Care. Pretoria: HPCSA.

Health Professions Council of South Africa (HPCSA). 2010. Board emergency registration. Pretoria: HPCSA. Available: http://www.hpcsa.co.za/board_emergency_registration.php. (Accessed 03 November 2022).

Health Professions Council of South Africa (HPCSA). 2019. Higher Certificate in Emergency Medical Care - Minimum Standards Pretoria: HPCSA.

Health Professions Council of South Africa (HPCSA). 2023. Statistics. Pretoria: HPCSA. Available: <https://www.hpcsa.co.za/?contentId=305&menuSubId=0&actionName=Publications> (Accessed 27 July 2023).

Heeralal, P. and Dhurumraj, T. 2016. Factors that contribute to poor learner performance in physical sciences in KwaZulu-natal Province with special reference to schools in the Pinetown district. *International Journal of Educational Sciences*, 14 (3): 304-317.

Hlongwane, I. 2019a. Compliance with quality assurance principles of recognition of prior learning (RPL) by library and information science schools in South Africa. *Innovation: journal of appropriate librarianship and information work in Southern Africa*, 2019 (58): 78-95.

Hlongwane, I. 2019b. Recognition of prior learning as an access tool. *Higher Education, Skills and Work-Based Learning*, 9 (4): 563-570.

Hou, X. Y., Rego, J. and Service, M. 2013. Paramedic education opportunities and challenges in Australia. *Emergency Medicine Australasia*, 25 (2): 114-119.

Jahn, W. T. 2011. The 4 basic ethical principles that apply to forensic activities are respect for autonomy, beneficence, nonmaleficence, and justice. *Journal of chiropractic medicine*, 10 (3): 225.

Jameel, H. T., Ali, H. H. and Phil, M. 2016. Causes of poor performance in mathematics from teachers, parents and student's perspective. *American Scientific Research Journal for Engineering, Technology, and Sciences*, 15 (1): 122-136.

Jappie, N. 2020. Access, equity, and admissions in South African higher education. *Higher education admissions practices: An international perspective*: 190-202.

Jensen, A. L. D. 2020. Higher Education in the United States' Emergency Medical Services: A Phenomenological Study. *American College of Education*.

Johnson, R. A. and Bhattacharyya, G. K. 2019. *Statistics: principles and methods*. John Wiley & Sons.

Joyce, C. M., Wainer, J., Archer, F., Wyatt, A. and Pitermann, L. 2009. Trends in the paramedic workforce: a profession in transition. *Australian Health Review*, 33 (4): 533-540.

Kashedi, P. W. 2021. Mature-age Undergraduate Students' Perceptions of their Learning Experiences at the University of Namibia. *Masters Dissertation, University of Namibia*.

Kasworm, C. E. 2018. Adult students: A confusing world in undergraduate higher education. *The Journal of Continuing Higher Education*, 66 (2): 77-87.

Kilner, T. 2004. Educating the ambulance technician, paramedic, and clinical supervisor: using factor analysis to inform the curriculum. *Emergency Medicine Journal*, 21 (3): 379-385.

Lebata, M. C. 2014. An investigation of performance in the biology 5090 at selected high schools in Lesotho. Master's dissertation, University of South Africa.

Leedy, P. D. and Ormrod, J. E. 2015. *Practical research*. 10th ed. Boston: Pearson Education International.

Makkink, A. W. and Barnard, E. 2022. Potential overtreatment by paramedic students: A study from three South African higher education institutions. *Australasian Journal of Paramedicine*, 19: 1-11.

Malatji, M. T. 2020. Rural development outcomes and policies in South Africa's Limpopo Province. Masters Dissertation, UNISA.

Malatjie, D. N. 2023. Performance management: a case study of the emergency medical and response services in Limpopo province. Doctoral Dissertation, Durban University of Technology.

Maponya, P. 2021. An Assessment of Smallholder Farmer's Status in the Capricorn District in Limpopo Province, South Africa. *Circular Economy and Sustainability*, 1 (4): 1401-1411.

Maree, K., Creswell, J., Ebersöhn, L., Eloff, I., Ferreira, R., Invankova, N., Jansen, D., van Niewenhuis, J., Pietersen, J. and Plano Clark, V. 2007. *First steps in research*. Pretoria: Van Schaik.

Margolis, G. S. 2005. The role of bachelor's degree emergency medical services programs in the professionalization of paramedicine. Doctoral Dissertation, University of Pittsburgh.

Mashaphu, M. P. 2021. Analysing factors affecting the participation of small-scale cattle farmers in livestock auctions in Capricorn District of Limpopo Province. Masters Dissertation, University of Limpopo.

Matlakala, M. 2017. Transforming nursing education: Benefit or peril for the profession.

Matlala, N. T., Malema, R. N., Bopape, M. A. and Mphekgwana, P. M. 2021. The perceptions of professional nurses regarding factors affecting the provision of quality health care services at selected rural public clinics in the Capricorn district, Limpopo Province. *African Journal of Primary Health Care & Family Medicine*, 13 (1): 2830.

Matric College. Provincial Matric Results (online). 2023. Available: <https://www.matric.co.za/provincial-matric-results/#:~:text=Matric> (Accessed 23 September 2023)

McDonell, A., Burgess, S. J. and Williams, B. A. 2008. From academia to clinical practice. In: *Paramedics in Australia: Contemporary challenges of practice*. Pearson, 190-200.

McMillan, J. H. and Schumacher, S. 2010. *Research in education: Evidence-based inquiry*. New Jersey: Pearson Education, Inc.

Mehmood, A., Rowther, A. A., Kobusingye, O. and Hyder, A. A. 2018. Assessment of pre-hospital emergency medical services in low-income settings using a health systems approach. *International Journal of Emergency Medicine*, 11 (1): 53.

Mekwa, J. 2000. Transformation in nursing education: chapter 13. *South African health review*, 2000 (1): 271-283.

Meso, L. O. 2021. Determinant of public participation in Integrated Development Planning in Polokwane Local Municipality, Limpopo Province South Africa.

Millar, E. 1966. Report by the Working Party on Ambulance Training and Equipment. Part 1—Training. Ministry of Health, Scottish and Home Department: London: HMSO.

Mishra, S. B. and Alok, S. 2022. *Handbook of research methodology*: Educreation publishing.

Mokiwa, H. O. 2014. Exploring the teaching of Physical Science through inquiry. *International Journal of Educational sciences*, 7 (1): 21-27.

Moodley, K. 2016. An investigation into the clinical practicum experience of ALS paramedic students and their preparedness for professional practice.

Moore, J. 2005. *Race and college admissions: A case for affirmative action*. McFarland.

Morton, J., Klopping, K., Buick, J. E., Todd, J. and Batt, A. 2015. 1. The evolution of the paramedic, *Canadian Paramedicine*, 38: 5 - 22

Mothibi, J. D., Jama, M. and Adefuye, A. O. 2019. Assessing the knowledge of emergency medical care practitioners in the Free State, South Africa, on aspects of pre-hospital management of psychiatric emergencies. *The Pan African Medical Journal*, 33

Mouton, J. 2011. *Understanding social research*. 5th Edition ed. Pretoria: Van Schaik.

Munro, G., O'Meara, P. and Kenny, A. 2016. Paramedic transition into an academic role in universities: a scoping review. *Journal of Paramedic Practice*, 8 (9): 452-457.

Mutairi, M., Jawadi, A., Harthy, N., Farhan, A., Enezi, Algerian, N., Jerian, A., Qahtani, A., Harbi, A. and Anazi, A. 2016. Emergency Medical Service System in the Kingdom of Saudi Arabia. *journal of medical science and clinical research*, 4: 13084-13092.

National Department of Health (NDoH). 2019. *National Policy on Nursing Education and Training*. Pretoria: Government Gazette.

National Highway Traffic Safety Administration (NHTSA). 2009. National Emergency Medical Services Education Standards. US: Department of Transport. Available: <https://www.ems.gov/pdf/National-EMS-Education-Standards-Final-Jan-2009.pdf&ved> (Accessed 03 June 2022).

Ndlovu, S. 2019. Access into professional degrees by students with disabilities in South African higher learning: A decolonial perspective. *African Journal of Disability*, 8 (1): 1-12.

Nell, E. N. 2016. Investigating the effect of the incorporation of the Free State College of Emergency Care under a higher education institution. Masters Dissertation, University of the Free State. Available: <https://scholar.ufs.ac.za/bitstream/handle/11660/4795/NellEN.pdf?sequence=1&isAllowed=y> (Accessed 02 August 2022).

Nell, E. N. 2021. Development of quality assurance and educational guidelines for an emergency medical care preparation programme in south Africa. Doctoral Dissertation, University of the Free State.

Nickson, C. 2017. Retrospective studies and chart reviews. *Life in the Fast Lane*,

Nieuwenhuis, J. 2007. Qualitative research designs and data gathering techniques. *First steps in research*, 7: 70-97.

O'Brien, K., Moore, A., Dawson, D. and Hartley, P. 2014. An Australian story: paramedic education and practice in transition. *Australasian Journal of Paramedicine*, 11 (3)

O'Meara, P., Stirling, C., Ruest, M. and Martin, A. 2015. Community paramedicine model of care: an observational, ethnographic case study. *BMC health services research*, 16 (1): 1-11.

Powell, J. and Sweeting, M. 2015. Retrospective studies. *European Journal of Vascular and Endovascular Surgery*, 50 (5): 675.

Ramutumbu, M. S. 2012. The implementation of educational media by biology teachers in the Thohoyandou area. Masters Dissertation, University of Johannesburg (South Africa).

Reis, H. T. and Judd, C. M. 2016. Handbook of research methods in social and personality psychology. Cambridge: University Press.

Republic of South Africa. National Department of Health (NECET Policy). 2017. National Emergency Care Education and Training Policy. Pretoria: Government Gazette Available: <https://www.hpcsablogs.co.za/wp-content/uploads/2018/08/national-emergency-care-education-and-training-policy.pdf&ved> (Accessed 01 March 2022).

Republic of South Africa (RSA). 1997. Higher Education Act 101 of 1997. Pretoria: Government gazette.

Republic of South Africa (RSA). 2001. General and Further Education and Training Quality Assurance Act 58 of 2001. 22896. Pretoria: Government Gazette.

Republic of South Africa (RSA). 2008. National Qualification Framework Act 67 of 2008. Pretoria: Government Printer.

Rifino, J. J. and Mahon, S. E. 2016. Role of emergency medical services in disaster management and preparedness. In: Ciottone's Disaster Medicine. Elsevier, 13-19.

Rosslee, F. R. 2020. Critical care assistants opinions of the Health Professions Council of South Africa register closure and change in clinical practice guidelines. Masters Dissertation, University of Witwatersrand.

Rossouw, S. 2000. Research Methodology for the Business and Administrative Sciences, JC Welman and SJ Kruger: book review. SA Journal of Industrial Psychology, 26 (1): 55.

Schuls, W., Solga, H. and Pollak, R. 2023. Vocational education, tertiary education, and skill use across career stages. European Sociological Review, 39 (5): 741-758.

Sefako Makgatho Health Sciences University (SMU) Handbook. 2021. Undergraduate Applications and Admissions: Emergency Medical Care Programmes

Sharma, B. N., Fonolahi, A. V., Bali, A. and Narayan, S. S. 2019. The online mathematics diagnostic tool for transformative learning in the Pacific. In: Cases on smart learning environments. IGI Global, 63-80.

Shepherd, D. L. and van der Berg, S. 2020. Analysing Matric Data to Identify "promising" Schools in Mathematics Performance. Department of Economics, University of Stellenbosch.

Sibanda, M. C. 2017. Work conditions and experiences of emergency medical services personnel in the department of Health in two Provinces, South Africa. Doctoral Dissertation, North-West University (South Africa).

Simelane, T. T. 2019. Barriers to high performance in Physical Science among learners: A case of selected Township Secondary Schools in South Africa. Masters Dissertation, UNISA.

Sobuwa, S. and Christopher, L. D. 2019. Emergency care education in South Africa: past, present and future. Australasian Journal of Paramedicine, 16

South African Qualification Authority (SAQA). 2002. Criteria and Guidelines for the implementation of the Recognition of Prior Learning. Pretoria: Government Printers.

South African Qualification Authority (SAQA). 2009. Bachelor of Technology: Emergency Medical Care. Pretoria: Government Printers.

Ten Cate, O., Gruppen, L. D., Kogan, J. R., Lingard, L. A. and Teunissen, P. W. 2018. Time-variable training in medicine: theoretical considerations. Academic Medicine, 93 (3S): S6-S11.

Tiwari, R., Naidoo, R., English, R. and Chikte, U. 2021. Estimating the emergency care workforce in South Africa. African journal of primary health care & family medicine, 13 (1): 3174.

United States of America Division of Medical Sciences. 1966. The White Paper on Accidental Death and Disability. Washington DC: National Academy of Sciences-National Research Council.

University of Johannesburg (UJ) Handbook. 2021a. Bachelor of Health Sciences in Emergency Medical Care (General Brochure)

University of Johannesburg (UJ) Handbook. 2021b. Diploma in Emergency Medical Care (General Brochure)

University of Johannesburg (UJ) Handbook. 2021c. Higher Certificate in Emergency Medical Care (General Brochure)

Vanderstoep, S. W. and Johnson, D. D. 2016. Research methods for everyday life: Blending qualitative and quantitative approaches. John Wiley & Sons.

Vincent-Lambert, C. 2011. A framework for articulation between the emergency care technician certificate and the emergency medical care professional degree. Doctoral Dissertation, University of the Free State. Available: <https://scholar.ufs.ac.za/bitstream/handle/11660/1988/Vincent-LambertC.pdf?sequence=1&isAllowed=y> (Accessed 22 July 2022).

Vincent-Lambert, C., Bezuidenhout, J. and van Vuuren, M. J. 2014. Are further education opportunities for emergency care technicians needed and do they exist? African Journal of Health Professions Education, 6 (1): 6-9.

Winstanley, D. and Cunningham, C. 2023. A descriptive literature review of recognition of prior learning for vocational learners in emergency medical care in South Africa. South African Journal of Higher Education, 37 (4): 322-333.

Wheelahan, L., Miller, P., Newton, D., Dennis, N., Firth, J., Pascoe, S. and Veenker, P. 2003. Recognition of prior learning: policy and practice in Australia. Australian Qualifications Framework Advisory Board,

Yin, H. Y. and Lim, W. Y. R. 2020. Educating adult learners: Bridging learners' characteristics and the learning sciences. *Diversity and inclusion in global higher education*: 97-115.

Zayed Khalifah Al-Shaqsi, S. 2010. Response time as a sole performance indicator in EMS: Pitfalls and solutions. *Open Access Emergency Medicine*, Article ID:1-6

Annexure A: Letter to the Head of the Department of Health, Limpopo

Letter of request to the HOD

The Head of Department
Department of Health
Private Bag X 9302
Polokwane
0700

Dear Sir/Madam

Request for approval to undertake research and access employee's records

I am a Master's in Health Sciences student registered at the Durban University of Technology with the Department of Emergency Medical Care and Rescue. I am currently undertaking a research study to be carried out in the academic years 2022/23

Student Name: Lekgowana Philimon Selahla (Student number 21751722)

Supervisor: Dr Simpiwe Sobuwa (SOBUWAS@cput.ac.za)

Co-supervisor: Mr Ntuthuko Gift Chule (NtuthukoC1@dut.ac.za)

Title of Research:

A Feasibility analysis of migrating emergency care providers to the new emergency care qualifications in the Capricorn district in Limpopo South Africa

Aim of Research:

The aim of this study is to determine the feasibility of migrating emergency care providers in the Limpopo EMS to the new emergency care qualifications.

Objectives of Research:

1. Describe the demographic profile of emergency care providers in the Capricorn district in Limpopo - SA
2. Describe the emergency care qualifications of emergency care providers in the Capricorn district in Limpopo – SA.
3. Determine how many emergency care providers are in a position to gain entry into the various new emergency care qualifications through direct access.

As stated above, in order for me to complete the data collection process, I request access to the electronic and hardcopy files of secondary school qualifications/results and emergency care qualifications of emergency care providers in the Capricorn district. I formally request permission of these documents in order to undertake the research study in the academic years 2022/23.

I trust that my request will meet your approval.

Yours Sincerely.

Mr L.P Selahla

21751722@dut4life.ac.za/pselahla@gmail.com

Annexure B: Letter of approval from the Limpopo Department of Health research and ethics committee



LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
HEALTH

Ref : LP_2022-11-002
Enquires : Ms PF Mahlokwane
Tel : 015-293 6028
Email : Phoebe.Mahlokwane@dhsd.limpopo.gov.za

Selahla Lekgowana Philimon

PERMISSION TO CONDUCT RESEARCH IN DEPARTMENTAL FACILITIES

Your Study Topic as indicated below;

A feasibility analysis of migrating emergency care providers to the new emergency care qualifications in the Capricorn district in Limpopo - South Africa

1. Permission to conduct research study as per your research proposal is hereby Granted.
2. Kindly note the following:
 - a. Present this letter of permission to the Office Chief Director: Clinical Services a week before the study is conducted.
 - b. This permission is **ONLY** for **Provincial Offices**
 - c. In the course of your study, there should be no action that disrupts the routine services, or incur any cost on the Department.
 - d. After completion of study, it is mandatory that the findings should be submitted to the Department to serve as a resource.
 - e. The researcher should be prepared to assist in the interpretation and implementation of the study recommendation where possible.
 - f. **The approval is only valid for a 1-year period.**
 - g. If the proposal has been amended, a new approval should be sought from the Department of Health
 - h. Kindly note that, the Department can withdraw the approval at any time.

Your cooperation will be highly appreciated

16/11/2022

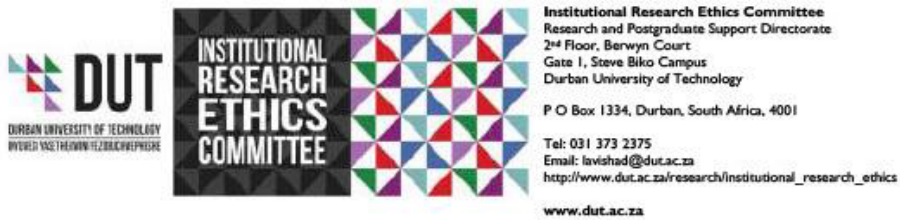
pp Head of Department

Date

Private Bag X9302, Polokwane
Fidel Castro Ruz House, 18 College Street, Polokwane 0700. Tel: 015-293 6000/12. Fax: 015 293 6211.
Website: <http://www.limpopo.gov.za>

The heartland of Southern Africa – Development is about people!

Annexure C: Letter of approval from Durban University of Technology Research Ethics Committee



14 February 2023

Mr L P Selahla
No 34 Sifaka Street
Westenburg
Polokwane
0699

Dear Mr Selahla

A feasibility analysis of migrating emergency care providers to the new emergency care qualifications in the Capricorn district in Limpopo, South Africa
Ethical Clearance number IREC 234/22

The Institutional Research Ethics Committee acknowledges receipt of your gatekeeper permission letter.

Please note that FULL APPROVAL is granted to your research proposal. You may proceed with data collection.

Any adverse events [serious or minor] which occur in connection with this study and/or which may alter its ethical consideration must be reported to the DUT-IREC according to the DUT-IREC Standard Operating Procedures (SOP's).

Please note that any deviations from the approved proposal require the approval of the DUT-IREC as outlined in the DUT-IREC SOP's.

Yours Sincerely

Prof J K Adam
Chairperson: DUT-IREC

Annexure D: Letter to the Chief Director of the Limpopo Department of Health, Clinical Support Services

To: Chief Director Limpopo Department of Health (Clinical Support Services)

Cc: Director Limpopo Emergency Medical Services

Cc: Deputy Director Emergency Medical Services

Cc: Human Resource Department (EMS Section)

COMMENCEMENT OF RESEARCH IN EMS PROVINCIAL OFFICE (HRD EMS SECTION)

I am a student at the Durban University of Technology (DUT), undertaking Master's Degree in Emergency Medical Care. The purpose of my study is to determine how many emergency care providers are in a position to gain entry into various new emergency care programmes through direct access.

TITLE OF THE RESEARCH: A FEASIBILITY ANALYSIS OF MIGRATING EMERGENCY CARE PROVIDERS TO THE NEW EMERGENCY CARE QUALIFICATIONS IN THE CAPRICORN DISTRICT IN LIMPOPO – SOUTH AFRICA

Full approval and gatekeeper's permission for the study has been granted by **DUT [IREC 234/22]** as well as the **Limpopo Department of Health Research Committee [LP_2022-11-002]** for the study, please see the attached letters. This letter seeks to kindly advise you that data collection for the study will commence on the 27 February 2023 and anticipated to end on the 27 March 2023.

For the purpose of this study, I will require data from your records at the Human Resource Department which relates to Capricorn district EMS personnel qualifications (Matric results and EMS related qualifications). Kindly assist me with obtaining the above data, more especially the electronic data related to the topic which is available at PERSAL. Some of the hardcopy data is assumed to be available at the Licensing and Inspectorate office. Would you be so kind and communicate these dates to the respective managers and officials within your department.

Please feel free to contact me or the study supervisors should you require any further information.

Primary researcher: Mr Lekgowana Philimon Selahla – email: pselahla@gmail.com

Contact number: 0839655676

Research supervisor: Dr Simpiwe Sobuwa – email: SOBUWAS@cput.ac.za

Contact number: 021-959 6209

Research co-supervisor: Mr Ntuthuko Gift Chule – email: NtuthukoC1@dut.ac.za

Contact number: 031-373 5402

From: Selahla L.P

20 February 2023

Annexure E: Data collection template.

DATA COLLECTION TEMPLATE

Participant NO	Gender	Age	Emergency care qualification	Secondary School Qualifications										
				Highest Grade/standard passed	Compulsory Matric Subject symbols (LG/SG/HG)					Non-Compulsory Matric Subject symbols (LG/SG/HG)	Total APS Score			
					Mathematics	Mathematics Literacy	Life Sciences/Biology	Physical Science	English					
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														
11														
12														
13														
14														
15														
16														
17														
18														
19														
20														
21														
22														
23														
24														
25														
26														
27														
28														
29														
30														

APS: Admission Point Score