EXPERIENCES OF KWAZULU-NATAL DIAGNOSTIC RADIOGRAPHERS' ENGAGEMENT IN CONTINUING PROFESSIONAL DEVELOPMENT ACTIVITIES DURING THE COVID-19 PANDEMIC

Yonela Ogile (22290457)

Thesis submitted in fulfilment of the requirements for the Master of Health Sciences
in
Radiography in the Faculty of Health Sciences at the Durban University of Technology

Supervisor: Prof P. B. Nkosi

Date: 04 June 2024

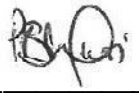
DECLARATION

I, Yonela Ogile, hereby certifies that this is my own work other than the acknowledged sources of information. This work has not previously been submitted to any institution for examination.

04/06/2024

Signature of student Date

Approved for final submission.



07 May 2024

Prof. P. B. Nkosi Date

PhD: Health Sciences; MBL; MTech: Therapy.

BTech: Therapy; Nat. Dip: Rad (Diag)

DEDICATION

I dedicate this dissertation to myself for being resilient and working hard to complete this research project.

ACKNOWLEDGEMENTS

I would like to extend my gratitude to the following people who were very helpful during the period of this research project:

- The Durban University of Technology for giving me the opportunity to study the Master of Health Sciences in Radiography.
- Prof P.B. Nkosi for supervising and supporting me throughout this research project.
- The gatekeepers for granting me permission to complete the study at the KZN Department of Health, eThekwini Health district and the hospitals where I conducted study.
- Mrs J. Wessels, my work manager, for support and giving me time off from work to collect data.
- The study participants for volunteering to participate to make this study a success.
- My friend Katlego for constantly supporting and motivating me to make this study a success.

ABSTRACT

Introduction

Continuing professional development remains a keystone for developing and maintaining professionalism of radiographers and other healthcare professionals throughout their career lifetime. It ensures that professionals retain their capacity to practice safely, effectively, and legally, within their evolving and advancing professional fields. Technological advancements and changes in the medical imaging field, necessitate and justify the need for diagnostic radiographers to engage in continuing professional development activities. The Corona virus disease of 2019 (Covid-19) has significantly disrupted all aspects of life globally. The Covid-19 pandemic transformed the way in which diagnostic radiographers engaged in continuing professional development activities . Many educational activities that have been traditionally designed for live interaction and in-person settings were moved to online platforms. However, in the South African context, no studies have been conducted to detail the effects of the Covid-19 pandemic on diagnostic radiographers' engagement in continuing professional development activities. The current study filled this gap.

Aim

This study aimed to explore the experiences of KwaZulu-Natal (KZN) province diagnostic radiographers' engagement in continuing professional development activities during the Covid-19 pandemic and to understand what could have been done to improve their engagement in continuing professional development activities .

Methodology

A qualitative descriptive phenomenological design was employed to conduct this study. A criterion sampling was used to select three public hospitals, within the eThekwini district in KZN. A sample size of 20 diagnostic radiographers selected using purposive homogenous sampling, participated in this study. Ethical approval to conduct the study was obtained from the Institutional Research Ethics Committee (IREC) at the Durban University of Technology (DUT). All participants participated voluntarily and gave their written consent. Data were collected using face-to-face, one-on-one, semi-structured

in-depth interviews using open-ended questions which were related to engagement in continuing professional development activities during Covid-19 pandemic. Interviews were transcribed verbatim before

data analysis. Data were analysed using thematic data analysis method. Data were stored on a password-protected computer which can only be accessed by the researcher. The audio tape recorder was kept in the lockable storage that can only be accessed by the researcher. The data would be stored in this manner for 5 years.

Findings

The following themes emerged as findings of this study, effect of Covid-19 on diagnostic radiographers' engagement in continuing professional development activities; barriers to engaging in continuing professional development activities during the Covid-19 pandemic; enablers to continuing professional development during the Covid-19 pandemic; and Radiographers' recommendations on strategies that could have been implemented to improve their engagement in continuing professional development activities during the Covid-19 pandemic or similar situations.

The findings revealed that diagnostic radiographers' engagement in continuing professional development activities was affected during the Covid-19 pandemic. One of the changes that the pandemic brought was the transition from face-to-face to virtual formats of engagement in continuing professional development activities . There was participation as well as lack of participation in continuing professional development activities during the Covid-19 pandemic. Either of the findings was linked to preferences in continuing professional development activities formats, barriers, and enablers for participants' engagement in continuing professional development activities . There was a general acknowledgment of the value of engaging in continuing professional development activities . Furthermore, participants recognised the obligation to fulfil the regulatory requirements of engaging in continuing professional development activities to remain registered as healthcare professionals. Participants in the current study highly recommended support for continuing professional development activities including time allocation, hosting of inhouse activities , and guidance from the Health Professions Council of South Africa (HPCSA) and accredited providers on how to engage in online activities .

Conclusion and recommendations

Continuing professional development remains important for diagnostic radiographers to professionally update their knowledge and skills so that they keep up with evidence-based practice and technological changes in their profession. The Covid-19 pandemic affected the diagnostic radiographers' engagement in continuing professional development activities. In the current study this effect was noted through the transition of the continuing professional development formats which was followed by a lack of engagement by some participants. Support in the form of time allocation for continuing professional development activities and in-house continuing professional development activities is strongly recommended to facilitate better radiographer's engagement. Employers, HPCSA, and accredited continuing professional development providers should take an active role in supporting diagnostic radiographers, so that they may better engage in continuing professional development activities.

CONTENTS

DECLARATION i
DEDICATION ii
ACKNOWLEDGEMENTS iii
ABSTRACT iv
LIST OF TABLES x
LIST OF FIGURES x
GLOSSARY OF TERMS xi
Continuing professional development xi
Coronavirus Disease of 2019 (Covid-19) xi
Health Professions Council of South Africa (HPCSA) xi
LIST OF ACRONYMS xii
CHAPTER 1: OVERVIEW OF THE STUDY 1
1.1. Introduction and background to the study 1
1.2. Problem statement 2
1.3. Aim of the study 4
1.4. Objectives of the study 4
1.5. Research questions 4
1.5.1. Main Research question 4
1.5.2. Sub -questions 5
1.6. Significance of the study 5
1.7. Structure of the dissertation 6
1.7.1. Chapter 1: Overview of the study 6
1.7.2. Chapter 2: Literature review 6
1.7.3. Chapter 3: Research methodology 6
1.7.4. Chapter 4: Findings of the study 7
1.7.5. Chapter 5: Discussion of findings 7
1.7.6. Chapter 6: Conclusion, limitations, and recommendations for the study 7
1.8. Summary of the chapter 7
CHAPTER 2: LITERATURE REVIEW 8
2.1. Introduction 8
2.2. Process of literature review 8
2.3. Engaging in continuing professional development activities globally 9
2.4. Effects of Covid-19 when engaging in continuing professional development activities globally 11
2.5. Effects of Covid-19 when engaging in continuing professional development activities in African context 15

2.6. Effects of Covid-19 when engaging in continuing professional development activities in South African context 18
2.7. Support for continuing professional development and radiography education……..21
2.8. Opportunities brought by the Covid-19 pandemic 22
2.9. Research gap 23
2.10. Theoretical framework 24
2.11. Summary of the chapter 27
CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY 28
3.1. Introduction 28
3.2. Research design 28
3.3. Research paradigm 28
3.3.1. Ontology 29
3.3.2. Epistemology 29
3.3.3. Methodology 29
3.3.4. Axiology 30
3.4. Research setting 30
3.5. Population 31
3.6. Sampling process 31
3.6.1. Inclusion criteria 31
3.6.2. Exclusion criteria 32
3.7. Recruitment 32
3.8. Data collection process 33
3.9. Data analysis 34
3.10. Data management 35
3.11. Trustworthiness 36
3.11.1. Credibility 36
3.11.2. Dependability 36
3.11.3. Confirmability 36
3.11.4. Authenticity 37
3.11.5. Transferability 37
3.12. Ethical considerations 37
3.12.1. Autonomy 38
3.12.2. Beneficence 38
3.12.3. Non-maleficence 39
3.12.4. Justice 39
3.13. Summary of the chapter 39
CHAPTER 4: PRESENTATION OF FINDINGS 40

4.1. Introduction 40
4.1.1. Main research question 40
4.1.2. Sub -questions 40
4.2. Participants demographics 41
4.3. Conceptualisation of the experiences of KZN diagnostic radiographer's engagement in continuing professional development activities during the Covid-19 pandemic..... 43
4.3.1. Effect of Covid -19 on radiographers' engagement in continuing professional development activities 45
4.3.2. Barriers to engaging in continuing professional development activities by radiographers during the Covid-19 pandemic 47
4.3.3. Enablers to continuing professional development during the Covid-19 pandemic..... 50
4.3.4. Radiographers' recommendations on strategies that could have been implemented to improve their engagement in continuing professional development activities during the Covid-19 pandemic..... 50
4.4. Summary of the chapter..... 51
CHAPTER 5: DISCUSSION OF FINDINGS 52
5.1. Introduction 52
5.2. Discussion of themes 52
5.2.1. Effect of Covid -19 on radiographers' engagement in continuing professional development activities 52
5.2.2. Barriers to engaging in continuing professional development activities by diagnostic radiographers during the Covid-19 pandemic 54
5.2.3. Enablers to continuing professional development during the Covid-19 pandemic..... 56
5.2.4. Radiographers' recommendations on strategies that could have been implemented to improve their engagement in continuing professional development activities during the Covid-19 pandemic 58
5.3. Findings in relation to the aim of the study..... 59
5.4. Summary of the chapter 61
CHAPTER 6: CONCLUSION, STRENGTHS, LIMITATIONS AND RECOMMENDATIONS 62
6.1. Introduction 62
6.2. Strengths of the study 62
6.3. Limitations of the study..... 62
6.4. Recommendations of the study 63
6.5. Conclusion 64
REFERENCES..... 65
Appendix 1: Ethical clearance certificate 75
Appendix 2a: Letter to the Health District Manager..... 77
Appendix 2b: Approval letter from the Health District Manager..... 79
Appendix 3a: Letter to KwaZulu-Natal Department of Health..... 81
Appendix 3b: Approval letter from KwaZulu-Natal Department of Health 83

Appendix 4a: Permission Letter to Addington Hospital CEO....85
Appendix 4b: Approval Letter from Addington Hospital CEO....87
Appendix 5a: Permission Letter to King Edward VIII Hospital CEO....88
Appendix 5b: Approval Letter from King Edward VIII Hospital CEO....90
Appendix 6a: Permission Letter to Inkosi Albert Luthuli Central Hospital CEO....91
Appendix 6b: Approval Letter from Inkosi Albert Luthuli Central Hospital CEO....93
Appendix 7: Letter of information to participants....94
Appendix 8: Consent form....97
Appendix 9: Interview Guide....98
Appendix 10: Editor's letter....100

LIST OF TABLES

Table 4.1: Themes and subthemes generated from data analysis....45

LIST OF FIGURES

Figure 1....41
Figure 2....42
Figure 3....42
Figure 4....43

GLOSSARY OF TERMS

Continuing professional development

Continuing professional development describes a range of learning activities through which healthcare professionals develop and maintain their career. continuing professional development ensures that professionals retain their capacity to practice safely, effectively, and legally within their evolving fields (Elshami, *et al.* 2016: 68).

Coronavirus Disease of 2019 (Covid-19)

Covid-19 is a highly transmittable and pathogenic viral disease which is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). It usually spreads between people who are in close contact (Shereen *et al*. 2020: 91). The Covid-19 was first announced on 31 December 2019 by China as a cluster of unexplained cases of pneumonia. It was then named Covid-19 by the World Health Organisation (WHO), a month later, which later declared it a public health emergency of an international magnitude (Mbeve *et al*. 2020: 34).

Health Professions Council of South Africa (HPCSA)

A statutory regulator of healthcare professions that promote healthcare, determines standards of education and training as well as maintain ethical professional practice for professions in South Africa (Anon. 2024).

LIST OF ACRONYMS

ACRONYM	MEANING
AD	Assistant Director
CEO	Chief Executive Officer
Covid-19	Corona Virus Disease of 2019
CPD	Continuing professional development
DoH	Department of Health
DUT	Durban University of Technology
HoD	Head of Department
HPCSA	Health Professions Council of South Africa
IREC	Institutional Research Ethics Committee
KZN	KwaZulu-Natal
RSZ	Radiological Society of Zambia
WHO	World Health Organisation

CHAPTER 1: OVERVIEW OF THE STUDY

1.1. INTRODUCTION AND BACKGROUND TO THE STUDY

Continuing professional development (CPD) describes the varied learning activities used by healthcare professionals to sustain and advance their career (Elshami, Elamrdi & Alyafie 2016: 68). The same author maintained that through continuing professional, healthcare professionals sustain their ability to practice legally, effectively and safely in their advancing fields. Uarije, Daniels & Kalondo (2017: 18) assert that technological advancements and changes in medical imaging requires radiographers to engage in continuing professional development activities. In addition, healthcare professionals who engage in continuing professional development activities maintain up to date skills and knowledge to retain their competence in their respective fields.

The Corona virus disease of 2019 (Covid19) pandemic generated worldwide emergency in sectors that include those concerning social, economy, health, and education (Masai & Boibanda 2022: 153). The health division expects all professionals in healthcare to embark on life-long learning, which can be achieved through continuing professional development so that they remain well-equipped with up-to-date knowledge. The Covid-19 pandemic resulted in unprecedented global disruption in healthcare, education, and training. Most learning institutions and research centers including face-to-face continuing professional development activities were suspended to maximise social distancing as a measure to contain the spread of the virus (Masai & Boibanda 2022: 153)

Continuing professional development is important for all professionals, and it should not be compromised, especially for healthcare workers who heavily rely on continuing professional development activities. The Covid-19 virus distorted healthcare systems and the continuing professional development learning environments globally (McMahon 2021: 1). Notwithstanding the extraordinary encounters, the continuing professional development community swiftly changed from in-person to virtual learning environments. Virtual learning increased clinicians and teams' engagement with training and upheld that continuing professional development is a critical part of

the solution to learn new skills needed to deal with Covid-19 pandemic. It is crucial that leaders in the health system and institutions properly resource continuing professional development programmes. This would enable the health systems to address evolving problems. Continuing professional development regulatory bodies should take a strong leadership role to ensure that continuing professional development activities do not stop (McMahon 2021: 1).

It is important that radiographers engage in continuing professional development activities to remain updated with technological advances, new knowledge, protocols, and skills, for them to thrive as medical imaging specialists (Wareing, Buissink & Harper 2017: 59). Various studies have been conducted on the impact of the Covid-19 pandemic on healthcare professionals including radiographers, radiography education, and research. Due to the Covid-19 pandemic, most learning and continuing professional development was moved to online, which is well documented in various global studies (Kitto 2020: 215).

However, according to Loewe (2021: 1) so far, less is known about the impact of the Covid-19 pandemic on professionals' engagement in continuing professional development activities, yet it is important to continuously update radiographers' knowledge and skills to improve patients' outcomes. Windrim, Gan & Kingdom (2022: 231) add that, until the time of their study there had been inadequate time to thoroughly assess the seismic adjustment in continuing professional development activities engagement. Thus in South Africa, research gaps remain on the impact of the Covid-19 virus on experiences of radiographers' engagement to continuing professional development activities. Yet, this is an important research area. Therefore, more studies are needed to fill this gap and enhance knowledge on the consequences of the Covid-19 virus on continuing professional development activities. Studies may also increase knowledge on radiographers' experiences when engaging in continuing professional development activities in the South African context, for the current study, with a focus on the province of KwaZulu-Natal (KZN).

1.2. PROBLEM STATEMENT

Continuing professional development is central to the radiographers' lifelong learning

and HPCSA registration. It constitutes an integral aspect for updating radiographers' knowledge and skills that underpin their competence. Continuing professional development is fundamental in a professional's life and should not be compromised. Prior to the Covid-19 pandemic, health care professionals were already operating in multidisciplinary teams with effective and meaningful communication. Health care professionals regularly participated in continuing professional development meetings and activities. However, Covid-19 induced social distancing and stopped many in- person continuing professional development interactions. The Covid-19 pandemic significantly changed normal operations. Hence education teams had to make changes to immediately ensure continued provision for continuing professional development activities to healthcare professionals (Besson, McNamara & Brown 2020: 356).

Literature indicates that Covid-19 influenced changes in practices within healthcare and other aspects of life, necessitating adaptation to a new normal (Aabdien, Abdallah & Awaisu 2022: 8). Literature also indicated that the professional practices and working patterns of the radiography workforce were significantly changed as a result of the pandemic (Akudjedu, Lawal & Sharma 2020: 1). The changes that occurred in the practice across radiography included: increased working hours due to additional time pressure to maximise the measures to control the pandemic. Moreover, the radiography workforce and resources were restructured, due to the concern that multiple staff members could be infected with Covid-19. Therefore, more focus was placed on implementing changes in departmental protocols and additional training on the infection control measures (McFadden, Flood & Shepherd 2022: 25-26). Tay, Tan & Huang (2021: 337) also argue that the Covid-19 virus had a likelihood to cause unforeseen and substantial consequences in continuing professional development several years after its end. Social distancing necessitated changes to be made on the traditional in-person continuing professional development activities to online to remain available and relevant.

In the South African context, less is known known about the radiographers' experiences in engaging to continuing professional development activities during the Covid-19 pandemic. The previous qualitative studies that were conducted in South Africa, focused mainly on the general experiences of radiographers during the Covid-19 pandemic and

changes in learning methods for student radiographers during the Covid-19 period (Lewis & Mulla 2021: 346; Gumede & Badripasard 2022: 193). These studies did not specifically focus on professional radiographers' engagement in continuing professional development activities. Therefore, the current study is necessary for understanding the effect that the Covid-19 pandemic had on radiographers' engagement in continuing professional development activities.

1.3. AIM OF THE STUDY

This study explored the experiences of KwaZulu-Natal (KZN) province diagnostic radiographers' engagement in continuing professional development activities during the Covid-19 pandemic and to understand what could have been done to improve their engagement in continuing professional development activities.

1.4. OBJECTIVES OF THE STUDY

The objectives of this study were:

- To explore the diagnostic radiographers' experiences of engaging in continuing professional development activities during the Covid-19 pandemic.
- To describe the radiographers' barriers to continuing professional development activities during the Covid-19 pandemic.
- To describe enablers when radiographers were engaging in continuing professional development activities during the Covid-19 pandemic.
- To make recommendations on strategies that could have been adopted to improve radiographers' engagement in continuing professional development activities during the Covid-19 pandemic or similar situations.

1.5. RESEARCH QUESTIONS

The study was guided by the following questions:

1.5.1. Main Research question

What were the KZN diagnostic radiographers' experiences when engaging in continuing professional development activities during the Covid-19 pandemic?

1.5.2. Sub -questions

- Would you please share your experience of engaging in continuing professional development activities during the Covid-19 pandemic?
- What were the barriers that you encountered when engaging in continuing professional development activities during the Covid-19?
- What were the enablers to engaging in continuing professional development activities during Covid-19?
- What could have been done to improve radiographers' engagement in continuing professional development activities during the Covid-19 or similar situations?

1.6. SIGNIFICANCE OF THE STUDY

This study is important mainly in the South African context. To the best of the researcher's knowledge, in South Africa, this is the first study that has explored the experiences of radiographers when they engaged in continuing professional development activities during the Covid-19 pandemic. Previous qualitative studies focused on the general experiences of radiographers during the Covid-19 period as well as the changes that occurred in student radiographers' learning methods in the same period (Lewis & Mulla 2021: 346; Gumede & Badripasard 2022: 193). Therefore, the current study was necessary to specifically understand the effect that the Covid-19 virus had on radiographers as they engaged in continuing professional development activities.

The value of this study is that it brings insight on how the Covid-19 pandemic transformed continuing professional development in the South African context. It highlights radiographers' experiences in light of the shift of all continuing professional development activities from in-person to online platforms. The study brings to light how the pandemic took precedence over continuing professional development activities. Radiographers' experiences that are reported in the current study include challenges that they encountered during their engagement in continuing professional development activities such as: a lack of support for continuing professional development activities, time constraints, and poor digital infrastructure. It also revealed the extent to which

the pandemic influenced their participation.

This study benefits the participants because it gives insight on the challenges that they faced during the pandemic. Thus, it offers radiographers knowledge that they can use to address the challenges that are in their capacity. These include embracing the use of digital technology to engage in continuing professional development activities, especially for those that relied solely on traditional in-person continuing professional development activities, because times have changed. Moreover, the current study's findings can be used by institutions to better support radiographers' engagement in continuing professional development activities. Thus, institutions may (1) allocate time for continuing professional development activities, (2) support radiographers on how to engage in online continuing professional development activities, (3) host in-house continuing professional development activities, and (4) encourage radiographers to engage in continuing professional development activities to ensure its continuation.

1.7. STRUCTURE OF THE DISSERTATION

This study consists of six chapters as follows:

1.7.1. Chapter 1: Overview of the study

This chapter provided the introduction and background of the study. Furthermore, it presented the problem statement, aim of the study, objectives, research questions, significance of the study, and a summary.

1.7.2. Chapter 2: Literature review

This reviews recent literature and discusses theoretical framework.

1.7.3. Chapter 3: Research methodology

Chapter 3 outlines the study's research methods and methodology as well as the ethical considerations underpinning a study such as this.

1.7.4. Chapter 4: Findings of the study

This chapter presents the study's findings in line with the objectives of the study.

1.7.5. Chapter 5: Discussion of results

Chapter 5 discusses the findings by making sense of raw data in consultation of previous studies.

1.7.6. Chapter 6: Conclusion, strengths, limitations, and recommendations for the study

This chapter summarised the study. It discusses the study's limitations provides the conclusion, and recommendations.

1.8. SUMMARY OF THE CHAPTER

The current chapter gave an overview of the study. It consists of the study's: introduction and background, problem statement, aim, objectives, questions, and significance. The chapter also provides an outline of the dissertation. The next chapter reviews relevant literature, related to the study, to gain more insight on what is already known regarding the experiences of radiographers when engaging in continuing professional development activities during the Covid-19 pandemic.

CHAPTER 2: LITERATURE REVIEW

2.1. INTRODUCTION

This chapter discusses the available literature that relate to the experiences of radiographers when engaging in continuing professional development activities during the Covid-19 pandemic. To conduct this literature review, different terms and expressions were used to retrieve research that is related to the current study. These included: Covid-19 pandemic, continuing professional development, radiography, effect on education, radiographers' experiences, and online continuing professional development. According to Leite, Padilha & Cecatti (2019: 1) the literature review in a dissertation aims to prevent duplication of the same research, gives credit to other researchers in the same field and aims to find areas of prior research in the same field. A literature review provides the state of the art and knowledge in a particular field. It indicates what is already known, elucidates implications of the current study, links theory and practice, identify gaps in the current literature, and places a dissertation within the context of its field.

2.2. PROCESS OF LITERATURE REVIEW

A literature review is an evidence-based in-depth analysis that demonstrates the researcher’s knowledge and understanding of the literature on their specific topic/subject of interest. The process of a literature review is a formal appraisal of a subject. It is an academic requirement and is crucial as well as critical when planning a research project. It helps the researcher place their findings into context. During the process of conducting a literature, previous studies are gathered, sorted, evaluated, and summarised into a relevant and informative unbiased narrative (Winchester & Salji 2016: 1). According to Leite, Padilha & Cecatti (2019: 3-5) the process of literature review consists of five main stages, which are as follows:

- Defining the main topic – this is directly linked to the main research question. It helps organise ideas, delimits the scope of the review, and avoid wasting time on the process.
- Searching the literature – concerns gathering adequate information that is

relevant to the topic, using databases and other sources of information.

- Analysing the results – encompasses critical reading, thinking and systematically taking notes to establish similarities and differences in the literature. This reinforces the researcher's ideas on their topic.
- Writing – a stage which is commenced after a sufficient period of reading and critical thinking. The stage includes a consideration of good writing methods, inclusive of correct referencing and editing of the work (Leite, Padilha & Cecatti 2019: 3-5).
- Reflecting on the writing – involves continuous refinement of the written material (Leite, Padilha & Cecatti 2019: 3-5).

The current literature review was obtained from various databases which include Google scholar, PubMed, SpringerLink, Research Gate, Science Direct, and EBSCO-Host. This chapter starts by discussing the process of conducting a literature review. It also explores professionals' engagement in continuing professional development activities, the effect of Covid-19 on continuing professional development activities (globally, in Africa, and in South Africa), opportunities brought by Covid-19, and support for continuing professional development in radiography as well as radiography education

.

2.3. ENGAGING IN CONTINUING PROFESSIONAL DEVELOPMENT ACTIVITIES

Continuing professional development is a method of ensuring that healthcare professionals, including radiographers, uninterruptedly renew their skills and knowledge. Continuing professional development is required for professionals to sustain their registration with the HPCSA (Naidoo & Naidoo 2018: 210). Continuing professional development is a combination of various methods of learning, which include: sharing of ideas, e-learning programs, events, conferences, best practice techniques, and training workshops. All continuing professional development activities aim to support an individual to improve and maintain effective professional development (Gawugah, Jadva-Patel & Jackson 2011: 332).

According to a study that was conducted in Gauteng by Lewis & Mulla (2021: 348), Covid-19 posed detrimental effects and changed the way that radiographers work and operate in their respective departments. The severe effect of the pandemic was noted mostly on radiographers' well-being. In previous studies, radiographers highlighted a surge of their emotions which included, sadness, anxiety, confusion, and frustration. They also indicated that the pandemic drastically reduced their morale since they were emotionally, physically, and mentally drained (Lewis & Mulla 2021: 348).

According to Kawczak, Fernandeza & Framptona (2021:1) at a global scale, the Covid-19 pandemic significantly interrupted all aspects of life. The disruptions that happened within the healthcare sector included interruptions in activities for continuing education. The educational activities were changed in focus, to pandemic preparedness, as well as delivery to digital modalities. Many educational activities have conventionally been intended for in- person interactions. These include well-known activities such as grand rounds as well as international, regional and national conferences for team improvement activities. Owing to the Covid-19 pandemic, these activities were stopped and some of them replaced by alternative virtual formats (Kawczaka *et al.* 2021:1).

The Covid-19 pandemic significantly interrupted all elements of health care education, distinctly continuing professional development. Many continuing professional development providers responded by moving continuing professional development activities to online learning (Windrim, Gan & Kingdom 2022: 231). The effect of the Covid-19 pandemic was more pronounced in continuing professional development which was affected by education limitations and pandemic-related travel restrictions. Most continuing professional development activities were either cancelled or moved to distant learning structures utilising digital programs like Zoom. But there has not been sufficiently rigorous evaluation of the Covid-19 induced seismic change in continuing professional development practice. Initial studies in this area have focused on the rates of uptake of online only continuing professional development (Windrim, Gan & Kingdom 2022: 231).

The Covid-19 pandemic has presented a working environment of flux uncertainty. The routine departmental protocols were heavily modified to adapt to the prevailing

circumstances that were brought by the Covid-19 pandemic. The frequent changes in practices and protocols are more likely to have contributed to employees increased work-related stress. Special training on infection control for Covid-19 was urgently required in continuing professional development, for future pandemics preparedness (Akudjedu *et al*. 2020: 8). As mentioned by Kawczaka *et al*. (2021:1) the Covid-19 pandemic created prompt and profound changes in various aspects of routine healthcare practices, including continued education.

According to Schulte, Groning & Ramsauer (2021: 6-8), the Covid-19 pandemic forced the medical field and educational institutions to innovate and implement new strategies to minimise close interpersonal interactions. Therefore, the medical field and educational institutions supported and accelerated digital online education. However, digital online education is associated with a lack of direct personal interactions, yet this serves as an important feedback tool for large groups. Moreover, online platforms depend on technical requirements and are heavily influenced by the user's experience and competence.

The Covid-19 pandemic caused numerous challenges to healthcare service delivery as well as continuing training and education. Various healthcare professionals reported the problem that Covid-19 virus exerted on medical staff, including emergency relocation of medical staff, inadequate training for diverted medical staff, failure to consider the skills of the diverted staff in new work areas, and social distancing (Elshami, Elamrdi & Alyafie 2016: 51). These challenges directly affected students' training and education. Subsequently, institutions of higher learning reported that it was difficult to fulfil training requirements for various healthcare professionals during the Covid-19 pandemic. Difficulties encountered by the institutions of higher learning included, limited clinical exposure, suspension of clinical rotations and social distancing. As a result, clinical skills development was affected. These complications enhanced the utilisation and advancement of distant learning environments (Elshami *et al*. 2016: 51).

2.4.EFFECT OF COVID-19 WHEN ENGAGING IN CONTINUING PROFESSIONAL DEVELOPMENT ACTIVITIES GLOBALLY

Globally, healthcare professionals have an obligation to participate in continuing professional development activities for recertification renewal and to expand their

knowledge and skills to keep up-to-date with developments in their respective fields, for the benefit of their patients. Beyond, the reasons for relicensure, there is a common trend and desire for professional development among healthcare workers, globally. Engaging in continuing professional development activities is a lifelong learning process and it must continue regardless of all kinds of challenges that healthcare professionals may encounter (Uslu, Ozyurek & Kayahan 2021: 624-625).

Various precautional measures were taken in response to the Covid-19 disruptions. The modifications in radiography practices were required whilst leveraging the innovations in technology such as tele-supervision and video conferencing. The variety of these periods and repeated educational webinars offered further learning. Educational webinars aided in addressing the shortfalls that arose from the cancellation of physical tutorials and concurrent clinical environment (Tay, Chow & Ooi 2020: 300).

Cassidy, Edwards & Bruen (2023: 175) argue that the shift in continuing professional development modalities during the Covid-19 pandemic disrupted how healthcare professionals would normally engage in continuing professional activities prior to the period of Covid-19 in such a way that they missed the opportunities for: collaborations, team building, laying groundwork for research and, other career- developing opportunities. In their study, participants expressed having appreciated the value of engaging with other professionals in different settings when engaging in continuing professional development activities. In addition, their participants expressed poor engagement in the online environment.

The Covid-19 pandemic initiated a global sense of urgency in all spheres of life, including the economy, education and health. The healthcare sector mandates all healthcare practitioners to be well trained with the latest advances in knowledge and research through engaging in continuing professional development activities. However, health practitioners' educational endeavours have been significantly affected and potentially compromised since they mostly rely on learning through in-person engagement (Masai & Boibanda 2022 153). This is supported by Loewe (2022: 3) who argues that the Covid-19 pandemic globally affected various aspects of life, including continuing professional development. The continuation of continuing professional development and other educational activities were hampered by the Covid-19 induced

lockdowns, travel restrictions, and cancellation of larger in-person gatherings. Resultantly, many continuing professional development providers moved their activities to utilise online educational resources such as webinars as well as virtual live events, to facilitate learning.

The Covid-19 pandemic led to drastic changes in the entire radiography profession, globally. It affected professional development for both students and qualified diagnostic radiographers. There were global changes to continuing professional development and student radiographers' training. (Alhasan & AL-Horani 2021:69). This is substantiated by Almutawa, Mahmoud & Rao (2020: 41) who posit that, globally, the Covid-19 pandemic caused an unanticipated disruption across healthcare education and healthcare systems.

Kawczaka *et al*. (2021:1) adds that the pandemic drastically and significantly transformed the continuation of educational activities in healthcare. The transformation has been noted on the shift of educational activities to adapt to the requirements of the pandemic era, whose changes were constant. In support of Kawczaka *et al*. (2021:1) a qualitative study conducted by Afifi, Razak & Choong (2022: 1) in Singapore, indicates that the Covid-19 pandemic indeed affected the planned physical educational activities around the globe, indicates that the Covid-19 pandemic affected the planned educational activities across the globe.

In a qualitative conducted by Mc Fadden *et al*. (2022: 19), it was revealed that online training was difficult to take up due to time constraints. Moreover, there was poor engagement in continuing professional development activities due to increased pressure, including staff shortage due to staff members contracting the virus. Most of the training had to be done outside of working hours, which was usually impractical.

A study by Lawal *et al*. (2022: 494-495) reviewed the global effect of the Covid-19 pandemic on clinical radiography education indicated that higher institutions transitioned from face-to-face, in-person delivery of radiography education to an online delivery format. Online learning was more successful in developed countries that have good infrastructure for online learning. However, in developing countries online learning

increased students' stress levels and anxiety due to inability to effectively interact with tutors, inadequate online learning infrastructure, digital illiteracy, and inadequate resources that prevailed in some settings (Lawal *et al*. 2022: 494-495). Furthermore, radiological research studies that were ongoing prior to Covid-19 were paused because, globally, research that is centred around Covid-19 had taken precedence (McFadden *et al*. 2022: 16-17). In support for McFadden *et al*. (2022: 16-17), Almutawa *et al*. (2020: 43) add that, during the Covid-19 era training and development was modified to deliver Covid-19 specific continuing professional development events. Continuing professional activities were focused primarily on the: provision of clinical care for patients contracting the Covid-19 disease, diagnosis, and management of the virus (Sklar, Yimaz & Teresa 2021: 1379)

According to Arnilla (2022: 215), the use of webinars to promote professionals' participation in continuing professional development activities during the Covid-19 pandemic has become prevalent globally. The pandemic accelerated the need for timely and relevant continuing professional development to keep healthcare professionals updated on how to deal with the pandemic. In Qatar, the requirement to ensure continuing professional development activities did not stop, due to professional and regulatory reasons. The work force training and development departments put measures place, including the establishment of an e-learning team, learning the management system, and coordinators to ensure the continuation of continuing professional development activities (Almutawa, Mahmoud & Main 2021: 44).

According to Hedge, Azzopardi & Hurley (2020: 179) the Covid-19 pandemic reflected an unprecedented challenge for global health-care systems. It had adverse effects on professional development in the field of radiography. In their survey, which they conducted across different countries, most participants indicated that their continuing professional development activities were affected by the pandemic. Due to social distancing measures, traditional teaching methods such as one to one teaching and teaching in groups were adversely affected and in fact non-existent. The Covid-19 induced lockdowns resulted in the cancellation of various courses and conferences, which hindered continuing professional development activities. Moreover, some hospitals revoked the support for professional development activities.

On the other hand, Sklar, Yimaz &Teresa (2021: 1379), argue that the Covid-19 pandemic accelerated innovation of continuing professional development. It created a continuing professional development environment that facilitates team-based training, work integrated continuing professional development, and assessment of individual and team competencies. Thus, preparing healthcare systems to be better prepared for the continuing professional development needs of future health related disasters including pandemics. This is substantiated by Soklaridis, Chowdhury & Turco (2024: 8), where they argue that the Covid-19 pandemic afforded health professionals the opportunity to personalise their learning needs, acquire and share knowledge, as well as engage in continuing professional development continuing professional development activities on a global context. The access to vast amount of continuing professional development activities through online formats challenged the conceptualisations of conventional continuing professional development.

In summary, the literature on continuing professional development engagement in the global context, during the Covid-19 pandemic, demonstrates unprecedented challenges that altered the way that the radiography field operates – from radiography education to the engagement of radiographers in continuing professional development activities. It can be noted that the pandemic accelerated the use of online platforms for radiographers to continue engaging in continuing professional development activities. Nonetheless, there were challenges that hindered successful continuing professional development engagement even after the implementation of online activities. The challenges included staff shortages and increased workload, which made it difficult for radiographers to find time for participating in continuing professional development activities. Additionally, owing to the need for social distancing, there were limit-to-no physical interactions. Lastly, continuing professional development activities were mostly Covid-19 pandemic related. Hence, radiography related research was more stunted because global research was about the pandemic itself

2.5. EFFECT OF COVID-19 WHEN ENGAGING IN CONTINUING PROFESSSIONAL DEVELOPMENT ACTIVITIES IN AFRICAN CONTEXT

According to Tsiouris, Hartsough & Poimboeuf (2022: 3), engaging in continuing professional development activities is increasingly becoming mandatory across Africa,

as it is part of relicensure. In Africa, despite advances in the development of emergency response strategies, surveillance and warning systems, national infection prevention and control policies, guidelines and training curricula, the emergence of the Covid-19 pandemic made it clear that significant gaps remained. When the pandemic emerged across the African continent, healthcare professionals needed to focus their continuing professional development on the pandemic and to improve their basic infection prevention and control knowledge as well as skills.

According to Byungura, Nyiringango & Fors (2022: 2), Africa is a developing continent faced by shortage of skilled healthcare professionals. This increases the need for healthcare professionals to engage in continuing professional development activities to stay dynamic, skilled and knowledgeable so that they can remain up-to-date and confidently manage the increasing and changing healthcare challenges. According to Chipamaunga, Nyoni & Kagawa (2023: 1), Africa like other parts of the world, constantly strives to deliver quality healthcare education. However, these efforts are highly influenced by global factors, as well as local socio- economic and cultural context. The disruption that was caused by the Covid-19 pandemic necessitated remote continuing professional development uptake, emergency remote teaching, and learning to continue delivering education to future healthcare practitioners. However, African countries are developing and mostly have limited resources, which hindered the success of remote learning and continuing professional development activities. Contingency measures for continued learning and teaching activities could not be adequately planned. Resultantly, the health professionals' education was severely affected.

The effects of the Covid-19 pandemic on radiographers' education are reported by Ceesay's (2021: 4) study, based on an online survey that was conducted in Africa. Ceesay (2021:4), reported that the Covid-19 pandemic tremendously affected learning, research, training, and staff development in Africa. These were interrupted by the Covid-19 induced lockdowns, travel limitations, social distancing, and an adjustment to online learning. One of the biggest challenges that Africa faced in online learning was users limited digital literacy, lack of adapted training programs and poor infrastructure, including internet connectivity, resources, and difficulty in delivering hands on training.

Byungura *et al*. (2022: 11-12) conducted a study in Rwanda on online learning for healthcare workers' continuing professional development. The study indicated that healthcare workers had limited engagement in online continuing professional development activities. Participants had poor: digital literacy, internet access, and online learning infrastructure. Participants also lacked time which they dedicated to online continuing professional development due to heavy workload. According to Byungura *et al*. (2022: 12) the Covid-19 pandemic surely created unprecedented challenges that needed well-trained healthcare work force who continuously engage in continuing professional development activities in response to new pathogens and emergencies. Nonetheless, Africa still faces several challenges that limit progress towards provision of quality care. According to Salehi, De Young & Asamoah (2023: 2), in Ghana engaging in continuing professional development activities is crucial for healthcare workers to update and enhance their professional skills to keep themselves and their communities safe. However, healthcare workers in Ghana, indicated under-preparedness to respond to the pandemic due to inadequate training and professional development. Furthermore, Akudjedu *et al.* (2021: 447-448) study, that was conducted in Ghana, found that the Covid-19 pandemic significantly influenced and altered the working patterns and professionalism for all healthcare practitioners, including radiographers. There was a need to shift continuing professional development activities on infection control measures to adapt to the pandemic. Most of Akudjedu *et al.* (2021: 447-448) participants indicated that they were not given any prior training on how to specifically manage Covid-19.

In some African countries such as Eswatini, there is no formal enforcement for healthcare professionals to partake in continuing professional development activities. However, they have a professional responsibility to attend continuing professional development activities, to fulfil the life-long learning obligation. Magwenya & Ross (2021: 3-4) conducted a qualitative study which focused on factors that were affecting Eswatini medical practitioners' participation in continuing professional development activities. The study revealed that healthcare practitioners were motivated by the emergence of the pandemic to uptake the continuing professional development activities that were structured around the pandemic with the intention to remain updated with trends during the pandemic (Magwenya & Ross 2021: 3-4).

According to Ngenzi, Scott & Mars (2021: 1-2), access to high quality continuing professional development activities is imperative for healthcare professionals to maintain competency within the ever- evolving healthcare sphere. However, majority of African countries, including Rwanda, have critical shortage of healthcare professionals and limited access to continuing professional development opportunities. The concern for limited access to continuing professional development opportunities was exacerbated by the Covid-19 pandemic which required swift transition from contact to virtual continuing professional development activities. According to Ng'andwe and Bwanga (2022: 763) in Zambia, during the Covid-19 period, the Radiological Society of Zambia (RSZ) provided weekly online continuing professional development activities to enhance radiographers' knowledge and skills in delivering better imaging services. Ng'andwe & Bwanga (2022: 763) reported that participants appreciated and embraced the online continuing professional development activities during this period. Radiographers' uptake of the online continuing professional development activities motivated the RSZ to continue with its initiative.

In summary, the Covid-19 pandemic altered continuing education and the way that healthcare professionals, including radiographers, across Africa, engaged in continuing professional development activities. Continuing professional development activities focused mainly on the Covid-19 pandemic infection control measures. It was also not easy to achieve healthcare professionals' successful engagement in virtual continuing professional development activities due to a lack of preparedness across Africa.

2.6. EFFECT OF COVID-19 WHEN ENGAGING IN CONTINUING PROFESSIONAL ACTIVITIES IN SOUTH AFRICAN CONTEXT

Lewis's (2022: 78) study on Johannesburg diagnostic radiographers' experiences of Covid-19, found that the pandemic posed a threat to radiography. The radiography department underwent various modifications to conform to new Covid-19 related changes. The modifications included, changes in departmental protocols, workflow, and working patterns. Radiographers experienced salary cuts, having to work extended shifts than the usual, and had to adapt to constantly changing departmental protocols. Radiographers' well-being was negatively affected. Another qualitative study that was conducted in Gauteng South Africa on diagnostic radiographers' experiences of Covid-

19 also indicated that there were changes in: radiography staff allocation, working hours as well as implementation of strict infection control and physical distancing (Lewis & Mulla 2020: 349). Moreover, participants reported having experienced challenges on their well-being.

Gumede & Badriparsad (2021: 193) argue that there have been drastic changes in the learning environment to maintain the learning momentum in South Africa. Learning can be facilitated through in-person, online, and blended activities. However, the introduction of social distancing to contain the spread of the Covid-19 pandemic resulted in the elimination of in-person learning activities. Online learning was put in place to ensure continuation of learning. A study that was conducted in Gauteng, found that the Covid-19 pandemic provided radiographers with the opportunity to unlearn old and learn new ways of providing healthcare to patients, while protecting themselves from contracting the virus. This provided radiographers with new ways of knowledge generation and growth (Mulla & Lewis 2020: 349). Mulla & Lewis' (2020: 349) findings are comparable to the findings from the study that was conducted by George & Fridell (2021: 383). George & Fridell's (2021: 383) study argue that, regardless of unprecedented challenges and changes brought by the pandemic in radiography, radiographers found the experience to be rewarding. It gave them valuable opportunity to reflect on their role in healthcare as radiographers, radiography practice, and professionalism. To add on, the Covid-19 pandemic gave insight to radiographers on how crucial it is to adapt, even in uncomfortable situations in their career. Radiographers realised their personal and professional development during the Covid-19 pandemic.

According to Bangalee & Bangalee (2022: 44-45), the Covid-19 pandemic disrupted learning in the healthcare workplace. It created enormous changes in the traditional model of learning by disrupting the hospital-based teaching environment since more focus was given to Covid-19 patients. One of the significant changes in healthcare education at the initial stages of the pandemic was cancellation of in-person medical meetings and conferences were replaced by narrated lectures or webinars. Bangalee & Bangalee (2022: 45) further add that research activities in healthcare were also affected because research grants were suspended or terminated. Additionally,

conferences, and workshops were cancelled or moved to online, which hampered collaboration and networking opportunities.

The effect of the Covid-19 pandemic has been noteworthy in radiography education in South Africa. The Radiography undergraduate degree programme is a work integrated learning course which requires radiography students to be registered at the learning institution and be clinically placed at an accredited training hospital. Radiography education took place through contact learning prior the Covid-19 pandemic. In South Africa, the pandemic accelerated the need to move radiography education to online platforms (Gumede & Badriparsad 2021:193).

The Covid-19 pandemic severely hindered continuous learning for radiographers. A qualitative study that was conducted in Gauteng province, on online teaching and learning of radiography students, participants preferred contact learning. Radiography students felt that contact learning is more conducive, because one can easily engage while experiencing less distractions. Participants reported that in online learning, they lost morale and motivation, due to limited resources, which was coupled with increased clinical and family responsibilities (Gumede & Badriparsad 2021: 196).

South Africa experiences unique challenges of inequality, which were exacerbated by the Covid-19 pandemic. In delivering healthcare education and learning, inequality is more evident. There is uneven distribution of resources to access online learning materials. Moreover, South Africa has poor connectivity and high cost of data, which is suffered mostly by marginalised groups, thus hindering their participation in online learning. Thus, South Africa is not fully equipped to embrace the abrupt paradigm shift in healthcare education which accelerated the use of digital technologies (Quan 2020: 13).

In South Africa, radiographers are obliged by the HPCSA to engage in continuing professional development activities to maintain their registration as health practitioners. The HPCSA's intention is to promote ethical and competent practice, which requires continually updating knowledge and skills which benefits patients. The continuing professional development system is one of self-selected continuing education activities

to update knowledge and skills (Singh & Fish 2019: 123). However, the pressure for radiographers to participate in continuing professional development activities to maintain their registration with the HPCSA has negative consequences. For example, Naidoo & Naidoo (2018: 213) conducted a study on radiographers' continuing professional development related opinions and challenges, in KZN. Their study revealed that radiographers participated in continuing professional development activities to meet the HPCSA regulatory requirements and not for professional growth. (Naidoo & Naidoo 2018: 213). Moreover, there were existing barriers to continuing professional development participation prior to the Covid-19 pandemic. These included a lack of time, funding support from their employers, and motivation (Singh & Fish 2019: 125).

Furthermore, previous studies that were conducted in the South African context by Lewis & Mulla (2020: 348-349); Lewis (2023: 81) and Madonsela, Mature & Mohono (2023: 53-55) focused mostly on the effect of the Covid-19 pandemic on radiography education. Beyond these examples of studies, no studies have gone further in understanding the experiences of radiographers' engagement in continuing professional development activities during the Covid-19 pandemic. There is paucity of literature on the experiences of radiographers when engaging in continuing professional development activities. There are also no previous studies on the effect of Covid-19 pandemic on continuing professional development activities in the South African context. Previous studies mainly focused on how radiographers experienced the pandemic from their working experiences with Covid-19 infected patients, changes in their working patterns and departmental protocols as well as the effect of the pandemic on their well-being

2.7. SUPPORT FOR CONTINUING PROFESSIONAL DEVELOPMENT AND RADIOGRAPHY EDUCATION

As shown in literature, the medical imaging field is constantly evolving, and has had high acceleration of technological innovations. Therefore, it is crucial for radiographers to engage in continuing professional development activities to remain up to date with advances in their field and ensure that they thrive for safe practice and best interest for their patients. Therefore, radiographers need support and motivation, to ensure that the

learning process does not cease (Uarije *et al.* 2017: 18; Afif *et al.* 2021: 927).

Healthcare staff, including radiographers and student radiographers have been working under challenging conditions during the Covid-19 pandemic. However, they showed high resilience. It is imperative that they are supported to ensure sustainability of high quality clinical, educational, and research practice, despite the recent challenges that were brought by the pandemic (Malamateniou 2022: 11). The support that can be provided to radiographers include addressing staffing issues, improving working conditions, investing in staff professional development and practice for better student support and preceptorship into clinical settings. Moreover, stronger support for the clinical educators is highly recommended with engagement and advancement of innovative use of simulations for different learning aspects to enhance better student transition from theory to clinical settings. This would also promote a research and evidence-based culture in clinical practice for better collaboration with higher education institutions while employing the gains on the technology for support (Malamateniou 2022: 10).

Health institution managers should avail institutional support for continuing professional development activities, including access to reliable internet connection, access to digital devices in the workplace, workload reduction and time allocation for continuing professional development activities. Rwandan radiography managers recommended use of blended learning to support radiographers to engage in continuing professional development, because it incorporates online and in- person methods. Moreover, the identified drawbacks of each method can be easily supplemented, thereby enhancing the achievement of the learning goals (Byungura *et al.* 2022: 12).

Mentorship support in clinical radiography is crucial in assisting newly graduated radiographers to develop their skills and understand how departments work. Consistent reflective activities can be used to supplement support for mentees so that they can effectively develop as professionals. Consistent reflexivity will also aid the cultivation of a culture of independence and identification of areas of radiographers' practice that are up to standard and aspects that need improvement (Lawal, Omiyi & York 2022: 494).

2.8. OPPORTUNITIES BROUGHT BY THE COVID-19 PANDEMIC

According to a global survey that was conducted in 21 countries, participants indicated that the Covid-19 pandemic afforded them an opportunity to access continuing professional development on online platforms, which was a huge benefit for them. Participants reported being able to access a whole new array of otherwise normally inaccessible opportunities. This was especially true for participants who lived in remote areas and those in areas where before the Covid-19 pandemic, there was scarcity of free or low cost continuing professional development activities. Thus, the pandemic greatly improved access to continuing professional development activities for some healthcare workers. However, participants indicated the loss of networking and social aspects in online environments (Cassidy *et al.* 2023: 5). This is especially true for developed countries which were better economically prepared, with advanced technologies, superior infrastructure and connectivity, better digital skills, and wider internet use (Arnilla 2022: 214).

However, an exploratory study that was conducted in Rwanda on online learning for healthcare workers' continuing professional development found that participants did not embrace the opportunity of engaging in continuing professional development activities using digital platforms. They did not use online delivered continuing professional development activities. This is due to challenges that were associated with online continuing professional development activities, including a lack of access to digital devices, poor internet connectivity, poor online learning infrastructure, lack of digital literacy and heavy workload (Byungura *et al* 2022: 11). Van de Venter (2020: 30-31) argue that the Covid-19 pandemic presented opportunities for radiography education. Opportunities for learning and expanding their skill set and competencies emerged. Many radiography educators might have been uncomfortable with using the digital platforms for teaching. Therefore, they had an opportunity to learn new skills and become more competent in using various digital learning platforms, and consequently contribute to their continuing professional development and increased satisfaction as educators.

2.9. RESEARCH GAP

A research gap is defined as a topic or subject for which there is missing or lack of sufficient existing body of knowledge derived from the related literature in a specific field

of research and requires further investigation, hence limiting the ability to reach a conclusion. It may also be considered as a problem for which the existing body of knowledge does not provide sufficient solutions. A research gap set the foundation for scholars to explore knowledge which is believed to be attainable through rigorous literature synthesis. A thorough literature review helps the researcher identify the research gap (Alamina, Okubokeme & Chijioke 2020: 41-42).

Loewe (2021: 1) states that less is known about the effect of the Covid-19 pandemic on radiographers' engagement in continuing professional development activities, yet it is important for them to continuously update their knowledge and skills to improve patients' outcomes. Thus, more time is required to thoroughly study the impact of the pandemic in continuing professional development (Windrim, Gan, & Kingdom 2022: 231). Tay, Abu-Bakar & Kaur (2021: 13) argue that the Covid-19 pandemic has a likelihood to have significant and unforeseen consequences on continuing professional development for years to come. Social distancing necessitated changes to be implemented on traditional in-person continuing professional development to online formats so as to maintain relevance and effect.

In the South African context, less is known about the experiences of radiographers on continuing professional development activity engagement during the Covid-19 pandemic. Previous qualitative studies that were conducted in South Africa, focused mainly on the general radiographers' experiences during the Covid-19 pandemic period and the change in learning methods for student radiographers (Lewis and Mulla 2021: 346; Gumede and Badripasard 2022: 193). However, these studies did not consider radiographers' engagement in continuing professional development activities. Therefore, the current study is necessary for understanding the effect that the Covid-19 pandemic had on radiographers' engagement in continuing professional development activities. Previous studies have mainly focused on how radiographers experienced the pandemic from their working experiences with the Covid-19 patients, changes in their working patterns, departmental protocols and the effect of the pandemic on their well-being.

2.10. THEORETICAL FRAMEWORK

A theoretical framework is a blueprint or guide for a study. It is a framework based on an existing theory in a field of study. The theory can be used to develop a hypothesis. It is a blueprint that is often borrowed by the researcher to build their own research inquiry. It serves as the foundation upon which research is constructed (Adom, Hussein & Agyem 2018: 438). The current study is guided by Kolb's experiential theory of learning. According to experiential theory, learning is a four experiential learning cycle. The theory suggests that a combination of experience and subsequent reflection is important for real learning. Reflection is a concept used by many constructivists. It is concerned with how people construct their own knowledge and understanding, and then reflect on their experiences (Dhital, Subedi & Prasai *2015*: 2). Dhital *et al.* (2015: 2) describe the four stages of experiential learning theory as follows:

- First stage: the learner is exposed to a concrete experience – this experience has the potential to change their knowledge and skills.
- Second stage: the learner reviews the real experiences to understand their value.
- Third stage: the learner goes through a deeper reflective process and transform the past experiences into knowledge or new conceptions.
- Fourth stage: active experimentation occurs – the learner translates the new knowledge into action.

This study applied Kolb's experiential learning theory . This theory aligned with the current study as it aimed to explore and capture the experiences of radiographers when engaging in continuing professional development activities during the Covid19 pandemic. According to this theory, learning is constructive in nature. The theory suggests that a combination of experience and subsequent reflection is important for real learning. Reflection is a concept used by many constructivists. It is concerned with how people construct their own knowledge and understanding, and then reflect on their experiences (Dhital *et al.* 2015: 2). In this study, the radiographers actively constructed their own knowledge through experiencing the phenomenon of Covid19, through the following stages:

- First stage: The radiographers were exposed to the Covid19 pandemic and

perceived it differently. The pandemic affected how radiographers engaged in continuing professional development activities. This gave them a concrete experience on the phenomenon.

- Second stage: The radiographers went through reflective observations on the changes that were brought by the Covid19 pandemic and what they were going through.
- Third stage: The radiographers went through a deeper reflective process and transformed experiences into knowledge or new conceptions. This knowledge was captured and recorded during the interviews to answer the research question.
- Fourth stage: The radiographers formulated new ideas on strategies that could have adopted to help them better engage in continuing professional development activities and in future similar situations.

Dhital *et al*. (2015: 2) used the same theory in their study of reflective writings on experiential learning of third year Nepalese medical students. The participants' reflections revolved around the four stages of Kolb's experiential learning theory. The first stage was based on participants' rural health experience. The second stage was based on the students' reflective observation on the differences between primary and tertiary care. During the third stage, participants developed and refined their concepts towards self-development and understanding reality. The last stage included active experimentation, their future, recommendations on improving curriculum and policies.

According to Wijnen-Meijer, Brandhuber & Schneider (2022: 2) Kolb's learning theory, which fits with the constructivist approach, the acquired knowledge is mentally anchored through concrete experiences that corresponds with knowledge. Continuing professional development is a strategy and an ethical obligation for healthcare professionals to promote and strengthen their specific skills, which are necessary for professional performance. Learning is lifelong, although, for a specialised field, it would be considered to start from the initial training. Healthcare professionals recognise that they need training to improve their professional performance. Kolb's experiential learning theory argues that an individual can learn, create, and recreate their own knowledge, based on their lived experience. Practical experiences help the

radiographers to build skills, knowledge, and attitudes for problem-solving, hence there is an importance of fostering the acquisition of learning through experience (Figueiredo, Silva & Prado 2022: 2).

2.11. SUMMARY OF THE CHAPTER

This chapter reviewed literature that is related to the experiences of radiographers' engagement in continuing professional development activities. The chapter also discussed the effect that the Covid-19 pandemic had on radiographers' engagement to continuing professional development activities with a global, African to South African perspective. Overall, the literature review demonstrates the value of engaging in continuing professional development in a broader context and how the Covid-19 pandemic transformed the continuing professional development landscape globally. There is a need for more research on the impact of Covid-19 pandemic on continuing professional development, with a focus on the South African context. The following chapter discusses the research methods that were employed to execute this study.

CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY

3.1. INTRODUCTION

The purpose of this chapter is to outline the research methodology that was adopted for the current study. The chapter describes the research design, research paradigm, methods, study site, sampling process, inclusion and exclusion criteria, data collection process and analysis. Khatri (2020: 1436) views research methodology as an umbrella term that describes the research design, methods, approaches, and procedures that are used in a logically planned scientific study to answer the research question. Qualitative methods involve collecting and analysing non-numerical data, with the aim to understand participants' experiences and attitudes. The current study used qualitative methods since it sought to explore the experiences of KZN diagnostic radiographers' engagement in continuing professional development activities during the Covid-19 pandemic.

3.2. RESEARCH DESIGN

A research design is the overall structure for connecting the conceptual research problems to pertinent and achievable empirical research (Asenahabi 2019: 77). Research design translates a research problem into data for analysis, to obtain answers to the research problem. The research design also guides the analysis process to obtain the desired results (Asenahabi 2019: 78). The current study adopted a qualitative, descriptive phenomenological design. This design was suitable for the current study. Descriptive phenomenological design is a qualitative research design that describes the universal essence of an experience as lived, which represents the true nature of the phenomenon (Shorey & Debby Ng 2022: 1969). It holds strong philosophical underpinnings and typically involves conducting interviews (Asenahabi 2019: 82).

3.3. RESEARCH PARADIGM

A research paradigm is described as shared scientists' beliefs and agreements about how problems are to be explored and understood; how the world is viewed and thus, how to conduct research (Rahi 2017: 1). The same author maintained that it is a

framework through which knowledge is filtered and a foundational perspective carrying a set of assumptions that guide the process of inquiry. For the current study, a constructivist paradigm was employed to explore the experiences of KZN diagnostic radiographers' engagement in continuing professional development activities during the Covid-19 pandemic. According to Rehman & Alharthi (2016: 51-52) a research paradigm has four elements, which are: ontology, epistemology, methodology, and axiology. These are discussed below:

3.3.1. Ontology

Ontology is the nature of the researcher's beliefs that they ascribe to reality. Researchers have assumptions about reality; how reality exists and what can be known about it. The ontological question leads researchers to enquire about what kind of reality exists. In the current study, the reality was that the Covid-19 pandemic affected the ways in which diagnostic radiographers engaged in continuing professional development activities. The radiographers' focus was mostly on the pandemic than continuing professional development activities. There is a lack of knowledge on how the diagnostic radiographers were affected.

3.3.2. Epistemology

The epistemology studies the nature of knowledge and the process by which knowledge is acquired and validated. It is concerned with the nature and forms of knowledge, as well as how it can be acquired and communicated with other people. For the current study, the researcher gathered knowledge from radiographers, with a focus on their experiences when they were engaging in continuing professional development activities during the Covid-19 pandemic. The data was collected through in-depth semi-structured interviews. The experiences were subjective to individual participant's experiences, based on how they perceived the phenomena. The researcher learnt about the reality which was constructed by participants based on their own experiences.

3.3.3. Methodology

Methodology is a systematic way of solving the research problem by logically adopting several scientific steps. It is the science of how scientific research is conducted in

various steps. Methodology is adopted by researchers in logically studying their research problem. The methodology helps the researcher understand the products of their scientific inquiry and the scientific process of inquiry itself (Patel & Patel 2019: 48). It deals with the how facets of the inquiry process.

The methodology is an umbrella term which is based on the research design, methods, approaches, and procedures that are used in a scientific inquiry to solve the research problem. Methodological considerations in a research paradigm include participants, the instruments that are utilised in data collection, and measures for data analysis, through which knowledge to solve the research problem is gained. It includes assumptions that are made, limitations that the researcher observed, and their mitigation. It seeks the answers to how the researcher should acquire the knowledge which is necessary for answering the research question (Khatri 2020: 1436). A qualitative research method that utilised a phenomenological design was adopted to conduct the current study.

3.3.4. Axiology

Axiology is concerned with the ethical considerations during planning and conducting of a study. Axiology is central in ensuring morality in a study (Khatri 2020: 1438). The study followed all ethical considerations necessary to conduct a research project.

3.4. RESEARCH SETTING

According to Jalowski (2021: 4), a research setting is a physical, social, cultural, or experimental context in which a study is conducted. The current study was conducted in the eThekwini district, in KZN. The EThekwini district has 17 public hospitals classified into district, regional, tertiary, and centralised (KZN Province Health: Republic of South Africa. 2022: np). The researcher interviewed diagnostic radiographers who were employed in three selected hospitals which are categorised as a district which is also a regional hospital, tertiary hospital, and centralised hospital. The rationale for selecting these hospitals is that they have the largest number of diagnostic radiographers in each category of the hospitals. Participants were interviewed at their own free time and place of their choice.

3.5. POPULATION

The general research population is a group of individuals to which the findings of a study will apply. Individuals in the general research population must share at least a single attribute of interest (Asiamah, Mensah & Oteng-Abayie 2017: 1611). In the current study, the general research population included diagnostic radiographers from public hospitals in the eThekwini district. A target population is a group that is selected through refinement of the general population (Asiamah, Mensah & Oteng-Abayie 2017: 1612). In the current study, the target population comprised of 86 diagnostic radiographers from the three selected hospitals. The selected hospitals had a total number of 86 diagnostic radiographers, distributed in hospitals as: hospital A (n=54), hospital B (n=19) and hospital C (n=13).

3.6. SAMPLING PROCESS

Sampling is the process of selecting a statistically representative sample of individuals from the population of interest (Majid 2018: 3). In the current study criterion sampling was utilised to select three public hospitals, which were categorised as follows: (1) district and regional, (2) tertiary, and (3) centralised. Criterion sampling is a type of sampling whereby participants that possess knowledge and experience of the studied phenomenon are selected to provide the required information for the study (Plinkas *et al.* 2015: 6). From those hospitals, diagnostic radiographers were selected utilising purposive homogenous sampling techniques. Dworkin (2012: 1319) proposes that five to 50 participants provide an adequate sample size in qualitative research. In the current study, 20 diagnostic radiographers participated.

The eligibility criteria determine the eligibility of an individual to participate in a study (Majid 2018:3). A prospective participant must fulfil the inclusion criteria to participate in the study. Exclusion criteria are the category that fall outside the desirable qualities for one to participate in a study (Majid 2018: 3). They include characteristics that may interfere with data collection, follow-up, and participants' safety. Below are the inclusion and exclusion criteria of the current study:

3.6.1. Inclusion criteria

- Diagnostic radiographers registered with HPCSA.
- All diagnostic radiographers from KZN.

- Radiographers who have been practicing as radiographers since 2020.
- Radiographers from selected public hospitals.

3.6.2. Exclusion criteria

- Diagnostic radiographers from hospitals other than those from the selected hospitals.
- Community service diagnostic radiographers.
- Private hospital diagnostic radiographers.

3.7. RECRUITMENT

The recruitment process is the process of identifying potential research participants and providing them with information to establish their interest in participating in the study (Manohar *et al.* 2018: 1). Before the recruitment process of the current study, ethical approval was obtained from the Institutional Research and Ethics Committee (IREC) at the Durban University of Technology (DUT) with an allocated ethical clearance number IREC 064/23 (Appendix 1). Moreover, a written permissions to conduct the study from the KZN Department of Health (DoH) Research Committee (Appendices 2a and 2b), the eThekwini Health district manager (Appendix 3a and 3b), and the three selected hospitals' chief executive officers (CEOs) (Appendices 4a and 4b, 5a and 5b, and 6a and 6b) were obtained.

After obtaining all permissions, the researcher started the recruitment process by sending emails to the Heads of the Radiography Departments (HoDs) and requested them to identify the radiographers who fulfilled the research's inclusion criteria. The researcher requested to meet with the suitable radiographers after a staff meeting. In this meeting, the researcher informed the potential participants about the study and requested them to participate. The information letter (Appendix 7) containing details about the study and the researcher's contact details was handed to prospective participants. Prospective participants were informed that their participation was going to be voluntary and those who wished to withdraw could do so without any fear of penalty. They were also informed that their names would be anonymised by using pseudonyms and that the interview data would be kept confidential. Those who were willing to participate in the study contacted the researcher to indicate where and how

they would want to be interviewed. All participants indicated that they preferred to be interviewed at their workplace during their lunchtime. They were interviewed one-on-one upon signing the consent form (Appendix 8) to participate voluntarily in the study.

3.8. DATA COLLECTION PROCESS

Once permission was granted by the KZN Department of Health and the eThekwini Health District manager, and gatekeeper permissions were obtained from the three public hospitals, the researcher informed all the CEOs' offices when she was about to commence the data collection process. They were provided with an explanation of the nature of the study and what participation would entail. After agreeing for the researcher to commence data collection, the data collection process commenced.

One-on-one, semi-structured in-depth interviews using open-ended questions which were related to engagement in continuing professional development activities during Covid-19 pandemic, were used to collect data from the participants. Participants were interviewed during their lunchtime in an unused private office where it was quiet with no noise disturbance. Prospective participants were given a chance to ask questions. Those who showed interest in participating in the study were given a letter of information (Appendix 7) and consent form (Appendix 8). Upon participants' consent, all interviews were audio recorded. Participants were informed that they were not going to be remunerated for participating in the study. Participants' information was kept strictly confidential and anonymous. Pseudonyms were used to protect participants' privacy, and their respective workplaces

The interviews were guided by the interview guide which consisted of participants' demographic information and interview questions (Appendix 9), to gain insight into KZN diagnostic radiographers' subjective experiences of their engagement in continuing professional development activities during the Covid-19 pandemic. The researcher greeted each participant, introduced herself and thanked the participants for agreeing to participate in the study. The researcher reminded the participants about what the study entails and that their names would be anonymous and their information will be confidential. Participants were also reminded that they would not be remunerated for participating in the study. The researcher then asked the questions as per the interview questions in the interview guide. The interviews were audio- recorded with the permission of the

participants. All participants agreed to be audio- recorded. The researcher probed where clarity was sought while observing and recording the participants' nonverbal communication.

The researcher thanked the participants after the interviews were conducted. The collected data with audio- recordings was later transcribed and stored in a password protected computer only known by the researcher to ensure that only the researcher has access to the information and personal information of the participants. Data in the form of physical notes and audio tape was stored in a locker that can only be accessed by the researcher The interviews lasted for 30 - 45 minutes. All the audio-recorded interviews were transcribed verbatim before data analysis lasted for 30 - 45 minutes. All the audio-recorded interviews were transcribed verbatim before data analysis. Data saturation was reached by the 18th participant, after which there was no more new information that was received. However, further two radiographers were interviewed to ensure that data collection has been sufficient to capture all relevant perspectives and themes. Fotana, Bazeley & Regnault (2020: 1) define saturation as a core concept in qualitative research, which suggests that data collection can end because no new information emerges with additional interviews.

3.9. DATA ANALYSIS

Liamputtong (2019: 22) defines data analysis as a complex process whereby the researcher organises data, gets familiar with, identifies categories, codes the data, generates themes, interprets, and searches for alternative understandings. In the current study, the collected data was transcribed verbatim and analysed using thematic analysis. Data was also systematically interpreted to understand what it represented. Thematic data analysis is a commonly used technique for exploring qualitative data by identifying patterns of themes in the data (Vaismoradi, Jones & Turunen 2016: 100). According to Maguire & Delahunt (2017: 335), there are six important steps for thematic data analysis that can be used in qualitative research. The steps are as follows:

Step 1: Familiarise yourself with the entire body of the collected data – this step involves reading and rereading the transcripts.

Step 2: Generation of initial codes – here, data is reduced through being organised in a systematic and meaningful way.

Step 3: Searching for themes – in this step, codes are organised into themes.

Step 4: Review of themes – in this step, the researcher makes sense of the themes through reviewing and modifying them.

Step 5: Defining themes – this involves the final refinement of themes. The essence of what each theme is about is identified.

Step 6: Writing up – this is a final phase of the research (Maguire & Delahunt 2017: 335)

These six steps of data analysis helped the researcher to develop themes which were presented as findings in the following chapter. The researcher familiarised herself with the entire body of the collected data through transcribing the recorded audio from the interviews, reading the written data, and making preliminary notes, to make sense of it before analysing individual items. The researcher then coded the collected data to generate themes. It was ensured that themes were valid and accurately represented the collected data. Once themes were generated, the researcher named and defined each theme. This process involved generating the exact meaning of each theme. The researcher then wrote the report to answer the research questions that fulfil the aim of the study.

3.10. DATA MANAGEMENT

Data management is a multi-step process that involves obtaining, cleaning and storage of data to allow accurate analysis and produce meaningful results (Dhudasia, Grundmeier & Mukhopadhyay 2022: 1-3). The same authors maintain that it encompasses the protection of participants, confidentiality, data storage and record keeping, data ownership, and data sharing. It is important that participants' confidentiality and privacy are maintained. The data which is collected during the interviews must be managed properly to ensure that participants are protected at all costs. Confidentiality in qualitative research means protecting the collected data collected by the researcher. The collected data with audio- recordings was later transcribed and stored in a password protected computer only known by the researcher

to ensure that only the researcher has access to the information and personal information of the participants. Data in the form of physical notes and audio tape was stored in a locker that can only be accessed by the researcher. This data would then be deleted from the computer and hard drive after five years. Data in the form of physical notes will be shredded after five years

3.11. TRUSTWORTHINESS

Trustworthiness is the degree to which the researcher is confident in the truth of their study's findings. It is determined by credibility, transferability, dependability, confirmability, and authenticity (Kyngäs, Kääriäinen & Elo 2019: 42-46). These are discussed below:

3.11.1. Credibility

Credibility is the confidence in the truth of the findings. It involves conducting the study in a way that ensures that readers will believe the researcher's presented findings. This confidence is based on carefully planned and systematic research processes, detailed notes of how each step of the research was conducted as well as discussion of strengths and limitations of the research in the final report. For the current study, the researcher audio-recorded the interviews to ensure credibility. To ensure truth in the findings, voice recordings were played during transcribing so that the written report corresponds with participants' views (Kyngäs, Kääriäinen & Elo 2019: 42-46).

3.11.2. Dependability

Dependability is concerned with the assessment of the quality of the integrated processes of data collection, data analysis, and theory generation. It refers to the stability of data over time and varying conditions. For the current study, an audit trail was conducted through safekeeping of raw data from each interview for future reference (Kyngäs, Kääriäinen & Elo 2019: 42-46).

3.11.3. Confirmability

Confirmability is the measure of how well the study's findings are supported by the collected data. It is concerned with the relationship between the collected data and presented results. The findings of the current study were evaluated to determine if they were solely shaped by the data collected from participants or if they reflected the

researcher's bias. Audio recordings of participants' voices were done. The research supervisor acted as an independent coder to examine the researcher's interpretation and analysis (Kyngäs, Kääriäinen & Elo 2019: 42-46).

3.11.4. Authenticity

According to Kyngäs, Kääriäinen & Elo (2019: 42-46) authenticity describes the researcher's ability to demonstrate a range of realities fairly and faithfully. Research with sufficient authenticity includes sufficient citations that demonstrate the connection between results and data. In this study the researcher ensured authenticity by audio recording the interviews and directly transcribing them to ensure that the collected data accurately reflect the views and experiences of participants. The researcher also kept the original data and records of how it was collected.

3.11.5. Transferability

Transferability refers to the extent to which the research findings will apply to other fields and contexts (Kyngäs, Kääriäinen & Elo 2019: 42-46). A researcher should question whether their results will hold in a different setting or with different participants. The researcher ensured transferability of this study by providing in-depth descriptions of the research processes and setting to provide a clear context of the study.

3.12. ETHICAL CONSIDERATIONS

Ethics are an integral part of a study such as the current which, involves people with their own beliefs, understandings, as well as their experiences and the meanings that they ascribe to them (Bhaskar & Manjuladevi 2016: 647). According to Bhaskar & Manjuladevi (2016: 647), all research that involves human subjects should follow four basic ethical principles namely: autonomy (individual's capacity to make their own decisions), beneficence (benefits of participating in the study should outweigh the risks), nonmaleficence (do not impose harm to participants) and justice (equitable selection of research participants and distribution of risks and burdens associated with participating in the study).

The researcher observed and complied with the ethical standards of research that involves human subjects. The researcher obtained all the necessary permissions from

the gatekeepers to conduct the study, these were approvals from: the IREC (Appendix 1), KZN Department of Health (Appendix 2a and 2b), eThekwini district health (Appendix 3a and 3b), and the three hospitals' CEOs where the data were collected (Appendices 4a and 4b, 5a and 5b and 6a and 6b). Participants were given the letter of information (Appendix 7) which explained what the study entailed and that their participation was going be voluntarily. Participants could withdraw at any time if they so wished, without any penalty. If they agreed to participate in the study, they signed a consent form (Appendix 8). T

he four bioethical principles applied in this research include beneficence, non-maleficence, justice, and autonomy (Mann, Treit & Geyer 2021). Bioethics is a discipline that applies abstract normative principles to biomedical contexts. According to Rocha, Bezerra & Fernandes *(*2022: 69) bioethical principles were proposed to guide research which involves human subjects. Rocha *et al*. (2022: 69) define bioethical principles as follows:

3.12.1. Autonomy

According to Rocha *et al*. (2022: 69) autonomy is a principle that requires that the capacity of participants' self-determination is respected, to exercise their free will, without the influence of other people. Information and freedom are inseparable from autonomy. In the current study, the researcher treated the participants autonomously. She respected their right to make their own informed decisions to either participate in the study or not. Participants were provided with complete information about the study using the information letter (Appendix 7) and the signed informed consent was obtained for their voluntary participation (Appendix 8). Furthermore, Participants were informed that they had the right to withdraw their participation at any stage, without any consequences. No undue pressure was applied to prospective participants upholding their autonomy Upon their permission, participants were audio recorded during the interviews. During the interviews the interview guide (Appendix 9) was used in the questioning of participants.

3.12.2. Beneficence

Beneficence means doing good and maximising actions that will benefit others (Rocha *et al*. 2022: 69). The purpose of the current study was to gain insight into the

radiographers' experiences of continuing professional development engagement during the Covid-19 pandemic, since there was a research gap in this area. The study bridged the gap and insights on the effect of the Covid-19 pandemic on radiographers' continuing professional development activities in the South African context were gained. Thus, the study added to the body of knowledge in this area. Furthermore, ways on how to improve radiographers' engagement in continuing professional development activities and ensure that it is a continuous process were recommended. Therefore, this study was beneficial to the community of radiography.

3.12.3. Non-maleficence

This ethical consideration means no harm being done to participants. This study did not impose any harm on the participants. The researcher ensured participants' confidentiality by safeguarding the collected data and strictly limiting access to it. Furthermore, participants and hospitals where the study was conducted were assigned pseudonyms to maintain privacy. The researcher interviewed the participants at their own leisure time with disrupting service delivery at the selected hospitals.

3.12.4. Justice

Justice in ethical considerations deals with the concept of fairness and equity. Participants for the current study were fairly treated and not discriminated against. The researcher ensured that all participants met the inclusion criteria. Participants were selected from three eThekwini district hospitals and given an equal chance to express their experiences.

3.13. SUMMARY OF THE CHAPTER

The current chapter discussed the applied research methodology and the data collection methods that were utilised. Moreover, the research paradigm sampling process, natural setting, target population, recruitment of participants, data collection process, data analysis, data management, trustworthiness, and ethical considerations were discussed. The next chapter presents the findings of this study.

CHAPTER 4: PRESENTATION OF FINDINGS

4.1. INTRODUCTION

The preceding chapter discussed in detail the methodology employed to guide the current study. This current chapter presents the study's findings from 20 diagnostic radiographers who were permanently employed at three selected public hospitals which are: one district and regional hospital, one tertiary and one centralised hospital. All sample hospitals are in the eThekwini district in the KZN province. The current chapter provides a description of the participants and presents the findings in the form of themes.

This study aimed to explore the experiences of KZN province diagnostic radiographers' engagement in continuing professional development activities during the Covid-19 pandemic and to understand what could have been done to improve their engagement in continuing professional development activities. The research questions were as follows:

4.1.1. Main research question

What were the KZN diagnostic radiographers' experiences when engaging in continuing professional development activities during the Covid-19 pandemic.

4.1.2. Sub-questions

- Would you please share your experience of engaging in continuing professional development activities during the Covid-19 pandemic?
- What were the barriers that you encountered when engaging in continuing professional development activities during the Covid-19?
- What were the enablers to engaging in continuing professional development activities during Covid-19?
- What could have been done to improve radiographers' engagement in continuing professional development activities during the Covid-19 pandemic?

4.2. PARTICIPANTS DEMOGRAPHICS

The researcher used purposive homogenous sampling to select 20 radiographers from three public hospitals selected using criterion sampling. Participants who were willing, agreed to participate, and fulfilled the inclusion criteria, were interviewed after obtaining their consent. The demographic information of the participants is demonstrated in figure 4.1 (gender distribution), figure 4.2 (ethnicity distribution), figure 4.3 (age group) and figure 4.4 (work experience).

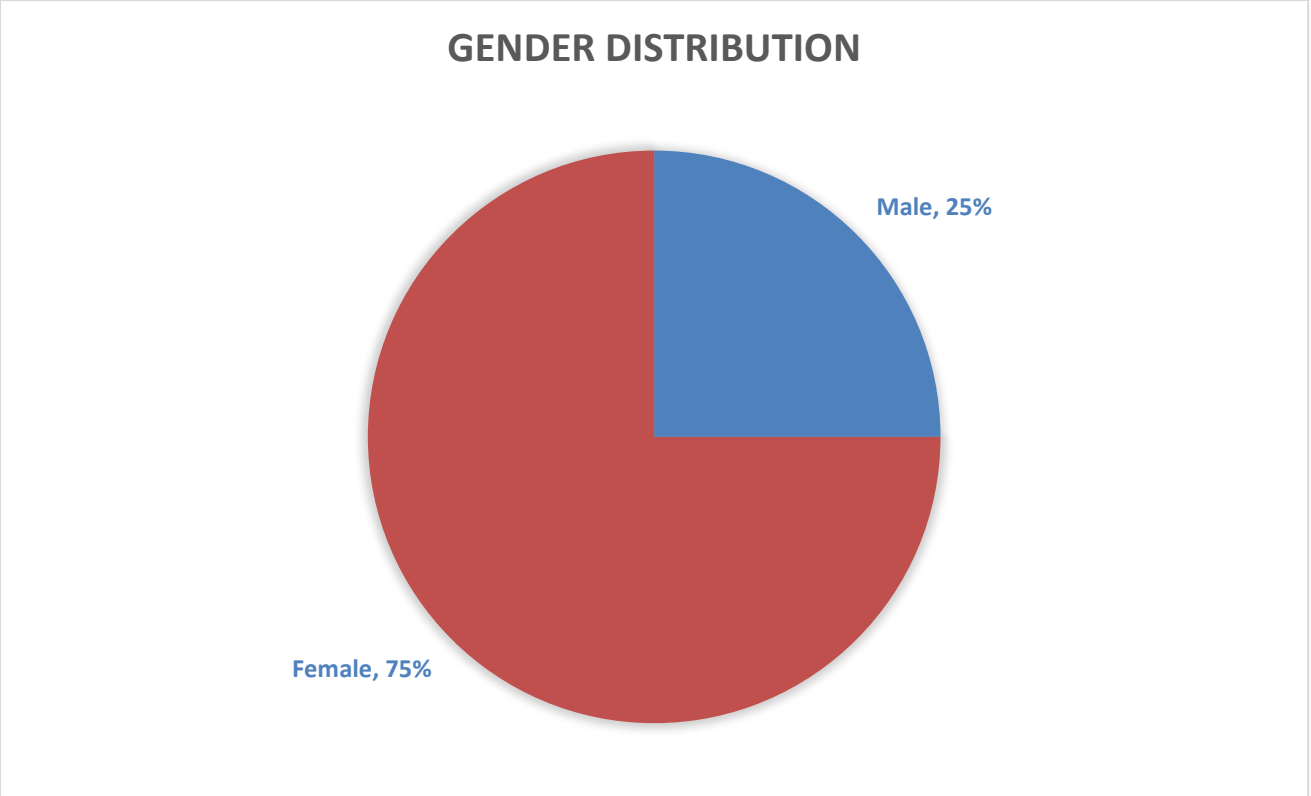


Figure 1: demonstrates gender distribution of the participants.

The above pie chart depicts that the study was female dominated. Most participants were females, making up 15 of the 20 total participants. The study only had five male participants

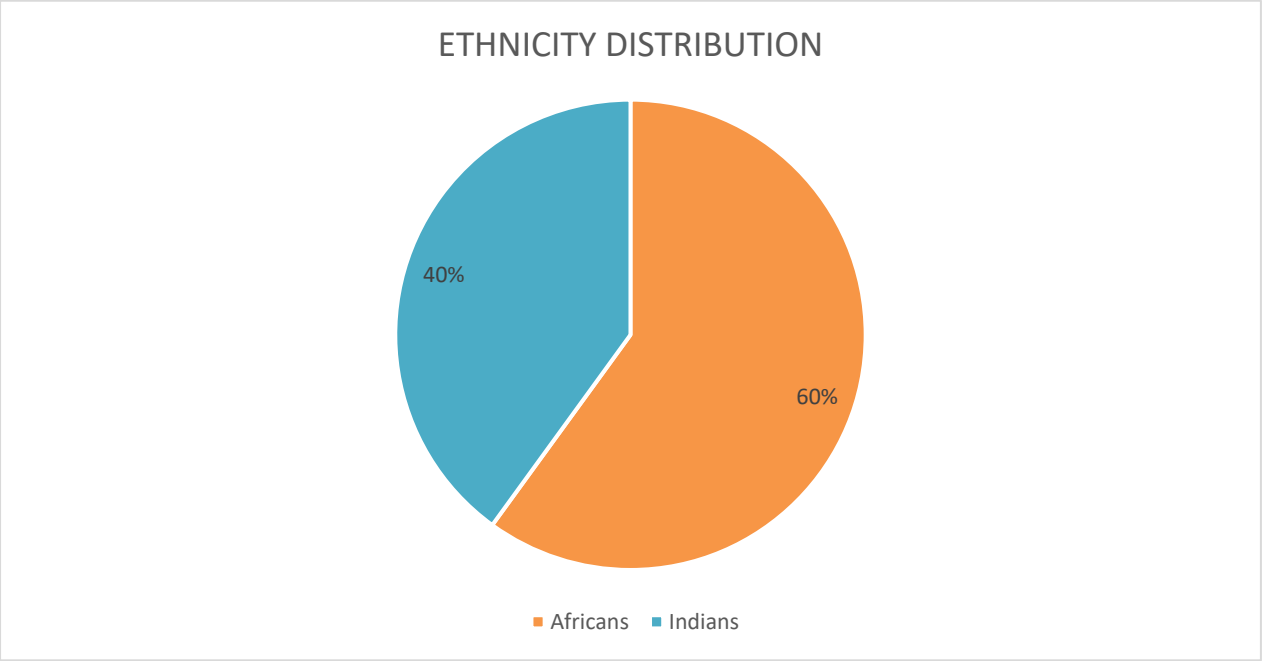


Figure 2: demonstrates ethnicity distribution of the participants.

The above pie chart depicts the ethnic distribution of the participants in this study. There were two ethnic groups, where 12 participants were of African origin and eight of Indian origin.

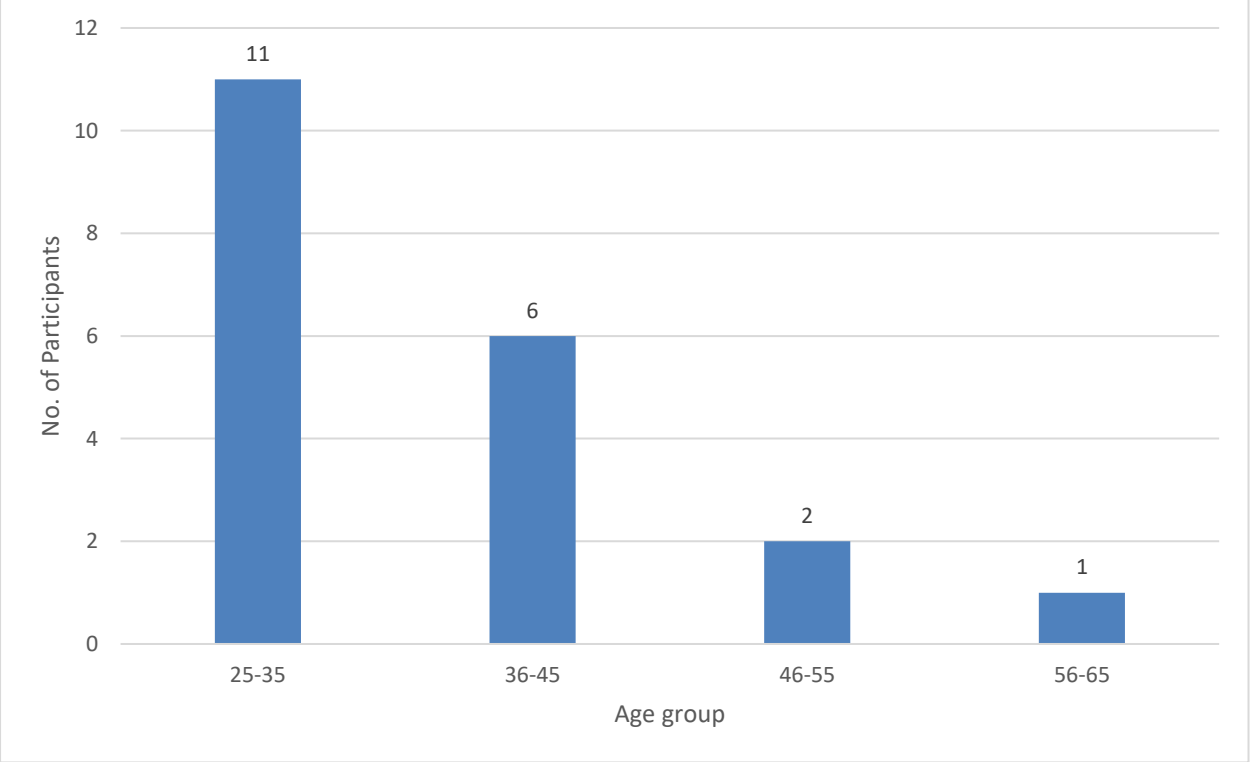


Figure 3: depicts a bar graph that demonstrates the age groups and number of participants in each age group.

Overall, participants ranged from 25-65 years whilst there were 11 participants in the 25-35 years age group, six participants in the 36-45 years age group, two participants in the 46-55 years age group and one in the 56-65 years age group.

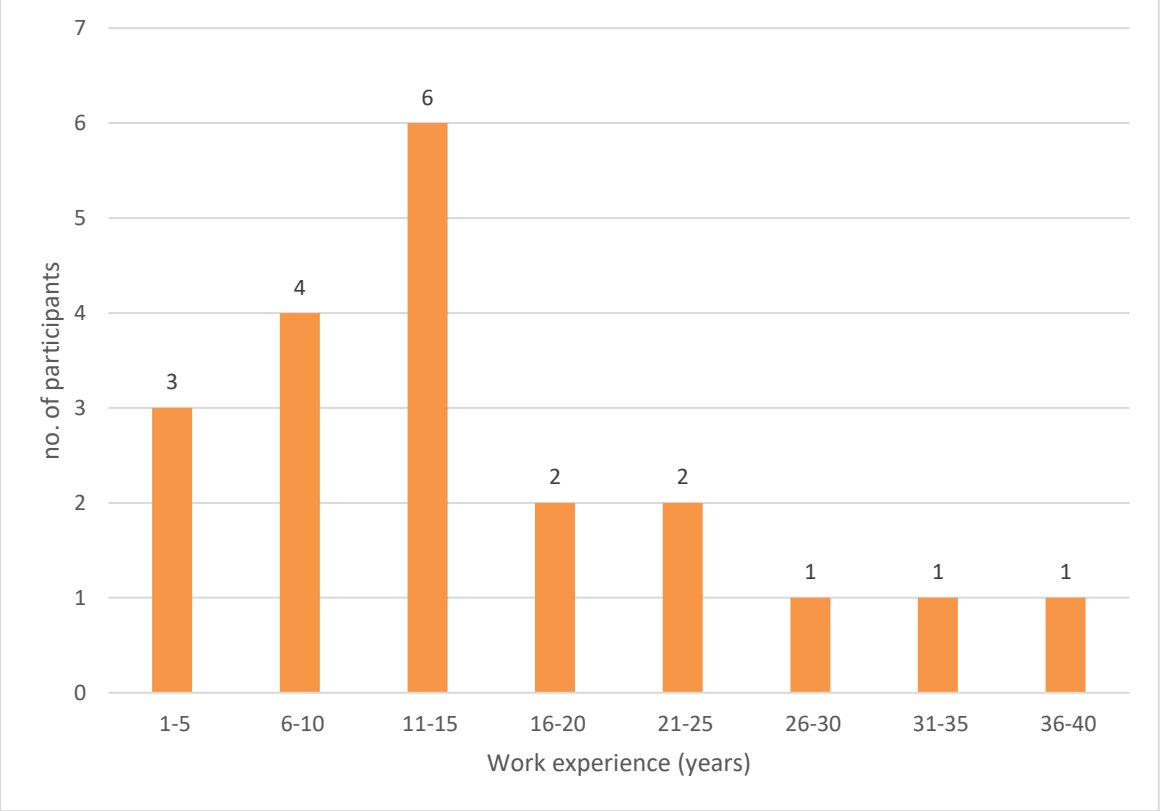


Figure 4: depicts a bar graph that the demonstrates the work experience of the participants and number of participants in each category.

The years of work experience ranged from one to 40 years and their work experience were as follows: one to 5 (three participants), six to 10 years (four participants), 11-15 years (six participants), 16 to 20 years (two participants), 21-25 years (two participants), 26-30 years (one participant), 31-35 years (one participant) and 36-40 years (one participant).

4.3. CONCEPTUALISATION OF THE EXPERIENCES OF KZN DIAGNOSTIC RADIOGRAPHER'S ENGAGEMENT IN CONTINUING PROFESSIONAL DEVELOPMENT ACTIVITIES DURING THE COVID-19 PANDEMIC

The transcripts were analysed using thematic data analysis. Key concepts were identified from the data and through the process of analysis, themes emerged. The following themes emerged:

- Effect of Covid -19 on radiographers' engagement in continuing professional development activities.
- Barriers to engaging in continuing professional development activities during the Covid-19 pandemic.
- Enablers to continuing professional development during the Covid-19 pandemic.
- Radiographers' recommendations on strategies that could have been implemented to improve their engagement in continuing professional development activities during the Covid-19 pandemic.

The themes and related subthemes generated during data analysis are presented in Table 4.1 below. Quotations from transcribed interviews are used to validate the themes and subthemes generated during data analysis.

Table 4.1: Themes and subthemes generated from data analysis

THEME	SUBTHEME
4.3.1 Effect of Covid-19 on radiographers' engagement in continuing professional development activities.	4.3.1.1 Seminars for continuing professional development were not allowed. 4.3.1.2 Shift of focus to safety during the Covid-19 pandemic. 4.3.1.3 Transition from in-person to online continuing professional development activities.
4.3.2 Barriers to engaging in continuing professional development activities during the Covid-19 pandemic.	4.3.2.1 Time constraints. 4.3.2.2 Loss of social interaction. 4.3.2.3 Online platform challenges.
4.3.3 Enablers to continuing professional development during the Covid-19 pandemic.	4.3.3.1 Professional obligation 4.3.3.2 Opportunity to advance their skill in computer literacy. 4.3.3.3 Embrace the change as a result of the Covid-19 pandemic.
4.3.4 Radiographers' recommendations on strategies that could have been implemented to improve their engagement in continuing professional development activities during the Covid-19 pandemic	4.3.4.1 Hosting of in-house continuing professional development activities. 4.3.4.2 Support from HPCSA and other continuing professional development providers.

4.3.1. Effect of Covid-19 on radiographers' engagement in continuing professional development activities

Participants reported various experiences about the effect of the Covid-19 pandemic on their continuing professional development engagement. Some participants stopped engaging in continuing professional development activities whilst some continued despite the Covid-19 pandemic.

4.3.1.1. Seminars for continuing professional development were not allowed

More than a third of the participants indicated having not engaged in any continuing professional development activities during the Covid-19 pandemic. The excerpt below is one of the participants' responses:

> "*During the Covid-19 we could not participate in CPD activities because we were not allowed to attend the continuing professional development seminars, so we did not have any."* **Participant 3, 25-35, female.**

4.3.1.2. Shift of focus to safety during the Covid-19 pandemic

Participants described having experienced a shift of focus from continuing professional development activities, to safety from the Covid-19 pandemic. Some participants indicated having had no thoughts about continuing professional development activities. This is illustrated through the following excerpt:

> *"Uhm to be honest really, no one was into it, we were too focused on the Covid-19 pandemic that was happening like we were too stressed to even think about doing any activities. It was the least of our problems really".* **Participant 4, 36-45, female.**

> *"I think it was more stressful about worrying how safe you going to be and getting to work, the restrictions and also mentally drained, emotionally drained so I didn't even think uh doing any CPD during the COIVID-19. And I don't even think that we even got any notifications or any reminders to do CPDs".* **Participant 9, 36-45, female.**

4.3.1.3. Transition from in-person to online continuing professional development activities

Some participants indicated having transitioned from in-person continuing professional development engagement methods including congresses, conferences, and meetings to virtual platforms for engaging in continuing professional development activities. However, some participants indicated having used virtual platforms to engage in continuing professional development activities even before the pandemic. This is described below:

"So in terms of the engagement, we had to resort to just doing the online work as opposed to organizing and attending the face-to-face seminars, conferences, yeah, meetings. We had to resort to doing Zoom meetings, teams' meetings everything online. Uh what we call eh engaging in CPD so it's just that I used to do both, attend all face-to-face CPD events as well as do online ones so it just meant that because there was no face-to-face events do all online so for me it was just the transition where you doing more of one because the others are unavailable." **Participant 15, 36-45, female.**

4.3.2. Barriers to engaging in continuing professional development activities by radiographers during the Covid-19 pandemic

Participants reported having experienced some barriers to engage in continuing professional development activities by failing to effectively and successfully use online platforms. This included difficulty finding time to engage in online seminars, loss of social interaction, poor digital infrastructure, poor digital literacy, and a lack of finances that are required to engage in online continuing professional development activities.

4.3.2.1. Time constraints

Participants reported time constraints as one of the barriers to engage in continuing professional development activities during the Covid-19 pandemic. This is illustrated below:

"…finding the time to even attend the lectures because now we were not going to campus it was difficult to get study leave and stuff". **Participant 12, 25-35, female.**

"The times now were little bit of challenge if I can put it that way because we are radiographers now that also working night shift, so sometimes now they will start their seminars after hours starting from six which is not practical for those radiographers including me, the target and everything. We couldn't be able to attend other seminars, yes you would register but when it comes to you attending you will find out that the times are now clashing." **Participant 1, 25-35, male.**

4.3.2.2. Loss of social interaction

Participants reported having lost social interactions with their colleague radiographers owing to the shift to online continuing professional development activities. This means, they lost ideas sharing and interactions on a social level. The following excerpt illustrates:

> *"On the live conferences, you interact with a lot of different people, listening to live ones you can actually ask questions and the people that are presenting explain things more in a better light and you can ask and get clearance even if you're listening and thought it meant something, if someone asked a question you'd understand more, like they were more enlightening I'd say cause I even presented something so I found it more uhm much better"*. **Participant 4, 36-45, female.**

4.3.2.3. Online platform challenges

Participants reported having experienced difficulties when they were engaging in continuing professional development activities through online platforms. This included poor internet connectivity, a lack of data, poor access to digital devices, load shedding, and digital illiteracy. This is described through the following excerpts:

> *"I believe that the challenges that some of my colleagues experienced was now eh challenges was eh we cannot… we don't have access to the internet."* **Participant 1, 25-35, male.**

> *"So firstly it was network issues online the network was really unstable on our lecture side and our side as well. Load shedding also affected all of that because it was loadshedding the laptop would die".* **Participant 12, 25-35, female.**

> *"The only effect that there was, is the flooding of the internet because everyone was going online so the connectivity was much low and the website itself, the functionality of it was compromised".* **Participant 16, 25-35, male.**

> *"We had to now go digital which was a barrier because we do not have a lot of education in that and we did not have a lot of guidance in it and the other problem is of course uhm load shedding is an issue with us for that and for another just having uhm a steady internet connection".* **Participant 6, 36-45,**

female.

4.3.3. Enablers to continuing professional development during the Covid-19 pandemic

4.3.3.1. Professional obligation

In this category, participants expressed acknowledgment of their professional obligation to engage in continuing professional development activities as radiographers. They understood the importance of continuing to engage in continuing professional development activities even during the Covid-19 pandemic, as illustrated below:

> *"So, I know the importance of updating my CPD and I think it's important for radiographers to know what's current trends and what's happening so they should be active."* **Participant 2, 36-45, male.**

4.3.3.2. Opportunity to advance their skill in computer literacy

Participants believed that engaging in online continuing professional development activities was going to advance their skills in computer literacy. Radiographers' engagement in continuing professional development activities through digital platforms even for those who were not accustomed to digital continuing professional development, offered them an opportunity to learn the use of the digital platforms and gain access to a vast amount of continuing professional development programs. The following quotation affirmed this:

> *"Covid-19 didn't cause any hinderance if anything they provided more online activities where radiographers had another opportunity for those who were obsolete with and only relied on face to face. This should have been a pushing, a learning curve for them to get on and learn how to do online activities. So, I think we did more CPD activities through online webinars".* **Participant 20, 25-35. Female.**

4.3.3.3. Embrace the change as a result of Covid-19 pandemic

Some participants were encouraged to engage in continuing professional development activities because they believed that the Covid-19 pandemic brought changes which they ought to embrace. The following statement illustrates this finding:

"It's to do with change, people fear change and in life you got to realise you got to embrace change, you know you have to embrace change if you want developing life, if you want to go up in your life. If you want self-development as such. You have to embrace change and when Covid-19 came it allowed you, forced you to change, so for those that were old activities, see this Covid - 19 gave you an opportunity you know what there's a change embrace it". **Participant 15, 36-45, female.**

4.3.4. Radiographers' recommendations on strategies that could have been implemented to improve their engagement in continuing professional development activities during the Covid-19 pandemic

4.3.4.1. Hosting of in-house continuing professional development activities

Participants felt that hosting of in-house continuing professional development activities could have assisted them to continue engaging. This is illustrated in the following excerpt:

"Maybe we could have some activities as a department you know maybe host some activities try see how to work it out and what not. Cause otherwise we wouldn't have been interested in doing anything else but at least then if it was inhouse and everyone gets to be engaged and you know you'd be encouraged because we didn't really have the urge to look out for CPD activities and what not". **Participant 4, 36-45, female.**

4.3.4.2. Support from HPCSA and other continuing professional development providers.

Participants indicated that the HPCSA as their regulatory body and other continuing professional development providers should have taken the initiative and supported radiographers to continue engaging in continuing professional development activities during the pandemic, as reported below:

"The Society of Radiographers of South Africa should have taken responsibility to change the strategy of physical congresses and seminars to the online platform for the continuity of CPD activities. Lastly, I also feel like the Health

Profession Council of South Africa since it is the board responsible of monitoring the compliance of Radiographers on CPD activities, should have done much communication on reminding and encouraging us to continue participating on CPD activities. And also assist us by offering the online activities, webinars or Zoom meetings for us the engage from our homes without any physical meeting." **Participant 2, 36-45, male.**

"HPCSA or these platforms that do have CPD or provide CPD, should have at least have some more interaction with the radiographers. They should have more advertisements, engage with the radiographers. I don't think we got any notifications from HPCSA during that Covid-19-time uhm except for payment like you know". **Participant 9, 36-45, female.**

4.4 SUMMARY OF THE CHAPTER

This chapter presented the findings of this study. It first described the demographic information of participants. The findings were presented as main themes and sub-themes that emerged from interviewing the participants. The following main themes emerged from the interviews; effect of Covid -19 on radiographers' engagement in continuing professional development activities, barriers to engaging in continuing professional development activities during the Covid-19 pandemic, Enablers to continuing professional development during the Covid-19 pandemic and radiographers' recommendations on strategies that could have been implemented to improve their engagement in continuing professional development activities during the Covid-19 pandemic or similar situations. The next chapter discusses these findings in detail.

CHAPTER 5: DISCUSSION OF FINDINGS

5.1. INTRODUCTION

The preceding chapter presented the current study's findings. The present chapter will discuss the findings presented in chapter four, which are based on the interpretation of the experiences of KZN diagnostic radiographers' engagement in continuing professional development activities during the Covid-19 pandemic. This chapter begins by providing a contextual background of the participants. The chapter then discusses the themes that emerged from the findings. The main themes that emerged were:

- Effect of Covid-19 on radiographers' engagement in continuing professional development activities.
- Barriers to engaging in continuing professional development activities by radiographers during the Covid-19 pandemic.
- Enablers to continuing professional development during the Covid-19 pandemic.
- Radiographers' recommendations on strategies that could have been implemented to improve their engagement in continuing professional development activities during the Covid-19 pandemic.

Lastly, the chapter correlates the findings of the current study with its aim and previous literature. The chapter concludes with a summary.

5.2. DISCUSSION OF THEMES

The current study explored the experiences of KZN diagnostic radiographers when engaging in continuing professional development activities during the Covid-19 pandemic. This section presents and discusses the themes that emerged during the process of data analysis, as listed in the beginning of this chapter.

5.2.1. Effect of Covid-19 on radiographers' engagement in continuing professional development activities

This theme emerged from the participants' responses to the question around the effect that the Covid-19 pandemic had on their engagement in continuing professional development activities. Participants' responses showed that some of

them stopped engaging in continuing professional development activities whilst other participants continued, despite the Covid-19 pandemic. About 13 out of 20 participants continued engaging in continuing professional development activities during the Covid-19 pandemic. They engaged in continuing professional development activities through online platforms. They also reported that they were registered and subscribed with accredited continuing professional development providers. Most participants who continued engaging in continuing professional development activities acknowledged the importance of the activities. They saw that continuing professional development activities add value to their professional growth. Byungura *et al*. (2022: 11) conducted an exploratory study in Rwanda, on perceptions of healthcare managers on online continuing professional development activities. In the study, participants acknowledged the value of online continuing professional development for enhancing their professional development. The participants considered online continuing professional development as a strategy that can enhance knowledge, attitudes, and practice of healthcare practitioners (Byungura *et al*. 2022: 11).

In the current study, about two of participants indicated continuing to participate in continuing professional development activities, primarily to earn continuing professional development points for compliance. A similar finding was reported by a mixed method study that was conducted in Nigeria on clinical nurses' perception of continuing professional development. In that study, participants indicated having engaged in continuing professional development activities to retain their jobs because participation was mandatory for relicensure by the regulatory body (Nsemo, John & Etifit, 2013: 332).

In the current study, about seven out of 20 participants reported a lack of engagement in continuing professional development activities due to the Covid-19 pandemic. Participants indicated that continuing professional development was not a priority during the pandemic. Their engagement stopped because they were accustomed to traditional in-person continuing professional development activities. Participants indicated stopping to engage in continuing professional development activities due to the cancellation of in-person continuing professional development activities, including seminars, congresses, workshops, and meetings. These participants expressed that

they preferred in-person continuing professional development activities over online platforms. They considered in-person continuing professional development engagements as more informative. Moreover, participants indicated having faced challenges to concentrate on online platforms.

According to Afif, Goh & Lin (2021: 930) in-person continuing professional development engagement platforms provide theoretical concepts, observation, and concrete experience. Individual types of learning styles might affect the mode of continuing professional development engagement. Windrim, Gan, & Kingdom (2022: 232) state that energy and attention span may be shorter when engaging in continuing professional development activities through virtual platforms than when engaging in live platforms. Screen time fatigue has also been reported when engaging in online continuing professional development activities using digital devices (Windrim, Gan and Kingdom 2022: 232).

The current study's participants described having experienced a shift of focus from continuing professional development activities to the Covid-19 pandemic itself. Some participants indicated having had no plans to engage in continuing professional development activities. Participants indicated that continuous professional development activities were the least of the things in their minds. They reported a drastic change in their focus on dealing with the pandemic. Lewis & Mulla's (2021: 348) qualitative study shows that the Covid-19 pandemic altered the community of radiographers. Radiographers' focus was mainly on the pandemic because they were adjusting to a whole new era of altered working conditions, new protocols and policies. Their well-being and mental health was associated with fear of the Covid-19 pandemic (Lewis & Mulla 2021: 348).

5.2.2. Barriers to engaging in continuing professional development activities by radiographers during the Covid-19 pandemic

When participants were asked about the barriers that they encountered when engaging in continuing professional development activities during the Covid-19 pandemic, they reported having experienced barriers to effectively and successfully engage in continuing professional development activities. Participants reported experiences of

time constraints as one of the barriers to engage in continuing professional development activities during the Covid-19 pandemic. One participant reported having an increased workload due to staff shortage and hence being overworked and having no spare time to engage in continuing professional development activities. Another participant reported finding it difficult to engage in continuing professional development activities because their department did not allocate any time for continuing professional development activities. An additional participant indicated having a challenge to attend virtual continuing professional development activities due to work shifts which clashed with the virtual meetings.

According to participants, the Covid-19 pandemic caused a shift from in-person continuing professional development engagement to virtual engagement. Participants expressed the experience of loss of social interaction with their colleague radiographers. They mentioned that they used to socialise, mingle, and share ideas and career opportunities during in-person conferences, congresses, and workshops. Thus, online continuing professional development activities limited participants' physical interactions with colleagues and forced complete reliance on virtual platforms. Windrim, Gan, & Kingdom's (2022: 232) study had a similar finding who report that one of the significant drawbacks of virtual learning is the loss of social interactions and networking which is possible in in-person continuing professional development events. The lost networking includes mentorship, collegial support, collaboration, and team building.

A mixed methods survey that was conducted on exploring the views of health professionals on post-pandemic continuing professional development also revealed that by using online continuing professional development activities, radiographers lost networks and learning, which would establish, and direct their careers (Cassidy *et* al. 2023: 3). The current study participants' barriers to participate in online continuing professional development activities included poor digital infrastructure and digital illiteracy for engaging in continuing professional development activities during the Covid-19 pandemic.

Participants reported having experienced poor connectivity and slow response due to continuing professional development websites being flooded, lack of internet data, load shedding, poor access to digital devices, and digital illiteracy. They indicated that the

shift from engaging in in-person continuing professional development events to online platforms became a challenge for some of their colleagues because some did not have access to digital devices. One participant added that digital literacy was crucial for engaging in continuing professional development activities during the Covid-19 period. Another participant reported having no sufficient knowledge on using digital platforms to engage in continuing professional development activities.

The current study's findings on the barriers for radiographers to engage in continuing professional development activities during the Covid-19 pandemic are not different from an exploratory study that was conducted on the perceptions of healthcare managers on online continuing professional development activities in Rwanda (Byungura *et al*. 2022: 12). Byungura *et al*. (2022: 12) found a lack of training on emerging technologies for engaging in continuing professional development activities. There was also a lack of good and reliable internet connectivity, as well as a lack of adequate technical support to engage in continuing professional development activities. Moreover, a lack of time for online continuing professional development activities was highlighted (Byungura *et al*. 2022: 12). Furthermore, similar to the current study's findings, Ngenzi, Scott, & Mars (2021: 4) reported primary challenges associated with eLearning to include poor connectivity, limited digital infrastructure, time constraints, bugs with the systems and digital illiteracy.

5.2.3. Enablers to continuing professional development during the Covid-19 pandemic.

Participants acknowledged their professional obligation and regulatory requirements to engage in continuing professional development activities. Thus, to obtain continuing professional development points and remain compliant with their professional body. They understood the importance of continuing to engage in continuing professional development activities even during the Covid-19 pandemic. They further expressed the importance of keeping up to date with current trends in their field. According to Wareing *et al*. (2017: 58-59) skills and knowledge acquired by healthcare practitioners at their undergraduate level provide the foundation of their career but are not sufficient to support them as they grow in their career. Healthcare practitioners need to remain updated on the constant changes to the evidence base and technological advancements, especially in radiography, to close any gaps between the actual and

best practice. For this reason, healthcare professionals must engage in continuing professional development activities (Wareing *et al*. 2017: 58-59). Participants believed that engaging in online continuing professional development activities would advance their skills in computer literacy. Participants recognised the opportunity to learn use of the digital platforms and gain access to a vast amount of continuing professional development programs. Furthermore, some participants reported that they were encouraged to engage in continuing professional development activities. They believed that the Covid-19 pandemic brought changes which they ought to embrace.

Participants viewed the Covid-19 pandemic as an opportunity for the radiography community to improve, evolve, and advance their: knowledge, continuing professional development engagement format, and professional growth. They indicated that the Covid-19 pandemic afforded radiographers the opportunity to engage in continuing professional development activities through digital platforms. Thus, improving their digital skill to engage in online continuing professional development activities. One of the participants emphasised the importance of embracing change. The participant added that the Covid-19 pandemic brought change and forced radiographers to adapt. According to Kawczak *et al.* (2021: 1) there was a remarkable increase in online-based continuing professional development activities to keep healthcare practitioners updated in their respective fields and prepared to deal with the hospital and clinical demands of the Covid-19 pandemic. The continuing professional development activities were offered in shorter increases, reached many participants and were equally as effective in reaching learning outcomes.

The above current study's finding is further substantiated by the results of a mixed methods survey that explored the opinions of healthcare professionals on post-Covid-19 continuing professional development modalities, which indicated the opportunity of access to timely and many continuing professional development activities. Many participants indicated that a whole array of otherwise inaccessible continuing professional development opportunities had opened for them (Cassidy *et al*. 2023: 5). Van de Venter (2020: 30-31) added that the pandemic offered radiography education opportunities. The pandemic allowed radiography educators to learn new skills and be accustomed to using digital technologies to carry out the teaching and learning functions and consequently, there is a potential for continuing professional development and satisfaction as an

educator and healthcare practitioner to be a lifelong learner and engage in such practices.

5.2.4. Radiographers' recommendations on strategies that could have been implemented to improve their engagement in continuing professional development activities during the Covid-19 pandemic

Participants indicated that they needed more support to engage in continuing professional development activities effectively and successfully during the Covid-19 pandemic. Participants recommended that facilitators could host in house continuing professional development activities. Furthermore, participants indicated that institutional support, at a departmental level, could have helped radiographers to continue engaging in continuing professional development activities during the pandemic. According to Singh & Fish (2019: 127) in South Africa where continuing professional development compliance is mandatory and a regulatory requirement for healthcare professionals, it is of great concern that not all employers provide support for continuing professional development activities. Employers must be encouraged to support their professionals' engagement in continuing professional development activities. Mlambo, Silen & McGrath (2021: 8) also argues that a supportive environment for learning is a prerequisite for effective and successful engagement in continuing professional development activities. This is consistent with the findings of a study that was conducted by Naidoo & Naidoo (2018: 4), where it was revealed that employers' lack of support for the provision of time, funding, and motivation affected continuing professional development engagement.

Byungura *et al*. (2022: 12) assert that health institution managers should invest in the value that they attribute to online continuing professional development activities and provide necessary institutional support, including reliable internet connectivity, digital devices, and allocate time for engaging in continuing professional development activities. Furthermore, online continuing professional development programs should be well organised, goal-orientated, self-directed, and based on healthcare practitioners' needs.

Participants also indicated that HPCSA, as their regulatory body and other continuing professional development providers, should have taken the initiative

and supported radiographers to continue engaging in continuing professional development activities during the pandemic.

Participants reported that they could have been encouraged to participate remotely, because some participants were not accustomed to engaging in continuing professional development activities online. They added that online continuing professional development providers should have marketed their platforms more so that more radiographers could register and engage in continuing professional development activities. They also recommended that more guidance and clear instructions on how to engage in online continuing professional development activities should have been given to improve their participation during the pandemic. According to McMahon (2021: 4), regulatory bodies for continuing professional development should take the initiative and responsibility of continuing leadership roles including facilitation of innovation, whereby they constantly evaluate their requirements to enhance flexibility for continuing professional development educators, whilst protecting the quality, integrity, and independence of continuing professional development education.

5.3. Findings in relation to the aim of the study

The main aim of the current study was to explore the experiences of KZN province diagnostic radiographers' engagement in continuing professional development activities during the Covid-19 pandemic and to understand what could have been done to improve their engagement in continuing professional development activities. The findings of this study are used to recommend strategies that could have been devised to help radiographers better engage in continuing professional development activities during the pandemic. The aim of this study was achieved, and this is demonstrated through the thematic discussion of the findings in the above sections. To further and clearly demonstrate how the aim was achieved, the below discussion is divided into the research questions and shows how each of the question was answered.

The main research question for this study was as follows: What were the KZN diagnostic radiographers' experiences when engaging in continuing professional development activities during Covid-19? Participants in the current study were interviewed and responded to four research questions in line with the objectives. The

research questions and findings obtained to answer them are summarised below:

- **What were the diagnostic radiographers' perceptions on engaging in Continuing professional development activities during Covid-19?** This question helped the researcher gain insight on the effect that the Covid-19 pandemic had on the KZN radiographers' engagement in continuing professional development activities. Findings indicate that the format for continuing professional development activities changed from live conferences, congresses, seminars, and meetings to be completely held online due to social restrictions at the time. About 13 out of 20 of participants continued engaging in continuing professional development activities during the Covid-19 pandemic through online platforms. The remaining 7 of the participants did not engage in any continuing professional development activities. They indicated that continuing professional development was not a priority during the pandemic. Participants also indicated that they preferred traditional in-person continuing professional development activities over online platforms.

- **What were the barriers to engaging in continuing professional development activities by diagnostic radiographers during Covid-19?** This question helped the researcher understand the barriers that participants encountered when they were engaging in continuing professional development activities. Participants who did not participate in any continuing professional development activities during the pandemic indicated that the pandemic itself was a barrier to their continuing professional development engagement. Some participants indicated having experienced barriers when engaging in continuing professional development activities through the virtual platforms, including internet connectivity issues, time constraints, clashing of live online continuing professional development sessions with their work shifts, and a lack of data. Other barriers that were reported by participants included no access to digital devices and poor digital literacy. Findings also indicated radiographers' loss of social interaction when engaging in online continuing professional development activities.

- **What were the enablers to engaging in continuing professional development activities by diagnostic radiographers during Covid-19?** The study's findings

revealed that the professional obligation for lifelong learning forced some radiographers to continuously engage in continuing professional development activities. Moreover, the pandemic gave participants the opportunity to advance their computer literacy skills and embrace the changes brought by the Covid-19 pandemic.

- **What could have been done to improve radiographers' engagement in continuing professional development activities during theCovid-19pandemic?** This question sought recommendations on strategies that could have been devised to improve radiographers' participation in continuing professional development activities during the Covid-19 pandemic. Participants indicated that more support for engaging in continuing professional development activities should have been provided. They recommended that hosting of in-house continuing professional development activities could have helped them to continue engaging in continuing professional development activities. They further indicated that the HPCSA and other continuing professional development providers could have supported as well in encouraging participation and providing guidance on engaging in continuing professional development activities.

5.4. SUMMARY OF THE CHAPTER

This chapter thematically, and in relation to previous literature, discussed the current study's findings. The aim of the study was to explore the experiences KZN province diagnostic radiographers' engagement in continuing professional development activities during the Covid-19 pandemic and to understand what could have been done to improve their engagement in continuing professional development activities. The research questions of the current study were answered using participants' responses. The next chapter will conclude this study, outline limitations, provide recommendations and areas for research in future.

CHAPTER 6: CONCLUSION, LIMITATIONS AND RECOMMENDATIONS

6.1. INTRODUCTION

The previous chapter discussed the findings of this study as themes . The current chapter provides a brief discussion of the strengths of the study, highlights the limitations and provides recommendations . The chapter concludes with conclusion of the study.

6.2. STRENGTHS OF THE STUDY

This study was conducted using qualitative methods. It employed constructivism paradigm to explore the experiences of KZN diagnostic radiographers' engagement in in continuing professional development activities during the Covid-19 pandemic. This ensured that rich data were obtained to explore participants' experiences. To the best of the researcher's knowledge, this is the first study to explore the experiences of diagnostic radiographers' engagement in in continuing professional development activities during the Covid-19 pandemic in the South African context. Therefore, the study adds to the body of new scientific knowledge in diagnostic radiography. Furthermore, the strategies that were proposed by participants can be adopted to improve radiographers' participation to continuing professional development activities and possibly help them realise the value of engaging in continuing professional development activities. The study had a significant number of participants and data saturation was reached. Moreover, all the interviews were conducted face-to-face, one-on-one, which allowed participants to give their full attention to the interview and deeply articulate their experiences.

6.3. LIMITATIONS OF THE STUDY

Limitations of a study are described as any possible weaknesses that are closely related to the selected research methodology and design which cannot be controlled by the researcher (Theofandis & Fountouki 2018: 156). According to Ross & Zaidi (2019: 261) all studies have limitations, regardless of the used methodology. Limitations represent shortcomings that may affect the findings and conclusions of a study. The aim of disclosing the limitations of a study is to provide meaningful information to the reader. The omission of limitations in a study results in researchers missing the opportunity to

fully communicate the relevance of their work and suggest areas for further studies (Ross & Zaidi 2019: 261).

In the current study, qualitative approach was used, implying that the findings cannot be generalized due to small sample size. It did not include participants who were working in private hospitals. The study was conducted in one province and one district. Only three public hospitals were selected for this study. Therefore, the findings cannot be generalised in the South African context. Moreover, this study only focused on diagnostic radiographers in the radiography field. However, it can be extended to other modalities including sonography, radiotherapy, and nuclear medicine, because they fall under the medical imaging profession. Furthermore, there is a necessity for that include participants from private hospitals rather than public hospitals only. Moreover, research across other provinces in South Africa was missing, yet it is necessary for generalising the findings in an African context.

6.4. RECOMMENDATIONS OF THE STUDY

The following recommendations are based on the findings of the current study, on experiences of KZN diagnostic radiographers' engagement in continuing professional development activities during the Covid-19 pandemic. The study's findings highlight the importance of support for continuing professional development activities. A lack of support is the main barrier that hinders continuing professional development practices and their value. It is highly recommended that more support is given to radiographers to encourage their engagement in continuing professional development activities. Easier access to continuing professional development should be made. Moreover, radiography departments should do inhouse continuing professional development and allow time for radiographers to engage in these activities.

Universities and clinical training centers should work together to cultivate and encourage continuing professional development culture in students to prepare them for their future careers. The HPCSA also needs to support the contisignnuing professional development activities by shaping their landscape in a manner that will best cater to the participants' needs, and promote self-directed learning to encourage participation and discourage the tick-box approach.

6.5. CONCLUSION

in continuing professional development remains important for radiographers to professionally update their knowledge and skills, so as to keep up with evidence-based practice and technological changes in their profession. These professional changes are evident in the findings of the current study. According to this study, all in continuing professional development activities were moved from traditional in-person to digital platforms during the Covid-19 pandemic. There was participation and a lack of participation in in continuing professional development activities during the pandemic. This was due to preferences in in continuing professional development formats, barriers, and enablers that influenced participants' engagement in in continuing professional development activities.

This study revealed that radiographers acknowledge the value of engaging in in continuing professional development activities. They also recognise the obligation to fulfil the regulatory requirements of engaging in in continuing professional development activities to remain registered as healthcare professionals. Furthermore, the study revealed that a lack of support for in continuing professional development activities was a challenge during the Covid-19 pandemic. Participants indicated a lack of guidance on how to engage in online in continuing professional development activities. They also felt that they lacked encouragement and time to engage in in continuing professional development activities during the Covid-19 pandemic.

REFERENCES

Aabdien, M., Abdallah, I. and Awaisu, A. 2022. Utilization of Technology in Continuing Professional Development and Training for Healthcare Providers: Current Trends and the Future Post-COVID-19 Era. *Journal of Emergency Medicine, Trauma and Acute Care*, 2022(1): 1–2.

Adom, D., Hussein, E. K. and Agyem, J. A. 2018. Theoretical and Conceptual framework: Mandatory ingredients of quality Research. *International Journal of Scientific Research,* 7(1): 438-441.

Afif, A. M., Goh, M. Z. H., Lin, Y. J., Ho, G. D., Anwar, T., Chong, C. M. and Sim, J. 2021. An analysis of the continuing professional development needs of radiographers and radiation therapists in Singapore. *Radiography*, *27*(3): 927-934.

Afif, A. M., Razak, H. A., Ang, X. K. and Choong, A. W. D. 2022. Organizing a Virtual Radiography Conference during Covid-19 Pandemic. *Journal of Radiology and Medical Imaging*, 5(1): 1-5.

Akudjedu, T. N., Lawal, L., Sharma, M., Elliot, J., Stewart, S., Gilleece, T., Mcfadden, S. and Franklin, J. M. 2020. Impact of the COVID-19 pandemic on Radiography Practice: Findings from a UK radiography workforce survey. *British Journal of Radiology*, 2(1): 11–13.

Akudjedu, T. N., Botwe, B. O., Wuni, A. R. and Mishio, N. A T. N. 2021. Impact of the COVID-19 pandemic on clinical radiography practice in low resource settings: The Ghanaian radiographers' perspective. *Radiography*, 27(2): 443–452.

Alamina, U. P., Okubokeme, O. P. and Chijioke, N. A. 2020. Knowledge gap: A panacea for conducting research and theory building. *International Journal of Business Systems and Economics*, 13(1): 39-45.

Alhasan, M. and Al-Horani, Q. 2021. Students' perspective on the online delivery of Radiography & Medical Imaging Program during COVID-19 pandemic. *Journal of Medical Imaging and Radiation Sciences*, 52(4): 68–77.

Almutawa, N. A. M., Mahmoud, H. M., Rao, C. and Main, M. 2021. Continuing Professional Development: Provision and Adaptation of Clinical Education within the Primary Health Care Setting in Qatar during the COVID-19 Pandemic. *Principles and Practice of Clinical Research Journal*, 7(1): 40–45.

Anon. 2024. *HPCSA*. Available: https://www.hpcsa.co.za/(Accessed 24 February 2024).

Arnilla, A. K. 2022. Utilizing Open Access Webinars to Promote Continuing Professional Development during COVID-19 Crisis in the Philippines. *Academic Journal of Interdisciplinary Studies*, 11(4): 214–225.

Asenahabi, M. 2019. Basics of Research Design: A Guide to selecting appropriate research design. *International Journal of Contemporary Applied Research*, 6(5): 76-89.

Asiamah, N., Mensah, H. K. and Oteng-Abayie, E. F. 2017. General, Target, and Accessible Population: Demystifying the Concepts for Effective Sampling. *The Qualitative Report*, 22(6): 1607-1622.

Bangalee, A. and Bangalee, V. 2022. Riding the waves: Challenges to medical specialty training during the COVID-19 pandemic in South Africa. *African Journal of Health Professions Education*, 14(2): 44–46.

Besson, J., McNamara, C. and Brown, E. 2020. 'Pivots and pirouettes: Adapting a robust departmental CPD and training program to the COVID-19 crisis'. *Journal of Medical Radiation Sciences, 67(4)*: 356-359

Bhaskar, S. B. and Manjuladevi, M. 2016. Methodology for research II. *Indian Journal of Anaesthesia*, 60(9), 646–651.

Byungura, J. C., Nyiringango, G., Fors, U., Forsberg, E. and Tumusiime, D. K. 2022. Online learning for continuous professional development of healthcare workers: an exploratory study on perceptions of healthcare managers in Rwanda. *BioMed Central Medical Education*, 22(1): 1–14.

Cassidy, D., Edwards, G., Bruen, C., Kelly, H., Arnett, R. and Illing, J. 2023. Are we ever going back? exploring the views of health professionals on postpandemic continuing professional development modalities, *Journal of Continuing Education in the Health Professions*: 1-9.

Ceesay, E. K. 2021. Potential impact of COVID-19 outbreak on education, staff development and training in Africa. *Research in Globalization*, 3(1): 1–6.

Chipamaunga, S., Nyoni, C. N., Kagawa, M. N., Wessels, Q., Kafumukache, E., Gwini, R., Kandawasvika, G., Katowa-Mukwato, P., Masanganise, R., Nyamakura, R., Nyawata, I., Pretorius, L., Dithole, K., Marimo, C., Mubuuke, A. G., Mbalinda, S. N., Jean, L. and Prozesky, D. 2023. Response to the impact of COVID-19 by health professions education institutions in Africa: a case study on preparedness for remote learning and teaching. *Smart Learning Environments*, 10(1): 1–19.

Dhital, R., Subedi M., Prasai, N., Shrestha, K., Malla, M. and Upadhyay, S. 2015. Learning from primary health care centers in Nepal: Reflective writings on experiential learning of third year Nepalese Medical students. *BioMed Central Research Notes*, 8(1): 1–9.

Dhudasia, M. B., Grundmeier, R. W. and Mukhopadhyay, S. 2021. Essentials of data management: an overview. *Pediatric Research*, *93*(1): 2-3.

Dworkin, S. L. 2012. Sample Size Policy for Qualitative Studies Using In-Depth Interviews. *Archives of Sexual Behavior*, 41(6): 1319- 1320.

Elshami, W., Elamrdi, A., Alyafie, S. and Abuzaid, M. 2016. Continuing professional development in radiography: Practice, attitude and barriers. *International Journal of Medical Research andHealth Sciences*, 5(1): 68–73.

Figueiredo, L. D., Silva, N. C. and Prado, M. L. 2022. Primary care nurses' learning styles in the light of David Kolb. *Revista Brasileira de Enfermagem*, 75(6): 1–7.

Gawugah, J. N. K., Jadva-Patel, H. and Jackson, M. T. 2011. The uptake of Continuing Professional Development (CPD) by Ghanaian radiographers. *Radiography*, 17(4):
332-
344.

Gumede, L. and Badriparsad, N. 2021. Online teaching and learning through the students' eyes – uncertainty through the COVID-19 lockdown: A qualitative case study in Gauteng Province, South Africa. *Radiography*, 28(1): 193–198.

Hegde, G., Azzopardi, C., Hurley, P., Gupta, H., Vemuri, N. V., James, S., and Botchu,
R. 2020. Impact of the COVID-19 pandemic on radiologists. *Indian Journal of Medical Sciences*, 72(3): 177–180.

Jalowski, M., 2021. Introduction: Motivation and Research Setting. *In Revolutionizing*
Workshops Springer Gabler, Wiesbaden, 2(1):1-
13.

Kawczak, S., Fernandeza, A., Framptona, B., Mooneya, M., Nowackib, A., Yakoa, M. and Stoller, J. K. 2021. Observations from transforming a continuing education programme in the COVID-19 ERA and preparing for the future. *Journal of European Continue Medical Education*, 10(1): 1–9.

Khatri, K. K. 2020. Research Paradigm: A Philosophy of Educational Research. *International Journal of English Literature and Social Sciences*, 5(5): 1435-
1440.

Kitto, S. 2020. Meeting the challenges of covid-19 at the close of 2020. *Journal of*
Continuing Education in the Health Professions, 40(4): 215-
216.

KwaZulu-Natal Province Health: Republic of South Africa. 2022. Hospitals listed by districts in KwaZulu-Natal. 2022. Available: www.kznhealth.gov.za

(Accessed: 28 September 2022).

Kyngäs, H., Kääriäinen, M. and Elo, S. 2019. The Trustworthiness of Content Analysis. *The Application of Content Analysis in Nursing Science Research*.

Lawal, O., Omiyi, D., York, H. and Akudjedu, T. N. 2022. Towards describing the global impact of the COVID-19 pandemic on clinical radiography education: A Systematic Review. *Journal of Medical Imaging and Radiation Sciences*, 53(3): 487–497.

Leite, D. F. B., Padilha, M. A. and Cecatti, J. G. 2019. Approaching literature review for academic purposes: The Literature Review Checklist. *Clinics*, 74: 1–8.

Lewis, S. 2022. Two years on and four waves later: Johannesburg diagnostic radiographers' experiences of COVID-19. *Journal of Medical Imaging and Radiation Sciences*, 54(2): 77–84.

Lewis, S. and Mulla, F. 2021. Diagnostic radiographers' experience of COVID-19, gauteng South Africa. *Radiography*, 27(2): 346–351.

Liamputtong, P. 2019. Qualitative inquiry. *Handbook of Research Methods in Health Social Sciences.* Singapore: Springer.

Loewe, C. 2021. The impact of Covid-19 on your educational activities. *European Board of Radiology*: 1–4.

Madonsela, N., Mature, O., Mohono, P., Nkuna, N. and Muller, H. 2023. Radiography students' lived experiences during the coronavirus pandemic: A letter to our peers'. *Journal of Medical Imaging and Radiation Sciences*, 54(2): 3–5.

Maguire, M. and Delahunt, B. 2017. Doing a Thematic Analysis: A Practical, Step-by-Step Guide for Learning and Teaching Scholar. *All Ireland Journal of Teaching and Learning in Higher Education*, 9(3): 3351-33514.

Magwenya, R. H. and Ross, A., 2023. Developing a CPD model for Eswatini—a

participatory action research study. *BioMed Central Medical Education*, *23*(1): 1-13.

Majid, U. 2018. Research Fundamentals: Study Design, Population, and Sample Size. *Undergraduate Research in Natural and Clinical Science and Technology Journal*, 2(1): 1–7.

Malamateniou, C. 2022. The legacy of COVID-19 for radiography practice, education, and research: How to use lessons learned to navigate the “new normal”? *Radiography*, 1-12.

Mann, S. P., Treit, P. V., Geyer, P. E., Omenn, G. S. and Mann, M. 2021. Ethical principles, constraints, and opportunities in clinical proteomics. *Molecular and Cellular Proteomics*,1–13.

Manohar, N. D., MacMillan, F., Steiner-Lim, G. Z. and Arora, A. 2018. Recruitment of Research Participants. *Handbook of Research Methods in Health Social Sciences*. Available: DOI: 10.1007/978-981-10-2779-6_75-1.

Masai, J. and Boibanda, F. 2022. Rethinking nurses’ continuous professional development in the era of COVID 19 pandemic: Empirical evidence from Kenya, *EAS Journal of Nursing and Midwifery*, 4(5): 153–159.

Mbeve, O., Nyambuya, V. P., Munyoro, A., Dube, N., & Shumba, K. 2020. The challenges faced and survival strategies adopted by Zimbabwean informal traders that live in Johannesburg inner-city, during the COVID-19-induced lockdown in South Africa. *Journal of Social Development in Africa*, 31-64.

McCusker, K. and Gunaydin, S. 2014. Research using qualitative, quantitative or mixed methods and choice based on the research. *Perfusion*, *30*(7): 1-6.

McFadden, S., Flood, T., Shepherd, B. and Gilleece, T. 2022. Impact of COVID-19 on service delivery in radiology and radiotherapy. *Radiography*, 28: 16–26.

McMahon, G. T. 2021. Facilitating flexibility: The role of CPD regulators and accreditors during a crisis. *Journal of European Continuing Medical Education*, 10(1): 1–4.

Mlambo, M., Silén, C. and McGrath, C. 2021. Lifelong learning and nurses' continuing professional development, a metasynthesis of the literature. *BioMed Central Nursing*, *20* (62): 1-13.

Naidoo, K. and Naidoo, S. 2018. Continuing professional development opinions and challenges experienced by radiographers in KwaZulu-Natal Province, South Africa. *African Journal of Health Professions Education*, 10(4): 210–214.

Ng'andwe, E. M. and Bwanga, O. 2022. Factors affecting the ability of radiographers to deliver imaging services in rural parts of Zambia. *Radiography*, 28(3): 758–765.

Ngenzi, J. L., Scott, R. E. and Mars, M. 2021. Information and communication technology to enhance continuing professional development (CPD) and continuing medical education (CME) for Rwanda: a scoping review of reviews. *BioMed Central Medical Education*, 21(1): 1–8.

Nsemo, A. D., John, M. E., Etifit, R. E., Mgbekem, M. A. and Oyira, E. J. 2013. Clinical nurses' perception of continuing professional education as a tool for quality service delivery in public hospitals Calabar, Cross River State, Nigeria. *Nurse Education in Practice*, *13*(4): 328-334.

Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N. and Hoagwood, K. 2015. Purposeful Sampling for Qualitative Data Collection and Analysis in Mixed Method Implementation Research. *Administration and Policy in Mental Health and Mental Health Services Research*, 42(5): 1-20.

Patel, M. and Patel, N. 2019. Exploring Research Methodology: Review Article. *International Journal of Research and Review*, 6(3): 48-55.

Quan, C. 2020. Two passions, one goal, and a pandemic: The Future of Medical Education in South Africa. *Southern African Journal of Anaesthesia and Analgesia*, 26(6): 11–13.

Rahi, S. 2017. Research design and methods: A systematic review of research paradigms, sampling issues and instruments development. *International Journal of Economics and Management Sciences*, 6(2): 1–6.

Rehman, A. A. and Alharthi, K. 2016. An introduction to research paradigms. *International Journal of Educational Investigations*, 3(8): 51-59.

Rocha, R. N., Bezerra, J. C., Fernandes, F. C., Correia, M. and Nunes, R. 2022. Brazilian law of inclusion: An applied analysis of the correlation of bioethical principles. *Acta Bioethica*, 28(1): 67–74.

Ross, P. T. and Zaidi, N. L. B. 2019. Limited by our limitations. *Perspectives on Medical Education*, *8*, 261-264.

Salehi, R., De Young, S., Asamoah, A., Aryee, S. E., Eli, R., Couper, B., Smith, B., Djokoto, C., Agyeman, Y. N., Zakaria, A. F. S., Butt, N., Boadu, A., Nyante, F., Merdiemah, G., Oliver-Commey, J., Ofori-Boadu, L., Akoriyea, S. K., Parry, M., Fiore, C. and Okae, F. 2023. Evaluation of a continuing professional development strategy on COVID-19 for 10 000 health workers in Ghana: a two-pronged approach. *Human Resources for Health*, 21(1): 1–13.

Shereen, M. A., Khan, S., Kazmi, A., Bashir, N. and Siddique, R. 2020. COVID-19 infection: Emergence, transmission, and characteristics of human coronaviruses. *Journal of Advanced Research*, 24(1): 91-98.

Shorey, S. and Debby Ng, E. 2022. Examining characteristics of descriptive phenomenological nursing studies: A scoping review. *Leading* Global *Nursing Research*, 78(1): 1968-1979.

Singh, S. A. and Fish, T. D. 2019. South African Health Practitioners' patterns of CPD practices – implications for maintenance of licensure. *African Journal of Health Professions Education*, 11(4): 123–128.

Sklar, D., Yilmaz, Y. and Chan, T. M. 2021. What the COVID-19 pandemic can teach

health professionals about continuing professional development. *Academic Medicine*, *96*(10): 1379-1382.

Soklaridis, S., Chowdhury, M., Turco, M. G., Tremblay, M., Mazmanian, P., Williams, B., Besa, R. and Sockalingam, S. 2024. Pivoting Continuing Professional Development During the COVID-19 Pandemic: A Narrative Scoping Review of Adaptations and Innovations. *Journal of Continuing Education in the Health Professions*, 1-14.

Stevens, B. J. and Wade, D. 2017. Improving continuing professional development opportunities for radiographers: A single centre evaluation. *Radiography*, *23*(2): 112-116.

Tay, Y. X., Abu-Bakar, R. B. and Kaur, B. 2021. Hospital training challenges during COVID-19 in Singapore: Radiographers' experience of continuing professional development in social distancing mode. *Journal of Continuing Education in the Health Professions*, 41(1): 13–15.

Tay, Y. X., Tan, C., Huang, Y., Kwek, L. S., Wei, Y. M. and Mcnult, J. 2021. Get comfortable with being uncomfortable: Experiences from diagnostic radiographers a year into the COVID-19 pandemic. *Journal of Medical Imaging and Radiation Sciences*, 52(3): 332–339.

Tay, Y. X., Chow, H. C. and Ooi, C. C. 2020. Impact on clinical learning during coronavirus disease 2019 pandemic: from disruption to recovery and the new norms. *Korean Journal of Medical Education*, 32(4): 297–305.

Tsiouris, F., Hartsough, K., Poimboeuf, M., Raether, C., Farahani, M., Ferreira, T., Kamanzi, C., Maria, J., Nshimirimana, M., Mwanza, J., Njenga, A., Odera, D., Tenthani, L., Ukaejiofo, O., Vambe, D., Fazito, E., Patel, L., Lee, C., Michaels-Strasser, S. and Rabkin, M. 2022. Rapid scale-up of covid-19 training for frontline health workers in 11 African countries. *Human Resources for Health*, 20(1): 1–10.

Uarije, C., Daniels, E. R., Kalondo, L., Amkongo, M., Damases-Kasi, C. and Nabasenja, C. 2017. Radiographers' attitudes towards continuous professional development (CPD)

at state hospitals in Windhoek Namibia. *The South African Radiographer*, 55(1): 18-22.

Uslu, U., Ozyurek, T., Kayahan, M. B., Gundogar, M. and Keskin, N. B. 2022. Impact of COVID-19 Pandemic on Continuing Professional Development of Endodontists: A Comprehensive Survey Study. *Turkiye Klinikleri Journal of Dental Sciences*, 28(3): 624–632.

Vaismoradi, M., Jones, J., Turunen, H. and Snelgrove, S. 2016. Theme development in qualitative content analysis and thematic analysis. *Journal of Nursing Education and Practice*, 6(5): 100–110.

Van de Venter, R. 2020. Rethinking radiography education amidst the coronavirus pandemic. *The South African Radiographer*, 58 (1): 30-32.

Wareing, A., Buissink, C., Harper, D., Olesen, M. G., Soto, M., Braico, S., Van Laer, P., Gremion, I. and Rainford, L. 2017. Continuing professional development (CPD) in radiography: a collaborative European meta-ethnography literature review. *Radiography*, *23(1)*: 58-63.

Wijnen-Meijer, M., Brandhuber, T., Schneider, A. and Berbera, P. O. 2022. Implementing kolb´s experiential learning cycle by linking real experience, case-based discussion and simulation. *Journal of Medical Education and Curricular Development*, 9: 1-5.

Winchester, C. L. and Salji, M. 2016. Writing a literature review. *Journal of Clinical Urology*, 9(5): 308–312.

Windrim, R. C., Gan, E. and Kingdom, J. C. 2022. The impact of covid-19 on Continuing Professional Development: Go Green and Go Home?. *Journal of Obstetrics and Gynaecology Canada*, 44(3): 231-233.