Occupational stress among Diagnostic Radiographers during the COVID-19 Pandemic: A Namibian Perspective.

By

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DECLARATION

I, Festus S Shidolo, do hereby declare that this thesis represents my own work. The opinions expressed are my own and not necessarily those of the Cape Peninsula University of Technology. I further declare that this thesis was not previously submitted for academic purposes towards awarding of any qualification.

Signed:  Date: 18 October 2023

ABSTRACT

Background: During the Coronavirus disease of 2019 (COVID-19) pandemic, many professionals had to work from home and maintain physical distancing as a measure to reduce exposure and risk of infection to the virus. Diagnostic radiographers were among the essential health care professionals (HCPs) who had to continue working to help fight this disease. Being considered essential HCPs made diagnostic radiographers vulnerable, not only to the most feared pandemic of the current generation but also hypothetically intensifying their occupational stress.

The objectives of this study were: to observe Namibian radiographers' occupational stress and stressors caused by the COVID-19 pandemic; to ascertain their coping strategies used to manage their occupational stress; and to identify and describe workplace interventions that can be used to mitigate the effects of occupational stress during future pandemics.

Methods: A quantitative cross-sectional and descriptive study design was used. An electronic questionnaire created with Google Forms software was distributed among diagnostic radiographers employed in both Namibian public hospitals and private radiology practices. Sampling was done among and based on the whole population of 207 diagnostic radiographers in Namibia using a purposive non-probability sampling technique. Data collected included demographic characteristics, perceived causes of COVID-19-related occupational stress, radiographers' coping strategies, workplace mitigating interventions and general suggestions on how to mitigate stress among diagnostic radiographers during future pandemics. The Statistical Package for Social Sciences statistics for Windows, Version 26 was used for statistical analysis of recorded data.

Results: A total of 90 diagnostic radiographers participated in the study of whom 83.7% were female and 16.3% were male. Out of the total respondents, 26.4% were radiographers in managerial roles. Increased workload and fear of both contracting

and spreading the infection were reported as the key contributors to the COVID-19 occupational-related stressors. The coping strategies used by respondents were spending quality time and talking to friends or a family member, developing hobbies as well as meditating and getting involved in spiritual and religious activities. Respondents cited the introduction of incentives, social networking and provision of psychological support as the best intervention that could be used to mitigate the effects of stress on radiographers during future or similar pandemics.

Conclusion: This study reveals the presence of COVID-19-related occupational stress among diagnostic radiographers in Namibia during the pandemic. Coping mechanisms such as spending quality time with family and friends were identified as effective strategies to manage this stress. These findings emphasise the importance of developing contingency mitigation plans for radiology departments to address occupational stress during uncertain periods like the COVID-19 pandemic and beyond. Moving forward, it is essential for radiographers and healthcare managers to continually reflect on their COVID-19 experiences and lessons learned to better prepare for future pandemics. While the study's limited response rate restricts the generalisability of the findings to all Namibian radiographers, the insights provided can serve as a foundation for further research in this area.

Keywords: Occupational stress, COVID-19, pandemic, radiographers, radiology, Namibia

DEDICATION

This thesis is dedicated to my beloved family.

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- First and foremost to Yahweh, my Lord and source of my strength. Thank you. I am nothing without You; this project would not have come to its completion if it were not for Your grace.
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LIST OF ABBREVIATIONS

AIDS	Acquired Immunodeficiency Syndrome
ANOVA	Analysis of variance
COVID-19	Coronavirus disease of 2019
CPD	Continuing Professional Development
CPUT	Cape Peninsula University of Technology
CT	Computed Tomography
ETD	Electronic Theses and Dissertations
H1N1	Hemagglutinin-1 Neuraminidases-1 virus
HCFs	Health Care Facilities
HCPs	Health Care Professionals
HIV	Human Immunodeficiency Virus
HOD	Head of Department
HPCNA	Health Professions Councils of Namibia
MoHSS	Ministry of Health and Social Services
N95 mask	Non-oil 95 mask
PHC	Primary Health Cares
PPE	Personal Protective Equipment
PTSD	Post-traumatic stress disorder
PUI	Person under investigation
REC	Research Ethics Committee
RT-PCR	Reverse transcription polymerase chain reaction
SARS	Severe acute respiratory syndrome
SARS-CoV-2	Severe acute respiratory syndrome coronavirus 2
SPSS	Statistical Package for Social Sciences
POPI	Protection of Personal Information
UK	United Kingdom
USA	United States of America
WHO	World Health Organisation
WMA	World Medical Association

CHAPTER 1 INTRODUCTION

1.1 Chapter Introduction

It is a well-known fact that the Coronavirus disease of 2019 (COVID-19) pandemic has significantly affected a number of industries around the world. This pandemic for example impacted negatively on the economy, livelihood and mental well-being of many people around the globe (Wang *et al.,* 2021). The health care sector was not exempted from this and was at the forefront of this widespread pandemic.

Stress is part of contemporary life and subsequently, occupational-related-stress is to some degree inevitable (Society of Radiographers, United Kingdom {UK} 2013). Stress affects all professionals, particularly Health Care Professionals (HCPs) (Birhanu *et al.,* 2018). This might be due to the nature of their working environment of providing service to [diseased and] stressed persons they encounter daily (Boyacı *et al.,* 2014). Else, stress could thrive in the absence of professional support and well-equipped health care facilities (HCFs) (Abbas *et al.,* 2021). While there is no perfect working environment, HCFs are the most stressful working environment compared to others (Boyaci *et al.,* 2014; Akweenda & Cassim, 2016). Working in a hospital during the COVID-19 pandemic was widely seen to be the most stressful (Hong *et al.,* 2021). Given the above, it could be argued that the COVID-19 pandemic therefore compounded an already stressful environment.

This thesis describes a study conducted among diagnostic radiographers in Namibia. This study set out to observe the type of occupational stressors Namibian diagnostic radiographers faced during the COVID-19 pandemic. Chapter 1 presents the background, problem statement, aim and objectives of the study. This chapter further provides a discussion on the significance of the study and ends with a thesis overview.

1.2 Background

COVID-19 originated in December 2019 in Wuhan, a city in China. The World Health Organisation (WHO) declared the COVID-19 outbreak as a global health emergency on 30 January 2020 (Akudjedu *et al.,* 2020). Subsequently, the WHO declared the COVID-19 outbreak a global pandemic on 11 March 2020 (Tay *et al.,* 2021).

Some governments around the world responded swiftly in an attempt to contain the pandemic by locking down certain cities. Some countries further locked down their borders as cautionary measures. The pandemic became the agenda of the entire world with resources directed toward the battle against the virus (Abbas *et al.,* 2021).

During the COVID-19 pandemic, many professionals had to work from home and maintain physical distancing as a measure to reduce exposure and risk of infection to the virus. Diagnostic radiographers (henceforth referred to as radiographers) and some other HCPs however continued working in an effort to fight the disease. Among these patient-facing practitioners, radiographers actively participated in the management and treatment of the COVID-19 disease (Lewis & Mulla, 2021; Pereira *et al.,* 2021). Throughout the COVID-19 pandemic, radiological tests emerged as essential diagnostic investigations in managing COVID-19 infections (Ooi *et al.,* 2021). As a result, radiographers in particular were integral to these investigations and diagnostics by providing imaging services, such as chest X-rays and Computed Tomography (CT) (Flood *et al.,* 2022). These essential imaging services made radiographers vulnerable to the most feared pandemic of the current generation and potentially heightened their stress levels.

The demand for medical imaging to confirm a diagnosis and assess the progression of the COVID-19 related diseases was reported to be on the increase during the pandemic (Mc Fadden *et al.,* 2022). The unsung radiographer heroes and heroines were worn out and exhausted as they responded to emergencies and answered to their humane call during this difficult time (Itani et al., 2021). Tirelessly, some

radiographers fought against COVID-19 and described their experience as “hectic and stressful” (Tan *et al.,* 2021). In addition, working in hospitals during the COVID-19 pandemic seemed to have increased fears among HCPs of passing infections to family members and successively affecting their well-being in return (Yeung *et al.,* 2021). A sad truth was that HCPs were at risk of contracting the disease, becoming the mode of transmission of the virus and even succumbing to death while in the line of their professional duties (Chui *et al.,* 2021).

According to Abbas *et al*. (2021), during the COVID-19 pandemic, most HCPs and managers had their focus on the patients’ well-being and preventive measures, leaving the psychological wellbeing and mental health of fellow HCPs overlooked. The current study sought to assess the stressors radiographers endured and the coping mechanisms they employed during the COVID-19 pandemic. The study further observed workplace interventions that could be used to lessen the stress of working during future pandemics.

1.3 Problem statement

Restauri and Sheridan (2020) stated that the COVID-19 pandemic has worsened stressors in health care systems in which occupational stress is already an epidemic. In a study to measure radiographers’ experience during the COVID-19 pandemic, AlMulla (2020) stated that the focus of most COVID-19 research was on HCPs in general and not specifically on radiographers. Despite the recognition of generalisation in quantitative studies, its findings may have a wide-ranging impact on the non-respondents, influenced by the responses of those who participated. This underscores the problem with generalisation wherein the risk findings are sometimes described in a way that makes it difficult for non-experts to draw accurate conclusions (Freudenstein *et al*., 2023). Besides, Mollart *et al*., (2011) stated that studies with low response rates, may not be generalised to the entire workforce but rather provide insights for future research. While acknowledging that occupational stress is common

among HCPs, it should however be noted that there are differences across professions (Croghan *et al.,* 2021).

During the pandemic, radiographers yet had to face challenges such as stress, exhaustion, separation from families, stigma, and emotional pain due to the death of colleagues and patients while delivering radiological services to infected patients (AlMulla, 2020; Elshami *et al.,* 2021). It was therefore likely that the COVID-19 pandemic may have presented additional occupational stress on radiographers (Akudjedu *et al.,* 2020). Radiographers thus had to deal with various forms of stress, coping with the possibility of being infected by the disease itself, as well as managing other occupational-related stress caused by a variety of reasons such as staff shortages and mental health issues among others. Occupational stress was known to have the potential to discourage radiographers from practising their profession and cause a brain drain whereby radiographers leave their country of origin in search of better compensation and work conditions (Gamalendira *et al.,* 2017).

In light of the aforementioned, the researcher developed a keen interest in conducting a study on the effects of the COVID-19 pandemic, particularly occupational stress among Namibian radiographers. In Southern Africa, Namibia is one of the geographically larger countries (824 300 km^2 surface area), however, the least populated, with less than 3 million inhabitants (Christians, 2020). Research in health care in Namibia is generally understudied[1]. To the author's knowledge, no published studies could be identified describing COVID-19 occupational stress among radiographers in Namibia, a gap that this study aimed to address. It was assumed that Namibian radiographers may have experienced similar stressors as were evident in other countries and by other HCPs (Afulani *et al.*, 2020; Akudjedu *et al.*, 2020; Elshami *et al.*, 2021; Croghan *et al.*, 2021; Zare *et al.,* 2021). However, COVID-19 occupational-related stress in Namibian radiographers cannot be generalised by comparing it to

[1] Speelman, A. (2023). Personal Communication. Department: Medical Imaging and Therapeutic Sciences. Cape Peninsula University of Technology, Cape Town South Africa.

other countries or other professions. HCFs including radiology across governments differ in terms of operations, access to resources *i.e.* equipment and specialised staff and subsequently stress sources (AlMulla, 2020). As a result, the findings of any research are unique and context-specific to the circumstances under investigation. Such findings, therefore, cannot be universal, but rather a noble starting point (working hypothesis) for researchers to conduct a study (Polit & Beck, 2010). It is in such instances that further research ought to consider ways to correct generalisation biases (Freudenstein *et al.*, 2023). It was for these reasons that a decision was made to determine whether the Namibian radiographers shared similar or different stressors to those described among other HCPs. For the purpose and context of this study, occupational stress was studied in terms of negative outcomes, *i.e.* distress.

1.4 Research aim

The study aimed to assess the occupational stress among radiographers due to the COVID-19 pandemic while working in private and public hospitals in the Republic of Namibia to make recommendations for managing future pandemics. Past research results on the topic together with theoretical knowledge were used to aid and guide the researcher in understanding stress among radiographers in Namibia.

1.5 Research Question

The following research question guided this study: “What stressors did Namibian diagnostic radiographers face at HCFs during the COVID-19 pandemic?”

1.6 Research objectives

The study was designed to achieve the following three objectives namely:

- Observe radiographers' occupational stress and stressors caused by the COVID-19 pandemic.
- Ascertain coping strategies used by radiographers to manage occupational stress due to the COVID-19 pandemic.
- Identify and describe workplace interventions that can be used to mitigate the effects of occupational stress among radiographers during future pandemics.

1.7 Overview of methodology

This study was quantitative, descriptive and cross-sectional in nature. The study population were radiographers who worked in radiology departments in government and private hospitals during the COVID-19 pandemic. The inclusion criteria among others consisted of all Namibian diagnostic radiographers who had been working with patients during the COVID-19 pandemic. Other radiography healthcare workers, radiography students, and radiographers from other disciplines were however excluded from the study. Data were collected using an electronic questionnaire which was distributed via different channels like electronic mail and radiography WhatsApp groups. Responses which were anonymous and online, were analysed using Statistical Package for Social Sciences (SPSS) software version 26. Chapter 3 will describe the methodology applied in this study in more detail.

1.8 Significance of the study

To the best of the author's knowledge, at the time of writing this thesis, there were no published studies done within Namibia that examined the occupational stress experienced by radiographers during the COVID-19 pandemic. This included the coping mechanisms used by them as well as mitigating factors that can be

employed to minimise the effect of the same or different life-threatening pandemics in future. The findings of this study contributed to both the literature and body of knowledge by addressing the gap in knowledge regarding the occupational stress of COVID-19 among Namibian radiographers. This knowledge gap is mostly evident due to a lack of publications related to this topic, particularly among Namibian radiographers. Furthermore, the findings of the study identified the current levels of stress and the triggers thereof and what coping mechanisms radiographers used to deal with the COVID-19 pandemic. The findings of the study identified strategies which may be used by hospital managers to mitigate the effects of stress on radiographers during future epidemics or pandemics. These strategies are described in Chapter 5. Providing such strategies can potentially assist hospital managers in preparing better for future pandemics.

1.9 Chapter Summary

Chapter 1 highlighted the important role radiographers had to play in the management and treatment of the COVID-19 pandemic. Many HCPs were affected by the COVID- 19 pandemic. Considering that radiographers were at the forefront of managing this pandemic, in so doing, it is likely that COVID-19 negatively affected their livelihood and mental well-being. The study thus sought to understand the stressors the Namibian radiographers faced at HCFs during the COVID-19 pandemic. The study had three objectives; specifically, to observe radiographers' occupational stress and stressors, to ascertain radiographers' coping strategies and to identify and describe workplace interventions that could be used to alleviate the effects of stress on radiographers, all concerning the COVID-19 pandemic.

1.10 Thesis overview

Chapter 2 Literature review

The literature reviewed in this chapter aimed to describe the outcomes of previous studies conducted with respect to the topic at hand. This literature review provides the reader with an in-depth understanding of the type and nature of stressors HCPs experienced during the pandemic as well as coping mechanisms used to manage the pandemic.

Chapter 3 Research Methodology

The research methodology provides insight into the research methods applied to carry out the study. Among others, this chapter explains how data were collected and how such data were analysed. Issues related to ethical approval and ensuring that no harm was caused to the respondents whilst taking part in this study are also discussed. This chapter further provides the reader with a background as to how reliability and validity were upheld within the study.

Chapter 4 Results

This chapter presents and discusses the results generated during the data analysis. The results are presented concerning the relevant demographic characteristics, stress awareness, stressors and stress levels associated with the COVID-19 pandemic, dealing/coping with occupational-related stress, interventions to mitigate the effects of stress and general suggestions. The data is further presented as it relates to the three objectives of the study.

Chapter 5 Discussion

This chapter presents an in-depth discussion of the findings about the study's objectives. This chapter ends with a conclusion, recommendations for future studies and limitations of the current study. The next chapter describes the review of the literature.

CHAPTER 2 LITERATURE REVIEW

2.1 Chapter introduction

This study set out to assess the occupational stress among radiographers due to the COVID-19 pandemic while working in private and public hospitals in Namibia. This chapter provides a review of the existing literature regarding the research objectives of the study. The following topics are covered: pandemics within a historical context, a definition of stress, the effects and symptoms of occupational stress, coping strategies and different interventions to mitigate the effects of stress. The chapter ends with suggestions from the literature on how occupational stress could be improved in future pandemics.

2.2 Pandemics within a historical context

A pandemic is defined as the worldwide spread of an epidemic, which is an outbreak of infectious diseases confined to a larger geographic area (Piret & Boivin, 2021). According to Mahajan and Sharma (2021), the COVID-19 pandemic was not the first [severe] pandemic to be reported. Throughout history, advents of various worst infectious pandemics have been reported to have caused havoc amidst societies globally (Balkhair, 2020). The following are some yet brief descriptions of the pandemics in history:

According to Phillips (2012) as cited in Miller (2022), an influenza outbreak known as the Spanish flu spread around the world around 1918/1919, infecting and killing millions of people globally. The deadly influenza has its origin in Kansas in the United States (Sampath *et al.*, 2021). The Hemagglutinin-1 neuraminidases-1 (H1N1) virus caused the Spanish flu. In South Africa alone, Spanish flu was reported to have killed approximately 300 000 people in just six weeks (Lewis & Mulla, 2021). Authors like

Nueangnong *et al.,* (2020), described Spanish flu as one of the deadliest pandemics of the 20th century.

In the early 1980s, a well-known global pandemic called the human immunodeficiency virus (HIV) and acquired immunodeficiency syndrome (AIDS) surfaced first in the United States of America (USA) and went on to cause millions of deaths yearly worldwide (Huremović, 2019). It was in June 1981, when the USA published the first case, which became known as AIDS today (De Cock, *et al.,* 2011). Monkeys were believed to have passed this immune system-attacking virus to humans (Mayda & Dinç, 2020). By the end of 2020, the number of people living with HIV/AIDS was reported to be at 37.7 million globally (Miller, 2022). The HIV and AIDS pandemic which spread mainly by exposure to infected blood and through sex came under control with the development of antiretrovirals, protection programmes and the raising of public awareness (Mayda & Dinç, 2020).

The severe acute respiratory syndrome (SARS) was reported to have started in China (Huremović, 2019). The SARS pandemic broke out between November 2002 and July 2003 when approximately 8096 people were reported to have had SARS whereas 774 persons died globally (Pereira *et al.,* 2021). The virus called Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (from bats) was understood to have caused SARS (Huremović, 2019; Mayda & Dinç, 2020).

The Swine flu pandemic also raised public attention in the year 2009. Swine flu was first reported in Mexico, then the USA before dispersing to other countries (Mayda & Dinç, 2020). The flu was believed to be transmitted from pigs to people (Piret & Boivin, 2021). It was estimated that more than 575,000 people died worldwide due to the Swine flu pandemic (Miller, 2022). It was not until November and December 2019 when a new type of coronavirus *i.e.* COVID-19 was discovered.

2.3 The COVID-19 pandemic

A zoonotic novel virus presumed to be belonging to the family of *Coronaviridae*, COVID-19 came after the SARS outbreak in 2003 (Arslan & Soylu, 2021; Goni *et al.,* 2022). It was during November/December 2019 when cases of pneumonia-like infections were reported from the Chinese city named Wuhan. Media houses initially called the disease Wuhan pneumonia with reference to the area and symptoms of the disease (Liu *et al.,* 2020). After a few days, the WHO reported SARS-CoV-2 to be the responsible pathogen causing the illnesses (Akudjedu *et al.,* 2020). The WHO consequently named the illness COVID-19 (Ruiz *et al.,* 2020). COVID-19 later spread to other parts of the world (Mudenda *et al*., 2022). Namibia reported its first confirmed COVID-19 case on 14 March 2020, diagnosed among a Romanian couple who arrived in the country from Spain (Julius *et al.,* 2020).

2.3.1 COVID-19 aetiology

Earlier during the pandemic, little was known about the cause of COVID-19. Besides theories indicating COVID-19 to be a natural-born virus emerging from bats, conspiracy theories also emerged that COVID-19 could be a result of a man-made virus engineered in the laboratory or at least created as a biological weapon (Yee *et al.,* 2021). On the other hand, a hypothesis pointing to animals sold at the Huanan Seafood Wholesale Market in Wuhan, China, in months before the COVID-19 pandemic also made rounds as the possible source of the COVID-19 virus (Worobey *et al.,* 2022). The Huanan market sold seafood and poultry together with live wild-captured and/or farmed animals for their meat and fur. These wildlife animals are thought to be possible hosts of SARS-CoV-2. The true origins of COVID-19 are therefore still a controversial subject to this day. The question of whether COVID-19 is a man-made or a naturally occurring disease is yet to be confirmed.

Nonetheless, this virus was believed to be airborne, transmitting from person-to-person by inhaling contaminated droplets or being in close contact with an infected

person or contaminated surfaces (Zare *et al.,* 2021; Goni *et al.,* 2022). The virus can also spread through body fluids (Goni *et al.,* 2022). This means, a person with the virus spread the droplets in the air and on to the surfaces when sneezing, speaking or coughing. The virus can then enter the body through inhalation or by touching the eyes and mouth with contaminated hands (Jorge & Fridell, 2021). As a result, a directive for mandatory use of face masks and social distancing was declared during the pandemic and whenever people were in public (Goni *et al.,* 2022). People were further advised to maintain hand hygiene and to avoid touching their eyes and noses.

2.3.2 COVID-19 clinical presentation

Patients with COVID-19 infections may present with various signs and symptoms. The most common symptoms include fever, dry cough, fatigue, chest pain and dyspnoea, sore throat, sneezing, diarrhoea and abdominal pain (Ruiz *et al.,* 2020; Mudenda *et al*., 2022; Salih *et al.,* 2022). Pneumonia (commonly referred to as COVID-pneumonia) was also reported in most complicated cases (Piret & Boivin, 2021). Depending on the severity of symptoms and perhaps fears among others, patients rushed to HCFs in search of medical assistance. As a result, the workload among HCPs drastically increased and exposed them to mental health problems caused by distress (Mudenda *et al*., 2022).

Features of COVID-19 pneumonia were reported to be mottling and ground glass-like opacification of the lungs on chest X-rays (Goni *et al.,* 2022). However, Kanne *et al.* (2021) indicated that COVID-19 radiology features on chest X-ray and CT images overlap with other lung infections. Therefore, during radiological reporting, precautions had to be considered when assessing chest radiographs for COVID-19 infections.

2.3.3 Role of Diagnostic Radiographers during the COVID-19 pandemic

Radiographers played an essential role both in the diagnosis and management of COVID-19 cases from the onset of the pandemic (Mahajan & Sharma, 2021). Chest X-ray and CT of the chest in addition to laboratory testing were the diagnostic tools of choice in detecting infectious manifestation, severity and disease progression of COVID-19 (Akudjedu *et al.,* 2020; Foley *et al.,* 2020). CT of the chest for example was reported to have a 97% sensitivity to detect COVID-19 as compared to laboratory tests *i.e.* reverse transcription polymerase chain reaction (RT-PCR) (Itani *et al.,* 2021). It is for that purpose that radiographers indisputably had their hands-on experience with COVID-19 cases by providing much needed imaging services (AlMulla, 2020).

It is worth noting that the increased demands for radiology services since the surfacing of the COVID-19 pandemic have been recognised (Ooi *et al.,* 2021). Not only had more patients been referred for X-rays to confirm COVID-19 pneumonia, but the use of X-ray mobile equipment was notably increased too (Shanahan & Akudjedu, 2021). The recommended use of mobile X-rays was necessitated to lessen the risk of transmission of the COVID-19 virus elsewhere in the hospital.

2.4 Occupational stress: A Definition

The WHO (2020) defines occupational stress to be the response a person may have when his or her work demands and pressure does not match his/her knowledge and abilities, therefore challenging the ability to cope. On the other hand, Adesi *et al.* (2015) define occupational stress as a disorder that interferes with a person's physical and mental health because there is a lack of balance between the person's capabilities and the demands. Furthermore, Alhasan *et al.* (2014) define occupational stress as a response of the body to the external physical or emotional forces to adjust to a situation. Similarly, Ehsan and Ali (2019) defined occupational stress as a physical and emotional action that happens when there is a gap between job requirements, capabilities and resources. This notion is supported by Padma, *et al.* (2015) who

describe occupational stress as when the job requirements do not match the worker's capabilities, resources or needs.

2.5 The effects of occupational stress

Occupational stress itself is not considered a sickness but can lead to ill health when prolonged (Donyani & Denicol, 2009). Moustaka and Constantinidis (2010) concur and described occupational stress as a 'state' and not an illness experienced as a result of exposure to work demands which in turn contribute to illness, injury, behavioural and even lifestyle changes. The authors further argued that stressed individuals may lose appetite; and indulge in smoking, alcohol and drug abuse, which consequently lead to unwanted health problems. Stress may affect a person's thoughts, feelings and physiological reactions which come after a stressful event (Ugwu *et al.,* 2011). Occupational stress also induces exhaustion, depression and anxiety, making people not enjoy their work and show little commitment (Ashong *et al.,* 2016).

According to Brookes *et al.* (2013), a stressed person may on average take up to 20 days off work a year making occupational stress one of the top causes of absenteeism due to stress-related sickness. Some studies have confirmed occupational stress to be both the result and a cause of occupational-related illness due to staff shortages and increased workload (Adesi *et al.,* 2015 & Hulls *et al.,* 2018). As stated earlier, all these aspects are undesirable for any organisation as they interfere with normal work activities and reduce the productivity of the employees [conceivably resulting in poor patient care or service delivery].

2.6 Symptoms of occupational-related stress

There are different symptoms of occupational-related stress reported in the literature (Donyani & Denicol, 2009; Moustaka & Constantinidis, 2010). These include depression, fatigue, headache, anger, anxiousness, insomnia, loss of desire for sexual

intercourse, isolation, changing eating habits, and drugs (smoking/alcohol) misuse among others. All these symptoms interfere with normal work activities and hence the productivity of the employees (Adesi *et al.,* 2015). Practical blunders such as undesirable repeated examinations, [unmarked or wrongly marked images, imaging wrong patients or body parties] are common happenings due to occupational stress in radiology departments (Ashong *et al.,* 2016). Individuals who experience moral injury may develop depression, post-traumatic stress disorder (PTSD) and suicidal thoughts (Croghan *et al.,* 2021).

2.7 Occupational stressors

Stress in the workplace can have many different sources, which affect both the employer and employees (Nayak *et al.,* 2020). The stress-causing factors are called stressors (Farzanmehr *et al.,* 2016; Nayak *et al.,* 2020). Among others, unsatisfactory working conditions such as poor equipment design and breakdown, and use of force in moving such equipment, are some of the major contributors to occupational stress (Adesi *et al.,* 2015). Ashong *et al.* (2016) also shared the same concern that often health care systems suffer from inadequate staffing, outdated and poorly functioning equipment, long working hours, which expose employees to infectious illnesses and dangerous substances, the threat of malpractice lawsuits, and encountering of deaths. Radiographers too might be finding themselves working in HCFs which are appalling, exposing them to occupational stress (Adesi *et al.,* 2015, Ashong *et al.,* 2016, Chinene *et al.,* 2023).

Identifying and differentiating occupational stress due to COVID-19 and stress present before the COVID-19 outbreak is a challenge to the researchers of the time. While there is a thin line between the two, confronting the COVID-19 pandemic may exaggerate and outweigh the prior stress experienced among HCPs. Radiographers' past stressful experiences may now be exacerbated by COVID-19 (Lewis & Mulla, 2021). For example, stress factors such as fear of getting infected or/and infecting

others, lack of protective equipment, increased workload, the stigma of being a healthcare worker and lack of experience among others are likely to be aggravated during the COVID-19 pandemic (Mahajan & Sharma, 2021; Herraiz-Recuenco *et al.*, 2022). In other words, the presence or absence, increase or decrease of occupational stress may be the key factors to help in differentiating between the two forms of stress. Figure 2.1 shows various factors that caused distress among employees during the COVID-19 pandemic.

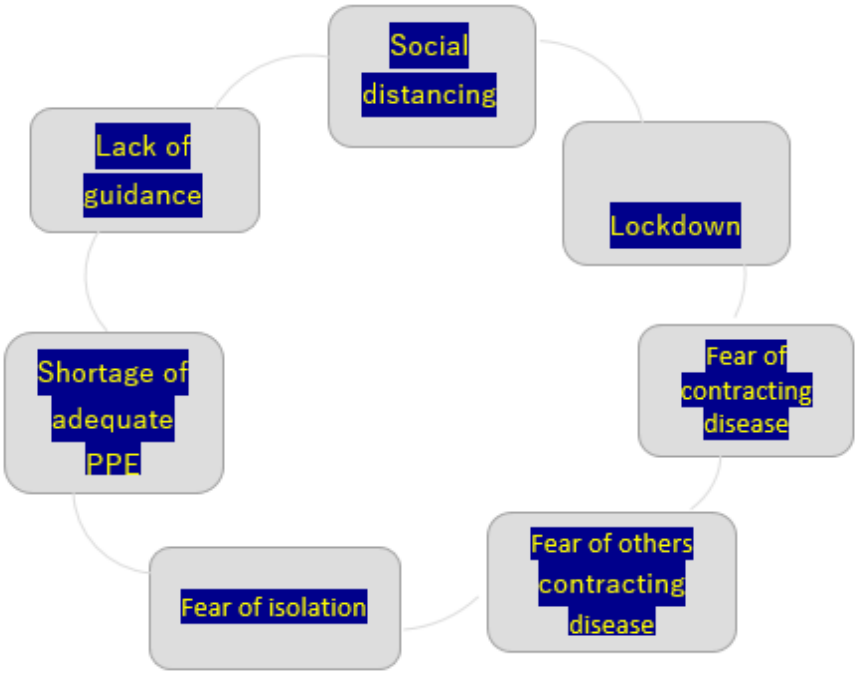

Figure 2.1: Factors that caused distress during the COVID pandemic (Source: Mahajan & Sharma, 2021).

The following are some causes of the COVID-19 stress described in the literature.

2.7.1 Staff shortages and workload

Staff shortages and workload are closely related. Employees are overloaded if they cannot cope with the amount of work they are asked to do (Akweenda & Cassim, 2016). Due to factors such as staff shortages and limited resources, HCPs have been

working under excessive workloads, exposing them to high stress levels (Afulani *et al.,* 2020). To keep up with the increasing workloads, radiographers reported struggling in the course of carrying out their professional duties (Adesi *et al.,* 2015). The same study by Adesi *et al.,* (2015) further found that working long hours without a break time to relax, further exposed radiographers to additional stress. One study conducted in 2017 (before the pandemic) reported that 83% of radiographers in the Kandy District of Sri Lanka reported increased stress due to an insufficient number of employees and resources (Gamalendira *et al.,* 2017).

At the onset of the COVID-19 pandemic and during the lockdown, a decrease in imaging referrals was reported in some radiology facilities (Lewis & Mulla, 2021). This was because the patients were advised to avoid coming to the hospital unnecessarily. On a different note, however, one study found that the majority (70%) of radiographers had to work harder and faster to compensate for staff shortages and high workloads (Nayak *et al.,* 2020). In addition, Elshami *et al.* (2021) reported that the number of patients needing radiology services increased resulting in hospitals recruiting temporary staff to work during the COVID-19 pandemic. Issues such as disinfecting, cleaning, donning and doffing of personal protective equipment (PPE) were also said to have added to the workload and prolonged the examination time per patient (Akudjedu *et al.,* 2020).

2.7.2 Lack of PPE and other resources

The lack of PPE and other resources was not something new during the COVID-19 pandemic. Obsolete equipment requiring a lot of energy to operate was reported before the COVID-19 pandemic, [further exacerbating the conditions under which staff had to work and making their work environment more stressful] (Adesi *et al.,* 2015; Ashong *et al.,* 2016). Moreover, Adesi *et al.* (2015) reported radiographers' experiences of discomfort and stress created by wearing lead aprons for radiation

protection before the COVID-19 pandemic. Similarly, shortages of medical supplies during the COVID-19 pandemic have increased the stress on the HCPs, including radiographers. There were times radiographers reported not getting proper PPE because hospitals felt radiographers were not recognised as frontline workers (Lewis & Mulla, 2021). The pandemic had therefore caused either no PPE or other consumables such as syringes, gloves and others, or insufficient PPE for everyone.

At work, radiographers have to make vital decisions on matters of life and death when the need arises (Croghan *et al.,* 2021). The researcher for example witnessed instances where radiographers had to assist a COVID-19-positive patient without the recommended Non-oil 95 (N95) mask. Because of its tight-fitted synthetic material, N95 masks are reported to filter up to 95% exceedingly small particles from the air inhaled. (Dardas *et al.,* 2022). HCPs had to watch patients with breathing difficulties being sent home because severely affected patients were using the available nebulisers. These calls to make decisions on life and death due to a shortage of medical and testing supplies had equally created stressful situations for radiographers in performing their professional duties. Watching patients dying from a shortage of medical supplies and equipment caused HCPs to be drained and stressed (Lewis & Mulla, 2021, Naylor *et al.,* 2021).

Occupational stress can be generated from the daily wearing of COVID-19 protective gear such as gloves, caps, disposable gowns, over-shoe covers, and face goggles, which are alleged to be exhausting and time-consuming for radiographers (AlMulla, 2020). It is particularly cumbersome to change these gears when nature calls and one has to use the bathrooms. This requirement of wearing PPE by the HCPs during the COVID-19 pandemic may have exacerbated the stress situation at work (Lewis & Mulla, 2021; Naylor et al., 2021).

2.7.3 Inadequate preparedness

The COVID-19 pandemic caught the health system unprepared. The spread of the virus was fast, subsequently leading to high levels of stress among HCPs (Itani *et al.,* 2021). Due to the pandemic, no clear protocols were in place, nor appropriate training or effective communication for HCPs from management on how to deal with the deadly virus. All the aforementioned factors were all associated with factors showing ill-preparedness for dealing with a pandemic (Afulani *et al.,* 2020; Demirjian *et al.*, 2020). Some factors related to the preparedness of many radiology departments during the pandemic included, but were not limited to PPE shortages, infection control protocols, and lack of infrastructure to allow HCPs to work remotely (Demirjian *et al.,* 2020). Creating and implementing appropriate PPE guidelines when dealing with potentially infected patients or family members, as well as assuring adequate and available PPE for the radiologists and staff, were challenges reportedly faced by many radiology departments (Ayyala *et al.,* 2021). Many infections reported among HCPs at the onset of the COVID-19 outbreak were a result of less information available on the COVID-19 transmission process and proper use of PPE (Pereira *et al.,* 2021).

As part of preparedness, radiology leadership may seek to hear from those who worked through past disasters, such as Hurricane Katrina and the World Trade Centre terrorist attacks when creating policies and procedures (Restauri & Sheridan, 2020). This notion is also true post the COVID-19 pandemic. By so doing, radiology managers gained wisdom in preparing for disasters and instilling hope among HCPs. Learning from other's experiences will further allow managers to know what previously tried programmes were effective and those that were unsuccessful before embarking on new initiatives (Fishman *et al.,* 2018).

2.7.4 Occupational fears among radiographers

Radiographers were among HCPs providing care and/or medical imaging to patients with COVID-19. This made radiographers to be at a higher risk of infection and may

experience fear of passing the virus to others (Zare *et al.,* 2021). Before the COVID--19 pandemic, radiographers were already known to fear the consequences of being exposed to ionizing radiation and lack of radiation protection (Gamalendira *et al.,* 2017). As if that was not enough, the fear of becoming infected with COVID-19 and transmitting the virus to other people were additional factors causing distress among radiographers during the pandemic (Pereira *et al.,* 2021). Fear can as an ultimate consequence result in HCPs leaving their profession (Abbas *et al.,* 2021).

During the peak of the COVID-19 pandemic, a decrease in radiological studies was reported in some departments due to the cancellation and postponement of especially elective imaging studies and imaging procedures (Ayyala, 2021). The reported incidents of reduction in imaging referrals especially in the private setting have resulted in some radiographers experiencing salary cuts (Lewis & Mulla, 2021). It was reported that in some instances, radiographers were encouraged to take leave, paid or unpaid, to decongest radiology departments (Shanahan & Akudjedu, 2021). These further added to work stress as radiographers had to deal with the fear of losing income or reduced disposable income.

2.7.5 Changes in the work environment

Changes are inevitable and might be difficult to adapt to, especially at certain HCF or clinical practices. Sudden and unexpected pressures can trigger stress on staff (Ashong *et al.,* 2016). In a study conducted by Gamalendira *et al.* (2017), about 70% of radiographers were stressed by sudden new changes in procedures and policies. Likewise, the COVID-19 pandemic brought changes to clinical practice which could be stressful to radiographers.

Pereira *et al.* (2021) reported difficulties in adapting to changes during the pandemic. Some of the changes pointed out included working patterns, service delivery and infection prevention control protocols (Akudjedu, *et al.,* 2020). Radiographers had to

adjust to a sudden increase in the recommended use of mobile X-ray equipment as a reduction measure in transmission of COVID-19 (Shanahan & Akudjedu, 2021).

2.7.6 Lack of acknowledgement

During the COVID-19 pandemic, there were instances where radiographers felt used and forgotten members at the front line. Some radiographers were complaining that despite seeing every single COVID-19 patient, even multiple times throughout their stay, all credit went to the nurses and doctors who were being described as hardworking (Shanahan & Akudjedu, 2021). According to Itani *et al.* (2021) and Naylor *et al.* (2021), radiographers stand equal to, and side by side with other HCPs who were fighting the COVID-19 pandemic and therefore worthy of the title - frontline heroes. Radiology is regarded as the "eye of medicine", hence radiographers deserve appreciation just as much as any other HCP (Itani *et al.,* 2021).

Fishman *et al.* (2018) believe that there must be a clear demonstration that members of the healthcare team are valued by showing genuine appreciation for their efforts. A personal "thank you" in the form of a card, verbal communication, sending messages on social platforms, and rewards *i.e.* giving trips, and year-end bonuses among others will enhance acknowledgement and appreciation among employees (Fishman *et al.,* 2018; Stephen, 2020). Considering that radiographers were indeed part of the frontline in fighting the COVID-19 pandemic, it will be prudent to acknowledge radiographers for their efforts in fighting this disease.

2.7.7 Physical/social distancing

Distancing at work was found to be a challenge during the COVID-19 pandemic. Some HCPs complained about how difficult it was to keep the recommended distance of 1.5 metres away from colleagues (Lewis & Mulla, 2021). On the other hand, radiographers worked near both the COVID-19 patients and other patients making a recommended

distance impossible. As a result, the public at large viewed HCPs as contagious, thus facing increased social isolation and stigma (Sriharan *et al.,* 2021). Some people were scared to meet HCPs fearing that they might carry the virus which they could pass on to them (Joshia *et al.,* 2021). At some points, radiographers were encouraged to work from home or take leave to decongest workplaces (Shanahan & Akudjedu, 2021). While decongesting workplaces was important in slowing the spread of the virus, mandatory leave in the quest of achieving physical distancing could presumably have caused further stress among the radiographers.

2.7.8 Cleaning and Disinfecting

Regardless of the COVID-19 pandemic, cleaning and disinfecting have been forms of infection prevention and control recommended for every HCF. Infection control measures during the COVID-19 pandemic however have made it cumbersome when dealing with medical emergencies. This is so because the radiographers had to adhere to the cleaning protocols in between imaging of patients. There was a requirement that the radiography examination room be thoroughly cleaned after examinations of all persons under investigation (PUI) (Demirjian *et al.,* 2020). This cleaning and disinfection process consumed time before the next examination was carried out. Infection control requirements not only complicate the procedures but also increase the examination time [which adds to radiographers' workload] (Shanahan & Akudjedu, 2021).

2.7.9 Lack of support

Farzanmehr *et al.*, (2016) defined workplace support as a degree to which employees can tell that their welfare at work is valued by colleagues and supervisors. Strategies to support the wellness of radiographers during any pandemic need to be prioritised by their managers. Although the concerns regarding lack of support from management

were reported in some regions in Australia, about 54.3% of Australian radiographers and radiation therapists strongly agreed or agreed to have received adequate psychosocial support at work (Shanahan & Akudjedu, 2021). Of those HCPs reporting stress before or during the COVID-19 pandemic, many did not access these support systems (Hardy, 2020). Reasons given were that they felt no need to, had insufficient time to access such support systems due to increased workload, and/or feared that fellow professionals may know that they were seeking support (Ferry *et al.,* 2021). Lack of support was evident again when some of the radiographers reported not getting proper PPE because they were not recognised as frontline HCPs (Lewis & Mulla, 2021).

2.8 Coping strategies to manage occupational stress

Strategies for coping with stress are specific ways of understanding how an individual can manage a stressful situation (Jagodič *et al.,* 2020). Anecdotal evidence during this review of the literature indicated that very few departments had programmes in place to provide radiographers with coping strategies during the COVID-19 pandemic.

Akweenda and Cassim (2016) postulate that HCPs cannot be freed from occupational stress by getting rid of their job but should rather find techniques to manage stress. With stress-related sicknesses on the rise in many societies, HCFs are therefore confronted with a healthcare problem [to ensure that the psychological well-being of HCPs is taken care of] (Boyacı *et al.,* 2014).

The first step in achieving wellness at work as far as stress management is concerned according to Fishman *et al.,* (2018) is to admit that there is a problem. Failure to acknowledge and address occupational stresses can lead to employees unnecessarily changing workplaces, changing careers, quitting professions and even nurturing harsh relationships among colleagues (Birhanu *et al.,* 2018).

It is of vital importance that an organisation assists stressed employees in developing adaptive coping strategies and resilience (Hong *et al.,* 2021). Playing sports, having a hobby or just taking a good holiday is among the means of managing stress according to Padma, *et al.,* (2015). Helping radiographers to apply such coping mechanisms will not only lessen the levels of occupational stress but can also assist in retaining the commitment and trust of the employees to their facilities (Ashong *et al.,* 2016). Figure 2.2 shows some recommended strategies that can help radiographers with resilience.

Figure 2.2: A diagram illustrating strategies for building resilience (Source: Fishman *et al.*, 2018).

Stress, if well-managed and directed in the right way, is described to yield a motivated team, a team with good spirit and a team with eminent morale among such employees (Akweenda & Cassim, 2016). Therefore, there must be a prioritisation of staff's well-being within all departments to help improve if the issue of achieving a stress-free work environment is to be realised, as advocated by Ooi *et al.* (2021).

Some suggested approaches to workplace stress management were group socialising, volunteer work and participation in activities that can help nurture wellness in the radiology workplace (Fishman *et al.*, 2018). Departmental leaders should introduce their staff to these activities to promote their self-esteem, joy and satisfaction at work. In addition, HCPs could learn to employ stress relievers such as relaxation, exercise, meditation techniques and other stress management approaches (Aristotelis *et al.,* 2015; Ashong *et al.,* 2016).

Attending occupational stress management lessons will teach radiographers how to reduce their levels of stress (Alhasan *et al.,* 2014). Radiographers must be motivated during pandemics like COVID-19 using reassurance (Lewis & Mulla, 2021). Radiographers should be made aware of the signs, and symptoms as well as the prevention measures of work stress. The authors are of the idea that while it is of vital importance to support HCPs with stress management, care must be taken that personal life challenges such as bereavement, financial burdens of the pandemic, divorces, separations in relationships etc. are not integrated with workplace duties and routines. All employees must also be made aware that stressful situations from outside the work need not be carried along to their work environment (Akweenda & Cassim, 2016). Home-related stress (or work–family conflict) keeps employees from performing their tasks optimally and hence lowers productivity (Shi *et al.,* 2023). Home-to-work stress spill-over can also accelerate burnout (Kopperud *et al.,* 2020).

2.9 Effective ways of dealing with occupational stress

Coffré and Aguirre (2020) reported several coping strategies said to have helped nurses in Guayaquil, a city in Ecuador during the COVID-19 pandemic to best deal with occupational stress. The strategies reported included communicating with relatives and friends using positive thoughts and attitudes, taking care of self-nutrition, physical exercise, partaking in recreational activities and expressing one's feelings among others. Yasmin *et al.,* (2020) indicated some healthy ways that

assisted students in managing their stress during the COVID-19 pandemic. These strategies included confronting the stressors, managing time wisely, spending time with and enjoying the company of loved ones, taking a break when feeling overwhelmed and seeking professional help when stress becomes unbearable. Arguably, radiographers can benefit by practising the same coping strategies stated earlier to overcome occupational stress associated with the COVID-19 pandemic.

2.10 Ineffective ways of dealing with occupational stress

It was concerning to note that even before the COVID-19 pandemic, some radiographers resorted to the use of alcohol and over-eating to manage stress (Eslick & Raj, 2001). Other authors such as Searby *et al*. (2022) had similarly reported an increase in alcohol consumption among HCPs due to different stress factors encountered in the workplace during the COVID-19 pandemic. Eating and drinking alcohol as a preferred mode of coping strategy may be unhealthy and need to be discouraged. Yasmin *et al,* (2020) agree that smoking, use of drugs or alcohol, reckless spending of money, eating either too much or too little, and ignoring the stressors are ineffective ways of dealing with occupational stress which need not be emulated.

Similarly, some HCPs were found to endure in silence and burn themselves out or choose to solve stress on their own (Boyacı *et al.,* 2014). Stressed HCPs must not suffer in silence but must rather be encouraged to seek professional help from their general practitioners, psychologists/psychiatrists, employers, occupational health practitioners as well as friends and family (Donyani & Denicol, 2009; Boyacı *et al.,* 2014).

2.11 Interventions to mitigate the effects of stress

To the author's knowledge, no publications could be found in the literature to confirm that hospitals had workplace interventions to mitigate the COVID-19 stress for staff. However, some publications might have escaped the attention of the author.

This section below describes some of the interventions that can lessen the effect of COVID-19-related stress.

Stress management needs to be a priority in every facility to protect the health of the employees and thereby safeguard their quality of life (Boyaci *et al.,* 2014). According to Restauri and Sheridan (2020), the duty of keeping a healthy work force lies within the administration, departmental leadership and individuals. Donyani and Denicol (2009) also alluded to the fact that employers have a responsibility toward workplace pressure just like employees do to seek help from employers or other professionals. Both hospitals and radiology departments have a responsibility to provide a work environment which is free of stress for radiographers (Rajan, 2014). Employers should ensure that stress management programmes and counselling sessions are available to their employees (Akweenda & Cassim, 2016). Stress management interventions come into two forms namely: systems-level and self-initiated interventions (Restauri & Sheridan, 2020).

2.11.1 Systems-level interventions

In the UK for example [and arguably in many other countries], it is the employers' responsibility to manage the health and safety of the employees (Brookes *et al.,* 2013). According to Sriharan *et al.* (2021) systems-level interventions such as work modifications, ensuring clear communication about policies, providing access to PPE, offering training related to managing COVID-19, financial support to HCPs, provision of rest areas for sleep and recovery, offering basic needs such as food including training programmes can be applied to manage the health and safety of employees.

2.11.2 Self-initiated interventions

Apart from addressing occupational stress by employers and other supporting organisations, HCPs too can embrace their own strategies to help them cope with occupational-related stress, according to Donyani and Denicol (2009). As postulated by Sriharan *et al.* (2021), self-initiated interventions such as regular exercise, yoga and meditation, faith-based activities, self-help resources, hobbies, psychological services, hotlines and talk therapy could be some useful preventative strategies to lessen the effects of stress.

2.12 Examples of stress-related interventions

Below are examples of other stress-related interventions described in the literature that can be used to mitigate the effect of the COVID-19 pandemic.

2.12.1 Social events, networks, physical activities and hobbies

Web-based meetings can be utilised by the management to timely disseminate accurate and updated COVID-19 pandemic-related information across HCPs (Croghan *et al,* 2021). This may include platforms such as YouTube, webinars, Zoom, and Google Teams among others. Socialising activities such as tea/coffee time, lunch breaks, dinner hours, and nights for a movie, concerts, sporting events, or outdoor adventures can be planned to promote unity among employees (Fishman *et al.,* 2018). Despite all the negative impacts of the COVID-19 pandemic, radiographers were encouraged to develop skills, and knowledge, and engage in positive recreational activities such as developing a culture of reading, learning a new language, developing a hobby, getting new certificates through continuing professional development (CPD) programmes among others (Itani *et al.,* 2021). It is the author's view that all these activities will stimulate relaxation and calmness as well as reduce stress levels among HCPs.

2.12.2 Psychological support

During the COVID-19 pandemic, evidence suggests that radiographers like other HCPs have gone through a tough time, having experienced both physical, mental and financial pressures and needing psychological support (Mahajan & Sharma, 2021; Flood *et al.*, 2022). Unfortunately, some HCFs were reported to not show adequate support to their infected/affected staff members (Itani *et al.,* 2021). In turn, this contributed to the deteriorating mental health of radiographers. In the era of advanced technology, the use of digital platforms is an effective means of delivering psychological treatment and training concerning interventions for improving coping mechanisms (Hardy, 2020). Radiographers are therefore encouraged to use these platforms.

Barriers to accessing available support to those in need are described in the literature. These barriers are also as stated under Section 2.7.9. These hindrances are a great concern that must be addressed to empower employees to strongly overcome the above-mentioned obstacles.

2.12.3 Performance incentives

According to Rajan (2014), it is of vital importance that remuneration provided to the employee is on par with workload and shortage of staff. Getting lower remuneration in comparison to the amount of work can be stressful. This opinion was shared by 85% of radiographers in Kandy, a district in Sri Lanka (Gamalendira *et al.,* 2017). Because of the excessive workload associated with the COVID-19 pandemic, it is possible that some radiographers felt that they were poorly paid for the job they were doing.

Generally, as demonstrated in Figure 2.3, employees tend to scrutinise their contributions (hours worked, education, experience, work performance) against the rewards they receive (salary, bonus, promotion, recognition, etc.) and compare them to those of others (Stephen, 2020). This comparison, if found to be disparate will either

be followed by individuals increasing or decreasing their inputs to bring the equation in balance. Stephen (2020) continued cautioning that employees who are not satisfied with their remuneration will not only be demotivated and complain a lot but will even go as far as asking for transfers or permanently leaving their job for better opportunities.

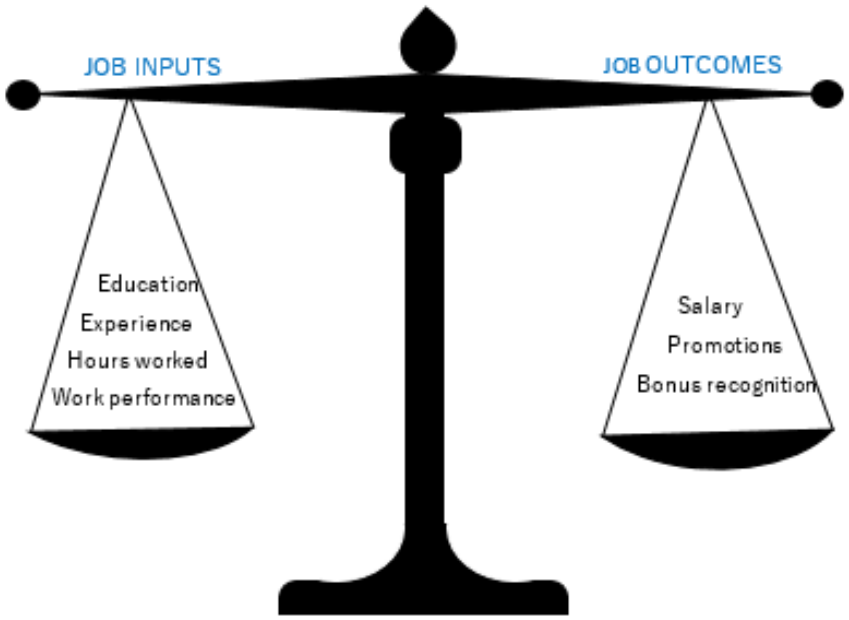

Figure 2.3: Balancing the inputs with the outcomes. (Source: Stephen, 2020).

Regardless of all challenges and reported reductions in incomes, radiographers must be applauded for their stance not to quit their jobs but to hold onto their humane call and life-saving role at all costs as reported by Itani *et al.,* (2021). The author is of the view that the introduction of an initiative such as danger allowance can be one of the best interventions.

2.12.4 Workplace resources

The unfair allocation of resources was a matter of concern for some HCPs during the COVID-19 pandemic (Itani *et al.,* 2021; Lewis & Mulla, 2021). With the scarcity of

resources experienced during the COVID-19 pandemic, healthcare systems need to be careful and make the best utilisation of the limited resources without causing harm to their users and HCPs (Satomi *et al.,* 2020). While trusting the governments [and management in private settings] to make sure that medical resources do not become scarce during the COVID-19 pandemic, it is recommended that guidelines be developed to ensure fair and consistent allocation of resources in case such resources become scarce (Ezekiel *et al.,* 2020).

2.12.5 Training and workshops

Having training and knowledge enable HCPs to feel confident in doing their work, thus providing some measure of stress reduction and improving their sense of safety (AlMulla, 2020). During the COVID-19 pandemic, some radiographers indicated that the correct guidelines for donning and doffing PPE were not demonstrated to them (Lewis & Mulla, 2021). This created concerns regarding the safety of radiographers. It is through workshops, lectures and increased stress awareness that the effect of occupational-related stress among radiographers could be reduced (Adesi *et al.,* 2015).

2.12.6 Faith-based activities

Faith-based activities are among the interventions available to support stressed HCPs. Rothmann and Malan (2011) described religious practices as sources of comfort and hope that can help to avoid behaviours of self-destruction such as suicide and substance reliance. On the contrary, Sriharan *et al.* (2021) found very weak evidence to support faith-based activities as one of the best interventions to support stress. This finding cannot be taken lightly, however, because, in the author's view, any intervention can benefit individuals differently. One intervention does not always fit all; it may be useful to one person but not another.

2.13 Improving occupational stress in future pandemics

Pandemics are inevitable and no one knows when the next pandemic will occur (Nueangnong *et al.,* 2020). Hospital managers thus need to be proactive at all times. The following ways may help to prepare and improve the management of future pandemics.

2.13.1 Periodic evaluation

To improve the management of the COVID-19 pandemic and plan for future similar incidents, regular periodic evaluations of HCPs' experiences and identification of underlying reasons may aid in developing appropriate coping strategies. Hence, conducting research among HCPs during pandemics is very crucial to finding clear directives, initiating precautionary measures and providing informed remedies for a current pandemic as well as preparing for future pandemics (Elshami *et al.*, 2020). It can be argued that this study is contributing in this regard as it provides an opportunity to observe radiographer's experiences during a deadly pandemic in an under-resourced middle-income country. A case in point is that at the conception of this study, it was postulated that the findings of this study may provide valuable information for hospital managers to best prepare and manage future pandemics, particularly in poor-resourced settings.

2.13. 2 In-service training

The need for in-service training, especially during pandemics must not be taken lightly. Training and workshops provide new and critical information to the radiographers regardless of their previous knowledge, enabling them to feel confident to do their work and reduce stress (AlMulla, 2020). Attending workshops such as regular refresher courses, conferences and other CPD activities may further help staff members to develop their skills and knowledge (Nayak *et al.,* 2020). Workshops and in-service training about stress management should be structured regularly to increase radiographers' awareness of occupational stress (Adesi *et al.,* 2015).

2.13.3 Prioritisation of staff wellness and resources

In 2014, radiographers in Ghana were asked about the existence of health and safety protocols in their workplace. The study findings were concerning as only 26% of the participants felt it existed, 32% disagreed, and 39% had no knowledge of these at their workplace (Adesi *et al.,* 2015). Through the provision of resources, every organisation must prioritise the wellbeing of their staff which all departments must comply with (Ooi *et al.,* 2021).

2.13.4 Periodic rotation

Occasional rotation of radiographers is an important approach that employers can apply to lessen the effect of occupational-related stress. Working in one unit for a long time may create boredom for the radiographers [and must be discouraged to avoid stressful working environments and conceivably complacency] (Kyei *et al.*, 2016). This is what Adesi *et al*. (2015) referred to as a *"one-man station"* in which a single radiographer manages a unit without moving to other imaging modalities. On the contrary, the researcher is of the view that moving a radiographer who has been comfortable in one imaging unit for a long period can create stress when moved into an unfamiliar imaging unit. In cases like these, periodic rotations can be useful to vary work activities among radiographers.

2.13.5 Increase the workforce

To manage the COVID-19 pandemic better, it would be wise for management to increase the number of their HCPs. In so doing, the increased workload experienced during the pandemic is shared among such HCPs (Hailu *et al.*, 2018). This can be achieved through outsourcing, the use of students or recalling retired professionals. According to Shanahan and Akudjedu (2021), the Australian government [as well as other international governments] is reported to have included students and retired health practitioners in a temporary register as a strategy for fighting the COVID-19 pandemic. At a regional level, the South African government is also understood to have

made use of retired HCPs and students in an attempt to curb the increased workload reported during the pandemic[2].

2.14 Chapter Summary

This chapter reviewed the existing literature concerning the research question. Occupational stress could have an adverse effect not only on radiographers' wellness but also on service delivery. Factors such as poor working conditions, lack of PPE, inadequate staffing, outdated equipment, long working hours and fear of infectious illnesses among others were shown to be sources of occupational stress during the COVID-19 pandemic. While occupational stress is inevitable, radiographers could apply various techniques like relaxing, exercising, taking a holiday, medication etc. to manage stress. Psychological support on the other hand could be introduced and strengthened at work to tackle the stress among HCPs. This review further highlighted various ways that could help hospital management to better prepare and improve for future pandemics.

[2] Speelman, A. (2023). Personal Communication. Department: Medical Imaging and Therapeutic Sciences. Cape Peninsula University of Technology Cape Town South Africa.

CHAPTER 3 RESEARCH METHODOLOGY

3.1 Chapter introduction

This chapter presents the methodology the researcher used to conduct the study. According to Sileyew (2020), research methodology is regarded as a pathway through which the researchers conduct their study with regard to study problem, objectives and presentation of the results. Here, the researcher accentuates the assurance to the readers that the chosen design and methods applied are certainly suitable to address the research problem. It is of vital importance for a researcher to choose a research methodology that best suits acquiring the information on the topic under investigation. Topics covered in this chapter include the research design employed, details about the research settings, study population, sampling methods used, inclusion and exclusion criterion as well as the data collection and analysis thereof. The chapter ends with a discussion of the ethical considerations applied in this research study.

3.2 Research Design

A quantitative, descriptive research design using a cross-sectional approach was employed. In clinical research, cross-sectional studies are designed to understand the prevalence of conditions in a given population at one point in time (Wang & Cheng, 2020). These types of studies do not require the investigators to interfere with the phenomena of study but rather to observe, collect and record data in a systematic manner (Zangirolami-Raimundo *et al.,* 2018). Cross-sectional studies may employ questionnaires to collect data, making this type of study cheaper and quicker to undertake compared to others (Zangirolami-Raimundo *et al.,* 2018; Wang & Cheng, 2020).

The current study sought to understand radiographers' experience of occupational stress during the COVID-19 pandemic. An electronic-generated questionnaire was

used as data collection tool to investigate occupational stress among Namibian radiographers during the COVID-19 pandemic. The objectives of this study were to observe radiographers' occupational stress and stressors caused by the COVID-19 pandemic; to ascertain coping strategies used by radiographers to manage occupational stress due to the COVID-19 pandemic and to identify and describe workplace interventions that can be used to mitigate the effects of stress among radiographers during future pandemics.

Quantitative research studies have their roots in positivism and use deductive logic (Davies; 2022). For such studies, data are collected in a numerical format and mathematically analysed to generate the results (Apuke; 2017). In this study, the researcher collected responses mainly in numerical form with minor responses being in words; these were interpreted to answer the research question. Where responses were required in word/s, such responses were converted into numerical form for data analysis.

3.3 Research Settings

The study was conducted in Namibia, a country located in the South-Western part of Africa. Namibia is divided into 14 regions; the latter are all first-level subnational administrative divisions of the country (Refer to Figure 3.1). In Namibia, health care services are mainly provided by the government, particularly by the Ministry of Health and Social Services (MoHSS). Namibia's public healthcare system is made up of five levels: clinics and Primary Health Care (PHC), district hospitals, intermediate hospitals and referral hospitals in reverse hierarchical order. Where a patient's needs exceed the scope of practice or available resources; for example, at a clinic, such patients will be referred to the next level of care, in this case to a PHC. A PHC refers patients to district hospitals and so forth (Christians, 2020). Ultimately, in Namibia, the three intermediate hospitals refer complex cases to Windhoek Central Hospital which is a national referral hospital.

The heads of departments (HODs) of the hospitals were informed about the nature and purpose of the study via telephone and where possible face-to-face. Namibian radiographers from both the public hospital radiology departments and private radiology practices were invited to participate using a cover letter attached. See *Appendix A*. Although the study was open to the entire population, a special invitation was sent to the private practices from three regions, namely; *A*, *B* and *C* [3]. These regions are well known for being among the most densely populated regions in Namibia and having busy private radiology practices. Moreover, region *A* and *B* were the COVID-19 epicentre at the initial stage of the pandemic, while the region *C* is home to private hospital *D*, one of the busiest private hospitals in the country serving mainly the northern regions of Namibia[4].

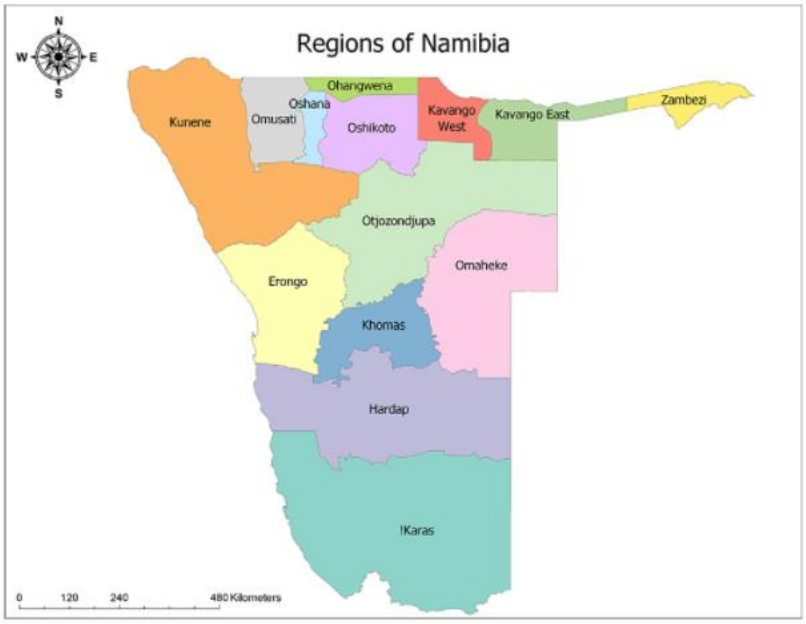

Figure 3.1: A map of Namibia depicting the 14 administrative regions. (Source: https://www.mappr.co/counties/namibia/).

[3] Study regions are anonymised.

[4] Study sites are anonymised.

3.4 Study population and sampling

In this cross-sectional study, the study population comprised diagnostic radiographers practising in public hospitals and private radiology practices in Namibia. At the time of participant recruitment, there were 207 registered diagnostic radiographers in the country (Health Professions Councils of Namibia {HPCNA}, (2020), servicing a population of less than 3 million people. This statistic was published in the 2019/2020 annual report of the HPCNA, (2020), a body responsible for public protection through regulated education and practice of the local HCPs.

Given the small population of registered radiographers in the country (*i.e.* 207) and essentially to minimise the effects of bias and generalise results unfeasibly, it was decided that total population sampling be used to recruit radiographers. Radiographers from all job grade levels throughout the country and who met the inclusion criteria were invited to partake in the study. Equally, for the same reason, no specific formula was used to calculate the sample size.

As prior postulated, no calculated samples were chosen as the entire population was considered in the study. Given a clear gap in literature regarding occupational stress among the radiographers in Namibia, the whole radiographer population was purposively sampled to best answer the research question. While the targeted sample size in this study was uncertain and not guaranteed, the aim was to obtain as many respondents as possible. Respondents were further encouraged to share the link to the online questionnaire with the fellow radiographers to maximise the response rate.

3.5 Eligibility

3.5.1 Inclusion Criteria

The research study included all the diagnostic radiographers in Namibia who met the following criteria:

- Qualified and practising radiographers of all ages and genders,
- Qualified and practising radiographers registered with the HPCNA, and
- Qualified and practising radiographers employed at the hospitals and were directly involved in the management of COVID-19 patients during the pandemic.

3.5.2 Exclusion Criteria

The study excluded the participants based on the following criteria:

- Diagnostic radiographers who are not involved in direct clinical roles. These were those working as lecturers, clinical instructors, officials, administrators and radiographers from other disciplines (*i.e.* ultrasound, radiation therapy and nuclear medicine) among others.
- Radiography assistants and student radiographers.
- Public hospitals usually do not use locums; however, locums and volunteer radiographers did not form part of this study.

3.6 Validity and Reliability

Bolarinwa (2015) defined validity as the degree to which a research instrument can measure what it is supposed to measure. The term reliability determines whether there is consistency in answering the research questions (Voyager Sopris Learning, 2023). In other words, reliability is the degree to which the study outcomes are achieved by the research instrument (*i.e.* measurement and procedure) can be replicated should the study be repeated (Bolarinwa, 2015).

3.6.1 Pre-test

A pre-test was conducted to test the data collection tool, viz the questionnaire. This pre-test was done before the distribution of the electronic questionnaires. Five radiographic assistants participated in the pilot testing. This was necessary to establish whether the questions were properly phrased, not ambiguous and clear to understand by the participants. The pre-testing aided with the reliability of the questionnaire. A 100% return rate for the pre-test study was recorded. Apart from refining the words, minor language editing and missing questions, it was further estimated that on an average, 15 minutes was needed to complete the questionnaire. The results of the pre-test were not included in the main study.

For reliability purposes, a stability check was done via a "test-to-retest" approach. Test-to-retest reliability requires the participants to answer the questions in the same way every time they take a survey (Voyager Sopris Learning, 2023). After a period of one week, the pre-test was repeated on the same respondents. Based on the re-test responses, no additional modifications were done to the questionnaire.

Regarding the aspect of validity, the researcher made sure that the questions posed in the questionnaire, would elicit responses to the satisfaction of the study's research question and objectives. For example, the questionnaire included questions such as:

- Whether the radiology workload has increased during the COVID-19 pandemic,
- Whether there was enough staff to deal with the COVID-19 pandemic workload,
- Whether the participants felt prepared to deal with COVID-19 patients during the pandemic among others.

These questions aimed at generating data to satisfy one of the study objectives *i.e.* the causes of stress. This alignment assisted in upholding the internal validity of the data collection tool, subsequently leading to accurate and intuitive findings (Khan *et al.*, 2023). The validity and reliability of the questionnaire was determined by Cronbach's alpha.

3.7 Data Collection

The researcher collected the data by electronic questionnaire using Google Forms as the data collection tool. The questions were developed based on related literature and other preceding similar studies from other geographical areas and/or health professions (Akudjedu *et al.,* 2020; Demirjian, *et al.,* 2020; Elshami *et al.,* 2021). Question 12 for example was adopted from Demirjian, *et al.* (2020).

For enrolment purposes, the questionnaire was distributed electronically mainly via a WhatsApp group for Namibian radiographers, especially those working in public hospitals where the researcher was an active member. The emails containing a link were further sent to private radiology HODs to distribute to their respective radiographers as well as to practising radiographers whose contacts were known by the researcher. In the instance where the survey link refused to open on WhatsApp, the participants were advised to forward the link to their emails and fill it in from there. The data collection period was 1 June to 25 June 2022.

According to Datascope (2023), Google Forms is an online software that allows potential researchers to create surveys free of charge; allows the publisher to send the survey on different platforms such as emails or copy a link to WhatsApp messenger. As the respondents complete the survey, Google Forms is set to automatically collect responses in real-time, allowing the researcher and collaborators to have an overview of the responses. The software can generate an automated summary of the responses collected. Raw data can also be extracted to be analysed by other applications such as SPSS if the researcher so wishes.

The questionnaire consisted of 19 questions, including open-ended questions with free-text provision, close-ended, multiple-response questions and rating scales. Please refer to *Appendix B* for a sample of the questionnaire employed. The questionnaire consisted of the following five parts:

a) Part ‘A’ requested respondents’ socio-demographic profiles such as age, gender, employer and job rank.
b) Part ‘B’ requested responses related to stress and stressors among radiographers due to the COVID-19 pandemic,
c) Part ‘C’ requested responses regarding strategies radiographers used in coping with COVID-19 occupational-related stress,
d) Part ‘D’ requested responses related to interventions to mitigate the effects of COVID-19 stress, and
e) Part ‘E’ was geared towards specific and general suggestions related to the COVID-19 pandemic.

Likert-type scales were also included where the participants were required to indicate their level of agreement with the given statements on a 5-point Likert scale. Another question was on stress levels which allowed the participants to indicate their level of stress according to four categories namely: low, intermediate, high and not applicable. Closed-ended and open-ended questions were also included.

Weekly follow-up emails and WhatsApp messages reminding the radiographers to respond to the survey were sent to those radiographers recruited. Annotation such as “please ignore this message if you have already completed the survey” was included in the email/WhatsApp message. The participants were encouraged to answer all the questions to the best of their ability; however, they were at liberty to skip a question they felt uncomfortable answering. Passive consent was assumed when the questionnaires were completed. The study received 90 responses.

Worth noting was that the study did not directly interfere with normal working hours or participants’ workload as the respondents were encouraged to complete the survey during their free time as far as possible. That was the time away from working hours. No employers’ consumables were used for the execution of this study. For storage, security and protection related to the electronic survey and data collected, please refer to Section 3.9 under Ethical Considerations.

3.8 Data Analysis

According to Akweenda and Cassim (2016), data analysis is a process of inspecting and transforming the data collected into meaningful conclusions that can be understood and communicated to others. The researcher with the assistance of a statistician transferred the survey data from Google Forms into the SPSS version 26.0 for analysis. The same data were checked manually and similarly entered into a simplified worksheet prepared by the researcher. Refer to *Appendix C*. A statistician assisted the researcher in analysing the data. Descriptive and statistical results were generated to present and explain the findings of responses to different questions. The results are presented in the form of graphs, tables, charts and percentage expressions (see Chapter 4). These descriptive results are quantitative demographic variables such as age, sex, respondents' rank, employer of the respondents and the age group.

The study applied Chi-square statistical analyses to assess the significance between the two variables for a given finding. The *Chi-square test* (χ^2) is a statistical analysis used to compare and see if there is any association among categorical variables (Kim, 2017). Here, a Chi-square test was performed to check if a relationship existed between fear of contracting/spreading COVID-19 and the age category among others.

The Cronbach's Alpha test was performed to assess the internal consistency/reliability of the study. Cronbach's alpha ranges from zero (0) to one (1) whereby 0.7 is considered as a benchmark, with values near 0.7 minimally acceptable but not ideal (Frost, 2023). The study did cross-tabulations to determine whether associations concerning the fear of contracting COVID-19 at work existed between respondents from government facilities and respondents from private facilities. Please see Table: 4.5 under Chapter Four. Responses to open-ended questions were reported as they were and not by thematic analysis.

For reporting percentage agreement for some responses, the study adopted the 'Percentage agreement table' used by Lee *et al.*, (2016). See Table 3.1.

Table 3. 1: Value for percentage agreement for interpretation purposes (Source: Lee *et al.*, 2016).

Value of Agreement	Strength of Agreement
0%	None
1%-20%	Very poor [or very small]
21%-40%	Poor [or small]
41%-60%	Moderate [or intermediate]
61%-80%	Good [or high, large]
81%-99%	Very good
100%	Perfect

3.9 Ethical considerations

According to Ashong *et al.* (2016), ethics in research is important to ensure that no harm occurs to the respondent as a result of participation. Permission to conduct the research study was obtained from the Research Ethics Committee (REC) - Faculty of Health and Wellness Sciences of the Cape Peninsula University of Technology (CPUT) and the MoHSS in Namibia. The ethics application letter and the ethical clearance letter are attached as *Appendices D and E* respectively. The application letter to and the permission letters from the MoHSS are attached as *Appendices F and G* respectively. Permission was further obtained from the management and HODs of the private hospitals where the radiographers were employed (application and permission letters attached as *Appendices H, I, J, K and L).*

The study adhered to ethical principles contained in the Declaration of Helsinki of the World Medical Association (WMA) (WMA, 2018). The principles included the protection of participants' life, dignity, health, integrity, privacy, right to self-determination and confidentiality. There was compliance with the fundamental ethical (Pera & van Tonder, 2011). Autonomy or the right of the participants to decide on their own whether to partake or not in a study was afforded to potential participants. The study ensured beneficence by ensuring that the questions asked caused no sort of discomfort to the respondents and information provided was protected throughout the research process. Information collected was only utilised to benefit and answer the study objectives. Respondents were further not forced to respond to the questions they were not comfortable with. As for the principle of justice, the purposive non-probability sampling technique used provided a fair and transparent selection of the respondents. Those who preferred not to take part in the study were fairly treated and their decisions were respected without any prejudice.

The study had clarification of the study aims and objectives whereby a brief explanation of the study and its purpose was made to the participants. The study upheld anonymity whereby respondent's responses required no personal identifiers. No information such as respondents' names, place of work, contact details and other key information likely to link to the participant's identity were recorded for this study. Participants were also assured that their identity or that of the research site would not be revealed in this thesis or during the publication of the research findings.

The study allowed participants the right to withdraw. No forced recruitment or coercion of the respondents for this study was applied. To ensure autonomy, all respondents were at liberty to partake in this study voluntarily and withdraw from the study at any time if the need arose without any penalties or consequences. The respondents were however, informed that once they had submitted the anonymised electronic questionnaire, there was no way to withdraw their submission as the researcher would not be able to link a particular questionnaire to a respondent.

Confidentiality was adhered to throughout the study. Data collected and other research-related information were kept in a secure safe accessible only by the researcher. Equally, the laptop used for this study was secured using a password and electronic data were stored in secure cloud storage space. The research information was not shared with any third parties other than the supervisors and statistician. Respondents were informed that the data collected will only be used for this study and will not be used for any future studies. Data collected and other research-related information will be securely stored for at least five years after which it will be destroyed.

3.10 Chapter Summary

This chapter outlined the methodology the researcher used to systematically conduct the study. This quantitative research study used an electronic survey tool to collect data. Respondents were radiographers from government hospitals and selected privately owned radiology practices in Namibia. Participation by the eligible radiographers was done voluntarily and all applicable ethical considerations were upheld during the study. The study received ethical clearance from CPUT. SPSS software version 26.0 was used for the analysis of data which is presented in the next Chapter.

CHAPTER 4 RESULTS

4.1 Chapter introduction

This study set out to observe diagnostic radiographers' occupational stress and stressors caused by the COVID-19 pandemic, ascertain coping strategies of radiographers to manage occupational stress due to the COVID-19 pandemic, identify and describe workplace interventions that can be used to mitigate the effects of stress among radiographers during future pandemics. This chapter presents the results following the data analysis. The results are presented under the following headings namely demographic characteristics, stressors and stress level associated with the COVID-19 pandemic, dealing/coping with occupational-related stress and interventions to mitigate the effects of stress. The chapter concludes with suggestions on how occupational stress could be better managed during future pandemics.

4.2 Research findings

A total of 90 responses were received. During analysis, it became evident that not all 90 respondents provided answers to all the questions. It is for that reason that the denominators vary for the results presented. In a fraction, a denominator is the bottom number representing the total number of respondents, *i.e.* the number on which percentage values are expressed. The reported figures were therefore calculated based on how many respondents answered a particular question rather than the full sample. Similarly, the rounding of percentages may not always add up to 100% in this chapter.

4.2.1 Demographic characteristics

The demographic characteristics reported outline the frequency analysis of the respondents' attributes. This frequency analysis aimed at providing rich information about the respondent's age, gender and position or rank. Frequency analysis was mainly expressed in percentages. The demographic characteristics of this sample are presented in Table 4.1.

A total of 90 registered radiographers completed and returned the survey, resulting in a response rate of 43.5% (n=90/207) concerning the 207 radiographers registered with the HPCNA in the year 2020. Majority of respondents were females (83.7%) (n=72/86) compared to 16.3% males (n=14/86). Respondents who identified themselves as merely radiographers were 73.6% (n=64/87) and 26.4% (n=23/87) were radiographers in managerial roles. In terms of ages, the respondents' ages ranged from 22-to-59 years. Majority of respondents were within the age group 20 to 29 years (40.91%) (n=36/88) and the least, 5.68% (n=5/88) within the age group of 50 to 59 years. Most of the respondents, (54.5%) (n=48/88) were from the private sector, with only 45.5% (n=40/88) accounting for the public sector.

Table 4.1: Demographic characteristics of respondents

Variables	Groups	Head count (n)	%*
Gender	Female	72	83.7%
	Male	14	16.3%
	Others	00	00%
	Total	86	100%
My rank	Just radiographer	64	73.6%
	Radiographers in managerial roles	23	26.4%
	Others	00	00
	Total	87	100%
Age group	20 - 29	36	40.91%
	30 - 39	35	39.77%
	40 - 49	12	13.64%
	50 - 59	5	5.68%
	Total	88	100%
Employer	Government	40	45.5%
	Private	48	54.5%
	Total	88	100%

4.2.2 Occupational stressors

4.2.2.1 COVID-19 occupational-related stress awareness

Stress awareness was determined based on participants' perceived knowledge of what occupational stress is. The three questions posed relevant to this were about what occupational stress is, whether the respondents had suffered occupational stress in their lives before the COVID-19 pandemic and whether the respondents had experienced occupational stress due to the COVID-19 pandemic.

Stress awareness findings are shown in Figure 4.1. Overwhelmingly most radiographers (96.6%) (n=84/87) admitted knowing what occupational stress is. A total of 80.5% (n=70/87) of the respondents agreed to have suffered occupational stress at one point or another before the COVID-19 pandemic. A large number of respondents (66.7%) (n=58/87) indicated that they have experienced occupational-related stress due to the COVID-19 pandemic.

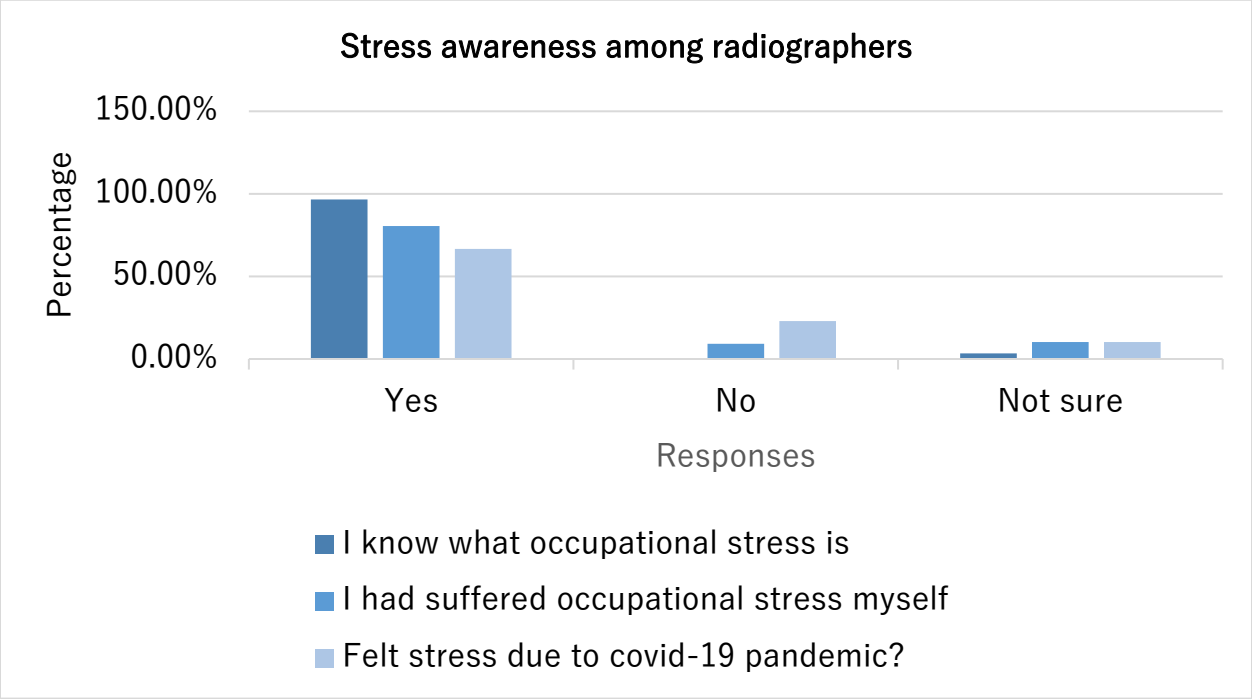

Figure 4.1: Stress awareness among radiographers

Respondents were asked to rate their level of the occupational stress regarding the COVID-19 pandemic. Their responses are presented in Figure 4.2. About half of the respondents (50.7%) (n=37/73) indicated their level of occupational stress due to COVID-19 to be intermediate with the rest indicating either low, high or not applicable.

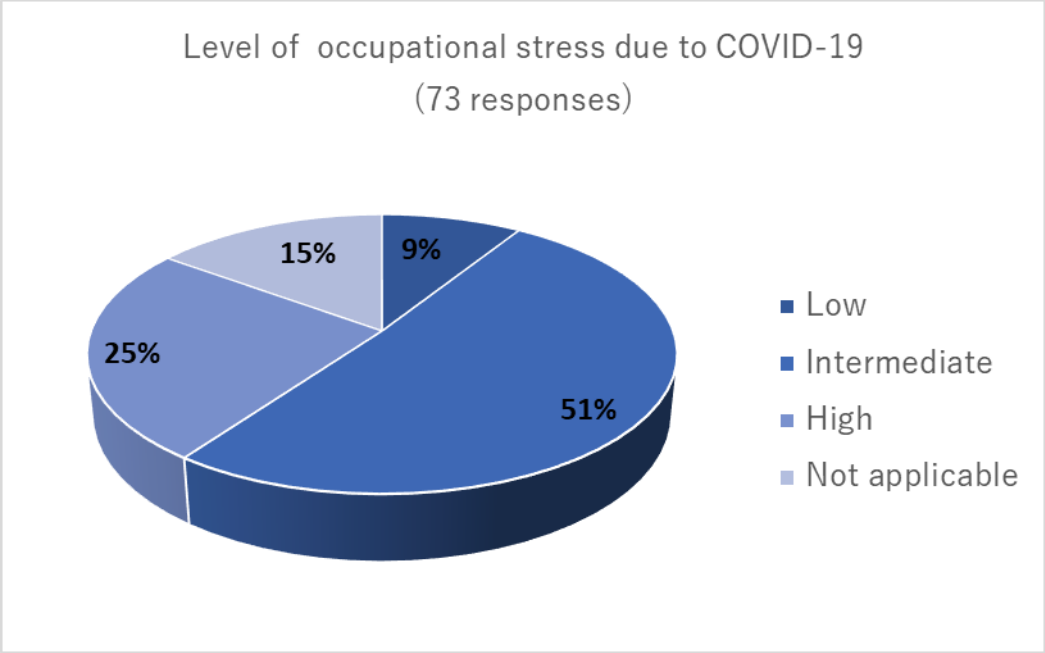

Figure 4.2: Level of occupational stress due to COVID-19

4.2.2.2 Stressors associated with COVID-19 pandemic

The respondents were provided with a table highlighting stressors associated with the COVID-19 pandemic as identified in the literature. Please see Table 4.2. Respondents were asked to indicate which of the listed stressors caused them stress at work by choosing the level of agreement with the statement on the Likert scale provided.

Table 4.2: Factors that caused stress among respondents

Statement	SA (n)	A (n)	N (n)	D (n)	SD (n)	Total (n)
Workload: The radiology workload at my hospital has increased during the COVID-19 pandemic	40	25	16	4	00	85
PPE: The personal protective equipment at my workplace during the COVID-19 outbreak was available	33	33	10	9	2	87
Fear: I am fearful of contracting COVID-19 from the workplace	34	26	22	4	00	86
Fear: I am fearful of spreading COVID-19 from the workplace to others	45	33	8	1	00	87
Staff: There is enough staff complement at my work to deal with the COVID-19 pandemic workload	12	36	25	9	5	87
Preparedness: My work has prepared me to deal with COVID-19 patients during the outbreak	19	37	21	10	00	87
Cleaning material: Supply as an infection control measure is available at my workplace	33	40	7	6	1	87
Disinfectant material: Supply as an infection control measure is available at my workplace	37	38	7	4	1	87
Physical distancing: My workplace practices physical distancing as a preventative form against contracting the COVID-19 virus	21	39	12	10	5	87
Adaptation: I find it difficult adapting to sudden new changes in the workplace due to the COVID-19 pandemic	14	32	27	10	4	87
Support: I am receiving support from management to keep me motivated during the COVID-19 pandemic	9	31	27	16	4	87
Appreciation: I feel I am appreciated for the work I am doing during the COVID-19 pandemic	13	24	25	11	14	87

Values in this table represent the actual number of observations (n).

SA - Strongly agree, A – agree, N – Neutral, D – Disagree, SD – Strongly disagree

As to whether the radiology workload at the respective hospital had increased during the COVID-19 pandemic, about 47.1% (n=40/85) of the respondents strongly agreed whereas 29.4% (n=25/85) agreed with an increased workload during the COVID-19 pandemic. About 18.8% (n=16/85) were neutral while 4.7% (n=4/85) disagreed and 0% (n=0/85) strongly disagreed with the statement.

As to whether there was adequate PPE available at the respective workplaces during the COVID-19 pandemic, about 37.9% of respondents (n=33/87) strongly agreed whereas 37.9% (n=33/87) agreed having adequate PPE available during the pandemic. Only 2.3% of the respondents (n=2/87) strongly disagree with the availability of PPE at their workplaces. At least 11.4% (n=10/87) and 10.3% (n=9/87) of respondents were neutral and disagreed respectively.

In response to whether the respondents were fearful of contracting the COVID-19 virus at their workplace, about 39.5% (n=34/86) strongly agreed and 30.2% (n=26/86) agreed that they were afraid of contracting the COVID-19 virus at work. About one quarter (25.6%) (n=22/86) were neutral. Only 4.7% of the respondents (n=4/86) disagreed while nil (n=0/86) strongly disagreed.

In response to whether the respondents were fearful of spreading the COVID-19 virus from the workplace to others, about 51.7% (n=45/87) strongly agreed and 37.9% (n=33/87) agreed that they were afraid of passing the COVID-19 virus onto others. On the other hand, 9.2% (n=8/87) were neutral. Only 1.1% (n=1/87) disagreed and none strongly disagreed with the statement.

As to whether there was enough staff complement at work to deal with the COVID-19 pandemic workload, about 13.8% (n=12/87) of the radiographers strongly agreed, 41.4% (n=36/87) agreed, 28.7% (n=25/87) were neutral, whilst 10.3% (n=9/87) strongly disagreed and 5.7% (n=5/87) disagreed.

In response to whether the work had prepared respondents to deal with COVID-19 patients during the pandemic, a total of 21.8% of the respondents (n=19/87) strongly

agreed and 42.5% of the respondents (n=37/87) agreed that their work has prepared them to deal with COVID-19 patients. Only 24.1% (n=21/87) were neutral and 11.5% (n=10/87) disagreed with the statement. None of the respondents cited strongly disagree.

As to whether there was adequate cleaning material supply as an infection control measure available at the respondents' workplaces, about 37.9% (n=33/87) strongly agreed and 46% (n=40/87) agreed to have had adequate cleaning material supply available at their workplaces during the COVID-19 pandemic. Only 1.1% of the respondents (n=1/87) strongly disagreed while the remaining 8.0% (n=7/87) and 6.9% (n=6/87) were either unsure or disagreed respectively.

As for the availability of disinfectant material at the workplace, 42.5% (n=37/87), 43.6% (n=38/87), 8.0% (n=7/87), 4.6% (n=4/87) and 1.1% (n=1/87) of the respondents cited either strongly agree, agree, neutral or disagree and strongly disagree respectively with the statement.

In response to whether the radiographers' workplace practised physical distancing as a preventative measure against contracting the COVID-19 virus, 24.1% (n=21/87) of respondents strongly agreed and 44.8% (n=39/87) agreed with the statement. A total of 13.8% (n=12/87) were not sure, while 11.5% (n=10/87) disagreed and 5.7% (n=5/87) strongly disagreed to have had practised physical distancing at work as a preventative measure against contracting the COVID-19 virus.

Whether the radiographers found it difficult adapting to sudden new changes in the workplace due to the COVID-19 pandemic, only 4.6% (n=4/87) of the respondents strongly agreed while 11.5% (n=10/87) agreed or adapted well to sudden new changes that occurred at the workplace due to the COVID-19 pandemic. Those who were not sure accounted for 31.0% (n=27/87). A total of 16.1% (n=14/87) and 36.8% (n=32/87) either agreed or strongly agreed respectively with finding it difficult adapting to sudden new changes.

Whether radiographers had received support from their management to keep them motivated during the COVID-19 pandemic – Less than half or 45.9% of the respondents *i.e.* 35.6% (n=31/87) agreed and 10.3% (n=9/87) had indicated having received management support during the COVID-19 pandemic. About 31% (n=27/87) were neutral, while 18.4% (n=16/87) and 4.6% (n=4/87) either disagreed or strongly disagreed respectively.

When the respondents were asked whether they felt appreciated for their work during the COVID-19 pandemic, only a small number of radiographers (14.9%) (n=13/87) strongly agreed that they were appreciated for their work during the COVID-19 pandemic. The remaining 27.6% (n=24/87) agreed, 28.7% (n=25/87) were neutral, 12.6% (n=11/87) disagreed whereas 16.1% (n=14/87) strongly disagreed with this statement.

Of all the listed stressors, the current study established that workload, fear of contracting COVID-19 from the workplace and fear of spreading the COVID-19 virus from the workplace to others were the most stressful factors that affected radiographers during the COVID-19 pandemic. Figure 4.3 presents the three most stressful factors as indicated by respondents.

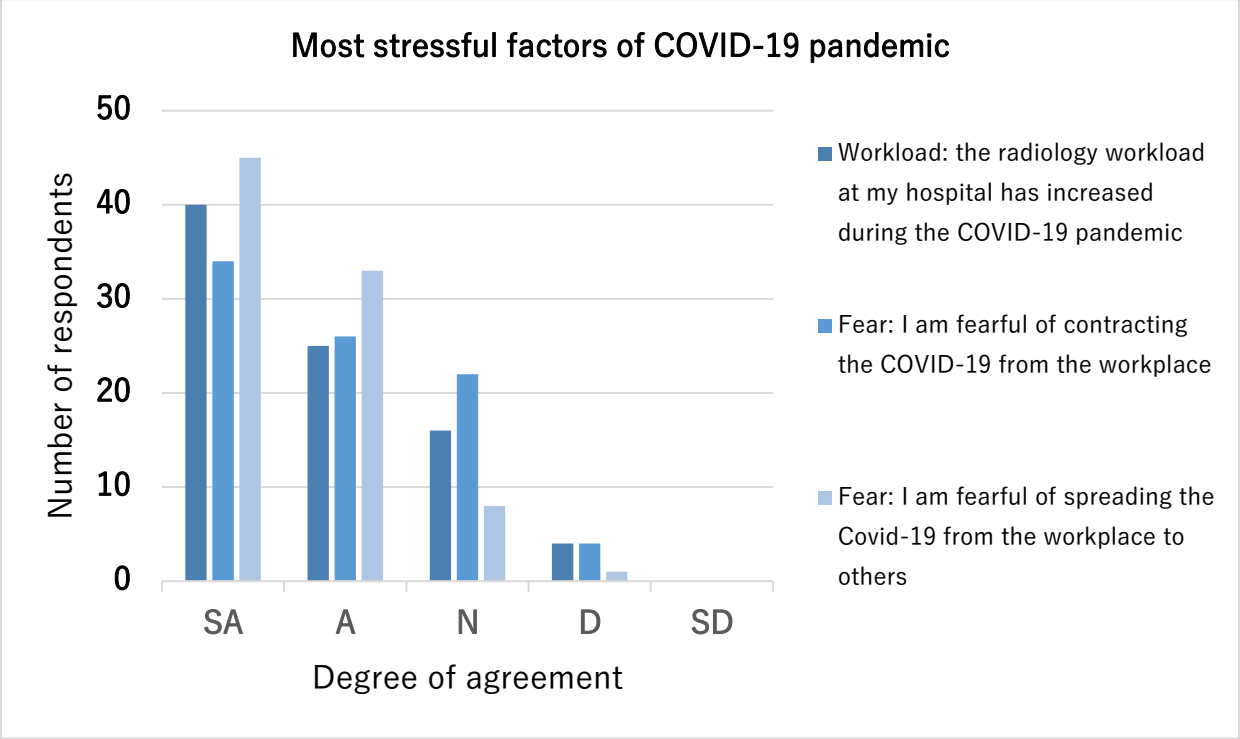

Figure 4.3: Top-three COVID-19 pandemic stress factors of respondents

4.2.2.3 COVID-19 stress factors and their stress levels

The study sought to establish what level of stress different stress factors had on radiographers during the COVID-19 pandemic. Respondents were asked to what degree the stressors provided in Table 4.3 caused them stress at work during the pandemic, to which they had to choose between either low, medium, high, or not applicable. The study established that the stress factor with the highest level of stress recorded among the respondents was fear of spreading the COVID-19 virus to others (67%) (n=59/86). This was followed by fear of contracting the COVID-19 virus by radiographers themselves (64%) (n=55/86) and discomfort caused by wearing PPE (44%) (n=38/87). The results of other factors caused high levels of stress were as follows: increased workload (41%) (n=36/87), sudden changes in work procedure (40%) (n=35/87), lack of appreciation (40%) (n=35/87), shortage of staff (34%) (n=30/87), unavailability of support (32%) (n=28/87), lack of preparedness (26%) (n=23/87), lack of PPE (25%) (n=22/87), absence of physical distancing (25%)

(n=22/87), lack of cleaning material (21%) (n=18/87) and lack of disinfectant material (17%) (n=15/87).

On the other hand, an intermediate/medium level of stress among radiographers in this study was found to be predominantly due to factors such as lack of preparedness (41%) (n=36/87) as well as increased workload (39%) (n=34/87), shortage of staff (39%) (n=34/87) and sudden changes in work procedures due to the COVID-19 pandemic, also with 39% (n=34/87). Other factors which caused medium stress level among radiographers during the COVID-19 pandemic were: discomfort caused by wearing the PPE (37%) (n=32/87), unavailability of support (34%) (n=30/87), absence of physical distancing (33%) (n=29/86), lack of appreciation (31%) (n=27/87), lack of cleaning material (26%) (n=23/87), lack of PPE (24%) (n=21/87), fear of spreading the Coronavirus (24%) (n=21/87), lack of disinfectant material (23%) (n=20/87) and fear of contracting the Coronavirus (22%) (n=19/87).

Of all the listed stress factors, three factors were found to have caused a low level of stress among respondents. These were lack of disinfectant material (51%) (n=44/87), lack of cleaning material (46%) (n=39/87) and lack of PPE (43%) (n=37/87). Other factors cited to have caused low-level stress were: the absence of physical distancing (34%) (=29/86), unavailability of support (29%) (n=25/87), lack of preparedness (26%) (n=23/87), lack of appreciation (24%) (n=21/87), shortage of staff (20%) (n=17/87), discomfort caused by wearing the PPE (17%) (n=15/87), increased workload (16%) (n=14/87), sudden changes in work procedure (16%) (n=14/87), fear of contracting the Coronavirus (15%) (n=13/87) and fear of spreading the Coronavirus (7%) (n=6/87).

Table 4.3: Stress factors and their stress levels on respondents

Stress factors	L (n)	I (n)	H (n)	N/A (n)	TOTAL (n)
Increased workload	14	34	36	3	87
Lack of personal protective equipment	37	21	22	7	87
Discomfort caused by wearing the PPE	15	32	38	2	87
Fear of contracting coronavirus	13	19	55	00	87
Fear of spreading coronavirus to others	6	21	59	00	86
Shortage of staff	17	34	30	6	87
Lack of preparedness	23	36	23	5	87
Lack of cleaning material	39	23	18	7	87
Lack of disinfectant material	44	20	15	8	87
Absence of physical distancing at workplace	29	29	22	6	86
Sudden changes in work procedure due to COVID-19 pandemic	14	34	35	4	87
Unavailability of support from the management	25	30	28	4	87
Lack of appreciation for the work you are doing	21	27	35	4	87

Values in this table represent the actual number of observations (n).

Key: L – Low, I – Intermediate, H – High, N/A – Not applicable (felt no stress)

4.3 Dealing/coping with COVID-19 occupational stress

Respondents were asked to indicate their methods/strategies of coping with stress related to the COVID-19 pandemic. The responses to this question are reflected in Figure 4.4. Respondents recorded talking to family or friends (60%) (n=54/90) and developing a hobby (57%) (n=51/90) as the preferred coping strategies. These were followed by meditation and religious activities (51%) (n=46/90), self-isolation (39%) (n=35/90) and spending time looking at and admiring nature (29%) (n=26/90). The least options selected were drinking and smoking with (7%) (n=6/90) and (2%) (n=2/90) respectively. Eighteen percent (18%) (n=16/90) of the respondents reported that they needed no coping strategies.

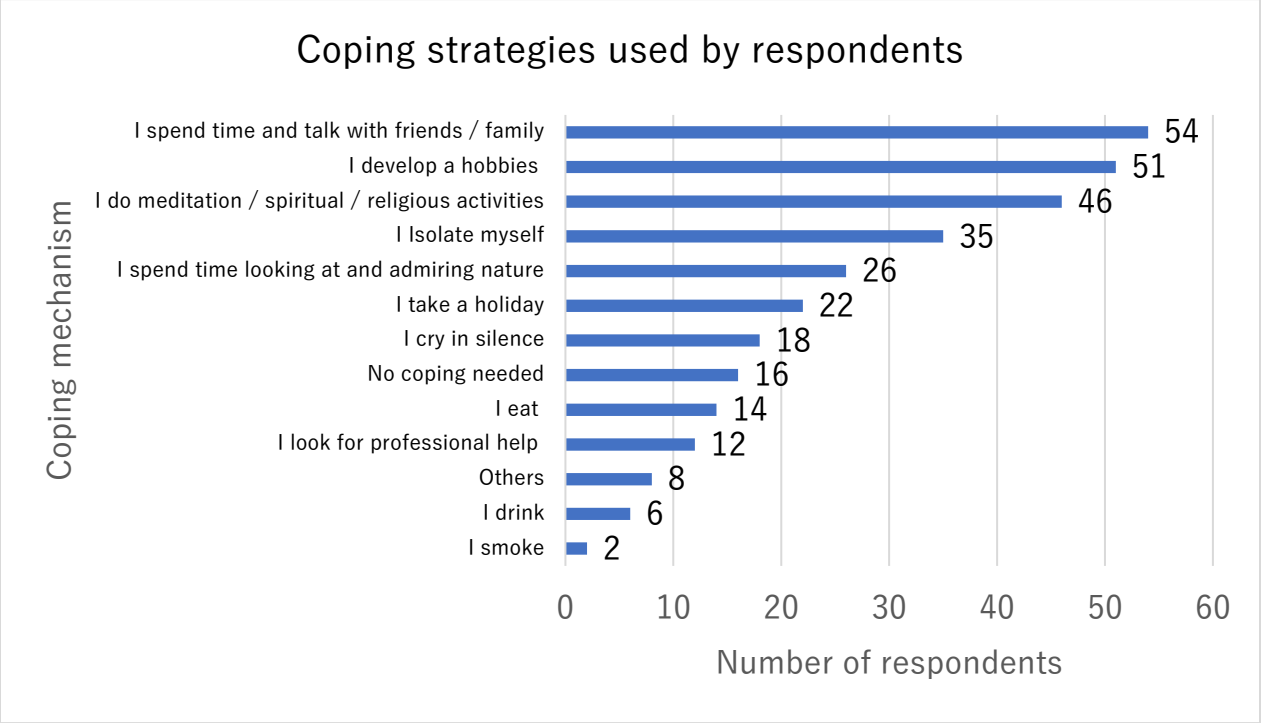

Figure 4.4: Strategies of coping used by respondents

4.4 Interventions to mitigate COVID-19 occupational stress

4.4.1 Support programmes at workplaces

The respondents were asked to indicate whether there were support measures at their workplace to help them deal with COVID-19 stress for instance when a staff member contracted the COVID-19 virus. Respondents were asked to indicate whether they felt a need for professional help to deal with stress caused by the COVID-19 pandemic. Responses to these questions are given in Figure 4.5. Most radiographers (52%) (n=45/86) reported that no support programmes were available at their workplace for dealing with occupational stress whilst only 29% (n=25/86) of respondents were unsure. A few respondents, (19%) (n=16/86) indicated that support programmes were indeed available at their workplace.

On whether the respondents felt a need for professional help to deal with stress caused by the COVID-19 pandemic, only 35% (n=30/87) of the respondents indicated that they would need professional help. During data analysis, the differences in responses between private and public hospital participants related to the latter variable were not analysed.

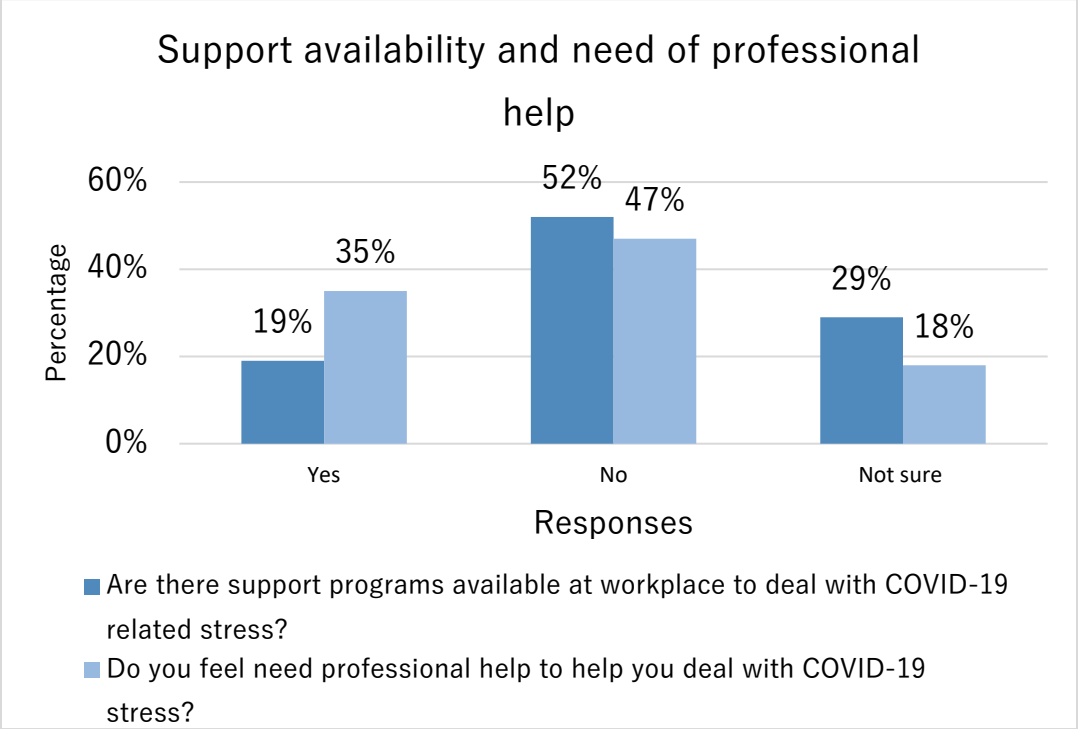

Figure 4.5: Support availability and need for professional help

When respondents were asked about "Where do they get their immediate support in case of COVID-19", 77% of respondents (n=66/86) indicated going to a family member or to a friend, 37% of respondents (n=32/86) got their support from colleagues. Only 13% (n=11/86) and 8% (n=7/86) of respondents go to their employer/supervisor and others for support respectively. Please see Figure 4.6.

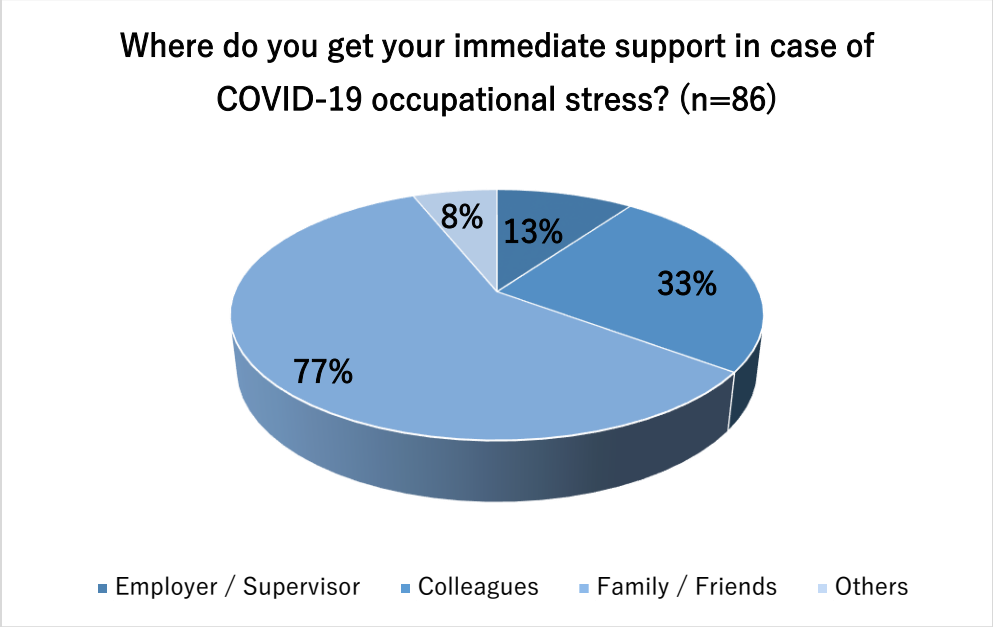

Figure 4.6: Source of immediate support

When asked about the types of support measures available at work to deal with stress when a staff member contracted the COVID-19 virus, respondents stated the following among others;

"Management got a speaker to come talk to us about feeling stressed".
"We got extra time off or away from work".
"Wellness officials provided counselling to employees during COVID-19".
"Support groups i.e. social workers/counselling/psychologist/supervisors /doctors/colleagues/surveillance team".

4.4.2 Interventions to support stress during COVID-19 and beyond

When asked to select their top-three best interventions to support stress during COVID-19 and beyond, respondents selected social networking, incentives and psychological support. Notably, only one of the respondents indicated 'motivation' as other preferred intervention methods to be used as motivation of radiographers. This respondent stated the following: "*Remind radiographers of how great their profession, responsibility and obligation is toward the patients*".

Please see Figure 4.7 for different types of interventions applied by radiographers during the COVID-19 pandemic.

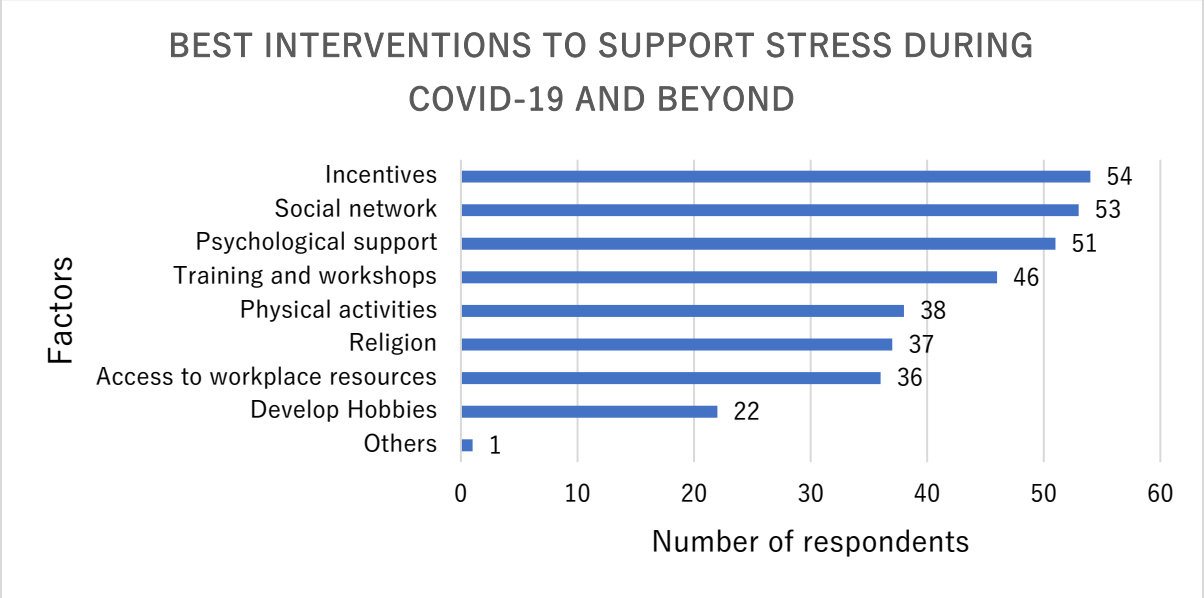

Figure 4.7: Interventions to support stress

The study made comparisons by using the Pearson Chi-square test to assess for independence of the following two variables. Respondents were divided into different age categories to see if their age influenced their fear of contracting COVID-19 at the workplace. Statistically significant associations were sought, as the p-value was set at < 0.05 or above 95%. This meant that variables with a statistical value equal to 0.05 or less had significant association while those with p-values of more than 0.05 had no association between them. Table 4.4 presents the Chi-square test result along with the degrees of freedom (df) and the significance level (p) or alpha set to 0.05 (5%). The result shows that there was no statistically significant relationship between the age category of the respondents and the respondents' tendency to be fearful of contracting COVID-19 at the workplace ($\chi^2 = 4.724^a$, $p = 0.858$). The Chi-square test established no significant statistical association which would have triggered respondents' stress between the age category of the respondents and the respondents' tendency to be fearful of spreading COVID-19 ($\chi^2 = 3.839a$, $p = 0.922$).

Table 4.4: Association between age category and fear of contracting COVID-19

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	4.724[a]	9	0.858
Likelihood Ratio	5.272	9	0.810
Linear-by-Linear Association	0.002	1	0.969
N of Valid Cases	85		
10 cells (62.5%) have expected count less than 5. The minimum expected count was .24.			

The study found that stress for fear of contracting COVID-19 at work was higher than expected in respondents from government facilities compared to respondents from private facilities. See Table 4.5. This was unlikely to be a result that could have just occurred by chance.

Table 4.5: Cross tabulation for 'My employer & fear of contracting the virus'

Cross tabulation: My employer & fear of contracting the virus caused me stress					
Employer		Low	Intermediate	High	Total
Government	Count	3	4	32	39
	Expected	5.8	8.5	24.7	39.0
Private	Count	10	15	23	48
	Expected	7.2	10.5	30.3	48.0

There was a statistically significant association between whether the respondents working at a private or government healthcare facilities and their fear of contracting COVID-19 caused them stress at work ($\chi^2 = 10.795^a$, p = 0.005). See Table 4.6.

Table 4.6: Association between employer and fear of contracting COVID-19

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	10.795[a]	2	0.005
Likelihood Ratio	11.306	2	0.004
Linear-by-Linear Association	8.666	1	0.003
N of Valid Cases	87		
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.83.			

The current study estimated the internal consistency of the data by using Cronbach's alpha. Cronbach alpha or internal consistency as sometimes referred to can be defined as an extent to which the items within a test are inter-related (Tavakol & Dennick, 2011). Tavakol and colleagues (2011) stated that the normal and acceptable values of Cronbach's alpha range from 0.70 to 0.95. A direct relationship exists between interrelated items of a test and the alpha values, *i.e.* alpha value increases with more related items in a test. In this study, the analysis for most of its variables yielded a measure over 0.700 (0.700, 0,727, 0.791, 0.792, 0.796 and 0.846) which indicates a good-to-excellent reliability measure. Only two sets of variables in this study produced Cronbach's alpha values below the cut off, *i.e.* 0.508 and 0.561 respectively. The findings of this study are therefore not only reliable, but a good measure of internal consistency for the research investigation at hand.

4.5 Managing occupational stress related to COVID-19: Suggestion

With regards to how the employer could better manage occupational stress related to COVID-19 – the respondents listed the following;

" Better working hours..."
"...better payment for overtime", "...compensation", "financial incentives"
"Psychological support", "psychological help", "Support groups among others."
"Invite faith-based organisations for moral and faith support."
"...resting and refreshment rooms", "Reach out more frequently", "checking in on employees regularly."
"Weekly updates", "Regular information sessions on COVID-19."
"...talk to the staff members directly and take their opinions and suggestions into consideration when making decisions."
"Minimise movements within the hospital to prevent cross-contamination."
"...organise counselling therapy, COVID-related stress is because of the fear and exposure one gets from work.", "Strengthen wellness programmes such as medical checkups, team building etc."
"...ensure safe working environment."
"Special pandemic leave."
"Anxiety and stress should be alleviated not aggravated."
"Trainings and workshops."
"Listening to employees and take their views into consideration during decision making."
"More time off from work.", "on/off rosters."
"...meetings to discuss issues affecting radiographers."
"...provide PPE".
"Emphasis is always placed on the doctors and nurses leaving out radiographers who are also in direct physical contact with COVID-19 patients.", "... appreciation".
"...hire more staff to lower stress burdens from the overwhelmed staff."

4.6 General comment relative to COVID-19 pandemic

The respondents were also asked an open-ended question to give general comments relative to the COVID-19 pandemic. The following are some of the views expressed by individual respondents:

"*Some patients don't like wearing their masks."*
"...health care workers suffered stigma from the community."
"Compensation in any form like vouchers etc."
"Recognise radiographers as frontline workers like the nurses and doctors and enjoy those privileges given to them."
"Health workers were traumatised, they need spiritual healing, holidays."
"Acceptance was all we needed to take seriously and adhere to COVID protocols provided."
"Enough material for the COVID pandemic must be availed."
"A risk allowance for radiographers/assistant radiographers."
"The salaries should be increased during this pandemic due to high workload."
"Employees may work shifts during the pandemic..."
"Prepare radiographers psychologically and emotionally."
"...trainings and workshops."

4.7 Chapter Summary

This chapter presented the results following data analysis with regards to demographic characteristics, COVID-19 occupational-related stress awareness, stressors and stress levels associated with the COVID-19 pandemic, dealing/coping with work- related stress, interventions to mitigate the effects of stress and suggestions on how the employer could better manage occupational stress related to COVID-19. The study had 90 respondents, the majority of whom were females (83.7%). More than half (66.7%) of the respondents had experienced stress at work due to the COVID-19 pandemic. About half of respondents indicated that no support programmes were available at the workplace to deal with occupational stress related to the COVID-19 pandemic. The most stressful factors identified by this study were

increased workload and fear of contracting the virus and/or spreading the COVID-19 virus among others. The next chapter will discuss the results of the study within the context of existing literature and the study limitations as well as provide recommendations for future research.

CHAPTER 5 DISCUSSION

5.1 Chapter introduction

Although a number of studies have assessed occupational stress among radiographers, to the author's knowledge, no such study has been conducted among radiographers in Namibia. This study aimed to observe radiographers' occupational stress and stressors caused by the COVID-19 pandemic, to ascertain coping strategies of radiographers to manage occupational stress due to the COVID-19 pandemic and to identify and describe workplace interventions that can be used to mitigate the effects of stress on radiographers during future pandemics. This chapter will provide an interpretation of the results of the study as presented in the preceding chapter. The chapter ends with a discussion of the limitations and strengths of this study. Recommendations are further provided for future research studies.

5.2 Namibian radiographers and COVID-19 occupational stress

The population of radiographers in Namibia is small. Hence, to minimize the effects of bias, the entire population of 207 radiographers were invited to participate in this study. A total of 90 radiographers took part corresponding to 43% of the total number of radiographers registered with the HPCNA in 2019/2020. The majority of the respondents (83.7%) were women.

This national survey established that during the COVID-19 pandemic occupational stress was prevalent among Namibian radiographers, in both government and private hospitals. A large number of respondents working in public and private hospitals in Namibia had experienced occupational stress due to the COVID-19 pandemic. This finding is consistent with those of Akudjedu *et al.* (2021) who found that the majority of the practising radiographers in Ghana were experiencing occupational stress due to the COVID-19 pandemic. In addition, Akudjedu and colleagues (2021) pointed out

that fear of contracting the virus and shortage of PPEs were the main stressors reported among Ghanaian radiographers. Correspondingly radiographers in this study reported fear of contracting and spreading the virus as well as increased workload to be their main stressful factors during the COVID-19 pandemic. This suggests that the effect of this pandemic was affecting radiographers on a larger scale. It is further safe to assume that this could likely be due to similar challenges such as increased workload and the threat of infection due to their contact with COVID-19-positive patients as experienced by radiographers from Namibia and Ghana respectively during the pandemic (Arslan & Soylu, 2021).

A study by Goni and colleagues (2022) reported mild to moderate levels of stress among HCPs in Portiuncula Hospital in Galway, Ireland. Goni and colleagues (2022) also assessed the prevalence of anxiety, depression and stress among HCPs. In line with the literature, the current study also found a moderate level of occupational stress among just over 50% of radiographers who participated, whilst a quarter had high levels of stress and about 15% a low level of stress respectively.

The first objective of the study was to observe radiographers' occupational stress and stressors caused by the COVID-19 pandemic. The findings of this study showed that the factors that had the most stressful impact on radiographers were increased workload, fear of contracting the contagious Coronavirus and fear of spreading the virus to others. The finding regarding the fear of contracting the COVID-19 virus was in keeping with those of Akudjedu *et al*. (2020) who found this to be among the major stressors experienced by radiographers in the UK. Furthermore, a study by Naylor *et al.* (2021) and van de Venter *et al*. (2021) also reported that radiographers in the UK and South Africa similarly experienced the fear of contracting and spreading COVID-19. In one other study, fear was reported to have caused HCPs to sleep in their cars to protect their families (Khan *et al.,* 2020).

To tackle fear, Ibrahim *et al.* (2021) stated that PPE is very crucial in shielding radiographers against possible infection by the virus. Ayyala *et al.* (2021) for example

argued that PPE made HCPs feel safe when interacting with infected patients. In addition, Foley *et al.* (2020) echoed this stating that nothing made radiographers fearful like having to engage with a patient without adequate PPE.

In the current study, an increased workload was found to intensify the level of stress among radiographers, a finding also showed by Ibrahim *et al.* (2021). Concerning increased workload in radiology departments, Adesi *et al.* (2015) believed that this was because radiographers were required to work long hours without a break time. Working continuously without relaxation allowed radiographers to keep up with their increased workloads but placed them under stress. An earlier study by Akudjedu *et al.* (2021) found that increased use of PPE and the need for decontamination of equipment had contributed to both an increased workload and prolonged examination time.

The second objective of this study was to ascertain the coping strategies radiographers used to manage occupational stress during the COVID-19 pandemic. A large number of radiographers in the current study agreed to have suffered occupational stress both prior to and during the COVID-19 pandemic. Despite being stressed, most radiographers highlighted different ways that helped them cope with the pandemic-related stress. The coping strategies mostly preferred by the respondents were spending quality time and talking to either a friend or a family member, developing some hobbies (such as exercise, sport, watching television, reading, cooking, listening to music etc.) as well as meditating and getting involved in spiritual and religious activities. This finding is consistent with the study of Knapp *et al.* (2022) in which respondents cited exercise as the best coping strategy undertaken by academic radiographers. In New York, USA, Shechter *et al.* (2020) also found that physical activity and spiritual practices to be the most common stress reduction activities undertaken by HCPs during the COVID-19 pandemic. Regardless of the difference in coping measures, radiographers must be advised to utilise whichever coping method best works for them.

Given the aforementioned mostly preferred coping strategies found in the current study, radiographers should learn to counteract their occupational stress by adapting the use of their preferred coping methods daily. Radiographers need to be encouraged to have social contact between themselves and their family and friends to discuss any conflicting issues they are experiencing at work (Knapp *et al.,* 2022; Mudenda *et al.,* 2022). Radiographers must be made aware that experiencing occupational-related stress and not acting on it by applying available coping strategies can lead to depersonalisation (Rothmann & Malan, 2011). According to Rajan (2014), opportunities such as rest, practising yoga, physical exercises, time management, work schedule management, eating healthy, self-motivation and relaxation training are good coping strategies which radiographers can use to mitigate occupational stress. In the same way, the researcher believes that pastoral and religious support should be made available to radiographers promptly whenever needed. Ashong *et al.* (2016) claimed that applying coping strategies regularly and frequently could lower stress levels.

The current study also found that a very small portion of the radiographers resorted to eating, drinking and smoking as their coping strategies. Alcohol use during the COVID-19 pandemic as a coping mechanism was also described in other studies (Avery *et al.,* 2020; Reilly *et al.,* 2021). While it is common for some HCP's [including radiographers] to use substances during stressful times to help them cope with the COVID-19 pandemic, Avery *et al.* (2020) as well as Reilly *et al.* (2021) warned HCPs to be mindful of the danger associated with using such coping strategies. It can be argued that misuse or overuse of any substances during a pandemic can be detrimental to radiographers.

The third objective of the study was to identify and describe workplace interventions that can be used to mitigate the effects of stress among radiographers during future pandemics.

5.3 Support systems for radiographers

Some of the radiographers in the current study indicated that they would need professional help to assist with the management of their occupational-related stress due to the COVID-19 pandemic. There was however conflicting knowledge of the existence of psychological and social support at the workplace among radiographers. The study identified that while a very small number of the radiographers felt that psychological and social support existed at their respective places of work, a moderate number of radiographers thought that such support was non-existent whereas a small number of radiographers had no idea about its existence. This worrisome finding is a reflection that most radiographers in Namibia lacked psychological and social support systems to assist radiographers in dealing with occupational-related stress. It can also be argued that there could have been a lack of awareness of such support systems among radiographers. Considering that the accuracy of this observation was not verified by the researcher, this finding must be interpreted with caution. Thus, radiography managers must create employee wellness programme (*i.e.* support and counselling structures) at the hospitals where such services are absent and strengthen the awareness of where they already exist.

A study by Flood and colleagues (2022) indicated that while awareness of and access to support services were available at some facilities, making use of these was reported to be another challenge. The reluctance to utilise these services was reported by Flood *et al.* (2022) and most HCPs only considered using such support services at later stages. Radiographers should be encouraged to get help from counselling programmes timely.

Respondents in the current study were asked where they sought immediate support in case of COVID-19-related work stress. Support from family and friends was the most frequently reported by radiographers. Colleagues, on the other hand, were the second most common source of immediate support. Results indicated that support from the managers or employers was among the lowest with only 13% of the radiographers indicating having received such support from their managers or employers. This can be an illustration that good relationships between radiographers and their managers are likely to be absent, causing radiographers to avoid them. Radiographer/manager relationships are important particularly when dealing with stress from a life-threatening pandemic. Feeley *et al.* (2021) confirmed collegial interactions as a useful support mechanism in the workplace. According to Farzanmehr *et al.* (2016), workers who see strong support from their colleagues and managers were reported to be more at ease in performing their duties.

Akweenda and Cassim (2016) stated that given the busy working environment of a hospital, there may be times when HCPs cannot turn to their colleagues for support when they are stressed as there is little-to-no time to discuss personal issues. This could be an inhibiting factor in discussing occupational-related stress or personal issues with colleagues due to the demands of work.

5.4 Interventions required at work

With regards to interventions that can be used to mitigate the effects of occupational stress among radiographers during future pandemics, the top three most cited interventions included the introduction of incentives, social networking and provision of psychological support. Regardless of this finding, another important concern found in one study was fear of stigmatisation and labelling for seeking psychological support as reported by Khan *et al.* (2020). HCPs in another study reported that accessing emotional and psychological support during the COVID-19 pandemic might be embarrassing should fellow colleagues find out that they were seeking such support

(Feeley *et al.*, 2021). Rajan (2014) however argued that support structures like counselling services should be made available to all staff members without fear of stigmatisation.

While it is impossible to meet all the needs of radiographers during a perilous pandemic, Khan *et al.* (2020) suggested that fulfilling the basic needs of radiographers must be made available to them when at work. The needs suggested were items such as providing food, drinking water, proper resting facilities and toiletries. Access to free internet services and electronic devices where radiographers can contact their loved ones and access virtual services such as counselling programmes, in-service training and workshops were also recommended. In other words, radiography managers must take it upon themselves to utilise everything at their disposal to make sure their staff are supported during difficult times such as the COVID-19 pandemic.

5.5 Suggestions regarding better management of future pandemics

In addition to the questions posed related to the three main objectives described above, the last two questions of the survey were open-ended and were aimed at eliciting suggestions on how COVID-19-related occupational stress could be better managed by the employer including the provision of general comments relative to the COVID-19 pandemic.

Apart from the provision of psychological support, training and workshops, monetary incentives, hiring of more radiographers, and flexible working hours among others were suggestions on how COVID-19-related occupational stress could be better managed. Radiographers further desired platforms where they can directly engage management and discuss matters of concern. Radiographers further suggested that management should listen to their opinions and suggestions and consider them when making decisions. That suggestion by itself may imply that radiographers did not feel involved in the general decision-making processes. Management should therefore

avail such platforms where radiographers can air their views and participate in decision-making. It is to be acknowledged that not all radiographers can be involved or might have an interest in such processes, but management should ensure fair representation or at least open dialogue. Akweenda and Cassim (2016) asserted that engaging staff members in the decision-making process improves their commitment to their employers.

As for the general comments concerning the COVID-19 pandemic, one of the most important points raised by respondents was that radiographers wanted recognition as front-line workers just like other HCPs such as nurses, doctors and pharmacists. Radiographers indicated that they were involved in many of the critical diagnostic activities related to COVID-19 but were not regarded and treated equally to other professionals whom they think were given more privileges by hospital managers. Radiography managers might consider remedies aimed at restoring the sense of feeling being valued (Prasad *et al.,* 2021). Management on the other hand must also ensure that resources needed to help staff feel valued and cared for during pandemics and beyond, are availed (Flood *et al.,* 2022).

On a positive note, radiographers stated that COVID-19 was part of their lives and their professional environment and accepting it eased the fear. One can argue that the current radiographers have seen the worst pandemic of their lifetime and would probably be better prepared for future pandemics physically, psychologically and emotionally. Radiographers are encouraged to continue adhering to COVID-19 protocols provided such as wearing masks and vaccinations in fighting together the COVID-19 pandemic.

Based on the results of this study, the researcher believes that mental health education should be made available to all radiographers to emphasise the practical importance of adopting coping strategies. Radiographers suffering from stress-related problems must be referred to appropriate support units immediately. Equally, radiographers must be taught to be resilient. Resiliency cultivates their ability to

bounce back as quickly as possible from challenges or setbacks (Fishman *et al.,* 2018). Fishman and colleagues (2018) however further stressed that unless the obstacles to resilience are addressed, the ability to recover remains a challenge. Radiography managers need to address not only the drivers of occupational stress among radiographers but also anything causing hindrances to resilience. Hence, regular meetings and thorough communication between the employer and radiographers must be encouraged. It is through regular meetings and communication that the relationships between the employer and employees improve and in return facilitate dialogue that can unearth matters of concern and help in addressing those matters (Pereira *et al*., 2021).

5.6 Study Summary

Stress is pervasive in radiography and Namibian radiographers faced similar COVID-19 occupational-related stress experienced by colleagues globally. Overall, the increased workload and fear of both contracting and spreading the virus were rated as a high source of stress among many radiographers. Of all the stressors, fear of contracting or spreading the virus was further found to have caused the highest level of stress among radiographers. Despite the stressful situations in the workplace, different coping methods enabled radiographers in Namibia to withstand the effects of COVID-19 occupational stress. The study recognised the important role played by families and friends in offering immediate support to the radiographers during the previous and importantly future pandemics. The introduction of incentives, building a strong social network and psychological support systems for radiographers within the workplace were the top-three most preferred interventions to support stress management during the COVID-19 pandemic and beyond.

5.7 Recommendations

Based on the top stressors of this study, the following effective stress reduction interventions can be employed in future pandemics:

- Reducing the daily workload - through hiring more radiographers and/or outsourcing some of their work (Fishman *et al.,* 2018,). Management can consider reducing daily working hours using a shift work system. Rajan (2014) suggested that it would be excellent if radiographers get involved in drafting their work shifts as this will improve their job satisfaction. Radiographers must be allowed to state how best their work could be arranged (International Labour Organization, 2016). Workers who choose their working schedule are less likely to stress over their work than those whose working shift is controlled by somebody other than themselves. Radiographers with control over their work are better able to synchronise and adjust their personal and work lives (Farzanmehr et al., 2016).
- Removing fear from radiographers - Over half of the study respondents were fearful of contracting or spreading COVID-19 at the workplace to others. The fact that radiographers care for patients with or without COVID-19 places radiographers at risk of infection. The nature of this disease according to Abbas *et al.* (2021) is so frightful that it could cause HCPs to stress while at work. Effective infection control measures and accessing PPE, whenever needed, will instil a sense of safety and reduce the radiographer's fear that COVID-19-positive patients will infect them. One study showed that having confidence in infection control lowers the level of stress among HCPs (Elbqry *et al.,* 2021).

Providing training in risk and disaster management can lessen if not remove fear among radiographers. This study's finding showed that unpreparedness had placed additional stress on radiographers during the pandemic. There is therefore a clear need for radiography managers to be proactive and provide comprehensive training in risk and disaster management for any future pandemic responses. It is evident from

the literature that education and training improve the experience, skills and subsequently mental health of staff (Elbqry *et al.,* 2021), ensuring that the skills of radiographers and the requirements of their jobs are aligned (International Labour Organization, 2016) [especially during the pandemic]. This can be done through regular simulations, video conferencing, reading and keeping up with the latest research reports.

It is further recommended from this study that facilities without support and counselling programmes in place should create such services and make them available to radiographers. Where such programmes already exist, these must be made known to all radiographers. Awareness must be strengthened continually to make sure that all radiographers are supported during their time of need.

All these recommendations require commitment and support from management, be it through allocating adequate resources, providing guidance and setting up goals to tackle occupational stress among radiographers.

5.8 Limitations, strengths and recommendations for future studies

The present study focused on the stressors Namibian radiographers faced at their workplaces during the COVID-19 pandemic. The study however had some noteworthy limitations. With the use of the electronic survey, radiographers with no smart cellular phones, or access to personal computers and those deep in remote areas with no internet coverage did not have a fair chance to participate. Consequently, the experiences of radiographers working in smaller hospitals and remote parts of the country were potentially excluded, preventing the author from gaining their potentially valuable insights too.

The data were collected in June 2022, two years after the onset and peak of the COVID-19 pandemic. By this time, the radiographers may have developed resilience toward the pandemic, their psychological status might have improved and their stress

levels might have been lower than it was at the initial stage of the COVID-19 pandemic. Due to this time-lapse, there could have been also a loss in memory vividness of respondents, potentially reducing the quality of the data obtained. The other yet important limitation is that the generalisability of results to disciplines other than diagnostic radiography cannot be made because of their exclusion.

Regardless of the said limitations, an important strength of this study however was noted. To the author's knowledge, this study is the first of its kind conducted among radiographers in Namibia. The study provided unique information about Namibian radiographers' experiences concerning COVID-19-related stress. The findings contribute to the body of knowledge by developing an understanding of the impact COVID-19 had on Namibian diagnostic radiographers. It therefore not only provides a baseline for future studies, but the findings and recommendations can also potentially be used to counteract the challenges of future pandemics as far as occupational stress among radiographers is concerned. Radiography managers who will proactively act on the findings of this study will mitigate the ever-increasing radiographers' occupational stress and promote wellness among their staff.

Future research can improve and build on the findings of the present study. For example, to avoid or rather to confirm the generalisability of the results of the present study, future studies may look at other disciplines within radiography such as radiotherapy, ultrasonography and nuclear medicine. In addition, future studies can also employ a larger sample size among diagnostic radiographers to increase the generalisability of the study findings. This study also did not ascertain how many radiographers made use of counselling during the pandemic as the study merely requested whether they knew whether these services were available.

Future studies can therefore ascertain how many radiographers make use of counselling support during pandemics. The study reported support from managers/employers to be the lowest in relation to being an immediate source of support for radiographers, with only a very small number of the respondents indicating

having received such support from their managers/employers. Hence, future studies can also consider exploring the relationship between managers and sub-ordinates and their willingness and or reluctance to request support from them during a pandemic.

5.9 Chapter Summary

In this chapter, a discussion of the study findings was made. Lastly, the chapter addressed the issues related to the study's limitations, strengths and recommendations for future studies. Radiography managers must ensure that the radiographers under their care are mentally and physically supported during the COVID-19 pandemic and future pandemics. Supported radiographers felt motivated and developed confidence in their employer. Radiographers should be encouraged now and again to prioritise and take good care of their health. Radiographers suffering from the effects of stress at the workplace must be encouraged to seek or be assisted with counselling and or rehabilitation. Where possible, access to such counselling and rehabilitation sessions should be available to radiographers at no cost, particularly during a pandemic.

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APPENDIX A - COVER LETTER TO PARTICIPANTS

P O Box 50650
Bachbrecht
Windhoek
23 July 2021

Dear Participant

I am a Master of Science (Radiography) student at the Cape Peninsula University of Technology. As a course requirement, I am expected to conduct a research study. The title of my study is: *"Occupational Stress among Diagnostic Radiographers during the COVID-19 Pandemic; a Namibian Perspective".* As part of my data collection for my research project, I will need your assistance in completing the attached questionnaire. The study seeks to understand the stressors the diagnostic radiographers in Namibia faced at the workplace during the Covid-19 pandemic and which interventions if any were available to support you in coping with occupational stress. Answering this survey will take about 15 minutes of your time. It is preferred that this questionnaire be completed in your free time after hours.

Please take note that your participation in this study is voluntary, you should not feel pressured to take part. You are free to withdraw at any time for any reason. Since this is an anonymous survey, the researcher will have no way of tracing your questionnaire after submission, so retraction of your questionnaire will not be possible. Therefore, be assured that your responses will not be traceable back to you.

Be informed that the information and data obtained from this study will be treated confidentially and participants' identity and the name of the research site, will not be revealed during publication of the results. Your identity will remain anonymous to protect your privacy. No personal or identifying information such as your name or staff number is required from you to enable you to complete the survey.

The information may be retained, analysed, stored and discarded accordingly after the completion of the thesis. Data collected and other research related information will be kept on a password-protected laptop which is usually stored in a secure location at the home of the researcher. Participants' information will not be shared with third parties other than my examiners and statisticians only if the need arises. Encryption means will be used where information is to be shared over the internet.

Kindly click on the link provided below *(to be provided*) to complete an electronic survey at your convenient time. The due date will be 31 March 2022 at midnight. No question is compulsory, you may omit any question you do not desire to answer. You are further reminded that, by filling in the survey, you are voluntarily consenting to participate in the study. No compensation of any kind will be offered to the participants of the survey.

For enquiry regarding this study, please feel free to contact me at my contact details provided. Alternatively, Dr A. Speelman, my supervisor at the email: speelmana@cput.ac.za or Ms C. Lackay, the chairperson of the Research Ethics Committee at the Faculty of Health & Wellness Sciences, Cape Peninsula University of Technology, P.O. Box 1906, Bellville 7535, South Africa.

Feedback on the outcome of the study can be offered on request. Please take note of my contact details to that effect. We also commit to providing an anonymised summarised report of the main findings to the heads of each department where participants were recruited from. This summarised report will be for distribution and or placement on the notice boards of such departments for your reading. The findings of the complete study will also be made available on the CPUT Electronic Theses and Dissertations (ETD) which is an online open-access repository to the university's theses and dissertations. This digital format will therefore make this study available freely to the participants and the public in general.

Your participation in this study is highly valued.

Yours faithfully

F. Shidolo (the researcher)

Cellphone: +264 81 2834 925

Email address: fizitus@gmail.com

Note: Radiographic assistants, students, radiographers from other disciplines other than diagnostic, locums and volunteer radiographers, lecturers, and other diagnostic radiographers not in direct contact with patients may not take part in this study.

APPENDIX B – THE RESEARCH TOOL: QUESTIONNAIRE

Study Title: Occupational Stress among Diagnostic Radiographers during the COVID-19 Pandemic: A Namibian Perspective

A. Participant consent

Note: By filling in this questionnaire, you are voluntarily consenting to participate in the study. You are further confirming that you have read the cover letter and understand the study and its purpose.

Where required, please simply click or make use of a cross (X) to mark the appropriate answer/box(es).

B. Socio-demographic information

1. My age	
2. My gender	
Male	
Female	
Other (please write in the opposite box)	
3. My Rank	
Just a radiographer	
A radiographer with a managerial role	
Others (please write in the opposite box)	
4. My employer	
Government	
Private	

5. I am confirming that… (Please mark all boxes that apply to you)

I am a practising diagnostic radiographer working in direct contact with patients?	
I am currently registered with the Health Profession Councils of Namibia.	
I am not an assistant-radiographer.	
I am not a student radiographer.	
I am not a part-time locum radiographer.	
I am not a volunteer radiographer.	

Important Notice: If you have marked all the boxes above, you may continue with the survey. If one or more does not apply to you, you may end here and thank you for your participation.

C. Occupational stress and stressors caused by the Covid-19 pandemic

	Yes		No		Not sure		
6. I know what occupational stress is							
7. I have suffered occupational stress.							
8. I feel stressed about work lately due to the COVID-19 pandemic?							

9. If your answer above (Question 8) is yes, how would you rate your level of occupational stress concerning the COVID-19 pandemic?							
Low		Intermediate		High		Not applicable	

10. The table below highlights possible stressors associated with the COVID-19 pandemic as identified from the literature. Which of them causes you stress at work? Please indicate your agreement with the statement on the Likert scale provided. (SA = Strongly agree, A = Agree, N = Neutral, D = Disagree, SD = Strongly disagree)					
	SA	A	N	D	SD
Workload: the radiology workload at my hospital has increased during the COVID-19 pandemic					
PPE: the personal protective equipment at my workplace during the COVID-19 outbreak was available as per the applicable regulations					
Fear: I am fearful of contracting the COVID-19 virus from the workplace					
Fear: I am fearful of spreading the COVID-19 virus from the workplace to others					
Staff: there are enough staff complement at my work to deal with the COVID-19 pandemic workload					
Preparedness: my work has prepared me to deal with COVID-19 patients during the pandemic					
Cleaning material: supply as an infection control measure is available at my workplace					
Disinfectant material: supply as an infection control measure is available at my workplace					
Physical distancing: my workplace practises physical distancing as a preventative form against contracting the COVID-19 virus					

Adaptation: I find it difficult adapting to sudden new changes in the workplace due to the COVID-19 pandemic					
Support: I am receiving support from the management to keep me motivated during the COVID-19 pandemic					
Appreciation: I feel I am appreciated for the work I am doing during the COVID-19 pandemic					

11. To what degree did any of the stressors in the table below cause you stress at work? Please select low, medium, high or not applicable in the appropriate box.				
	Low	Intermediate	High	Not applicable
Increased workload				
Lack of personal protective equipment (PPE)				
Discomfort caused by wearing the PPE				
Fear of contracting the coronavirus				
Fear of spreading the coronavirus to others				
Shortage of staff				
Lack of preparedness for the pandemic				
Lack of cleaning material				
Lack of disinfectant material				
Absence of physical distancing at the workplace				

Sudden changes in work procedure due to the COVID-19 pandemic				
Unavailability of support from the management				
Lack of appreciation for the work you are doing				

D. Dealing/coping with work-related stress

12. From a personal perspective, what are your methods/strategies for coping with stress related to the COVID-19 pandemic? Select all those applicable to you (Questions adapted from Demirjian, *et al.,* 2020).	
I do not need coping mechanisms	
I cry in silence	
I isolate myself	
I eat (abnormal/irrepressible eating)	
I drink (alcohol)	
I smoke	
I take a holiday	
I look for professional help (psychologist, GP, etc)	
I spend time and talk with friends/family	
I spend time looking at and admiring the nature	
I do meditation/spiritual/religious activities	
I develop hobbies (exercise/sport/television/reading/cooking/music etc.)	
For others, please enter below	

List any others: _____

E. Interventions to mitigate the effects of stress

13. Are there support measures at your work to deal with stress for instance when a staff member contracted the COVID-19 virus?					
Yes		No		Not sure	

14. If you have answered "yes" to question number 13, please explain the type of support measures available: _____

_____

15. Do you feel you need professional help now to deal with stress caused by the COVID-19 pandemic?					
Yes		No		Not sure	

16. In case of COVID-19-related work stress, where do you get your immediate support?											
Employer		Supervisor		Colleagues		Family		Friends		Others	

List any others: _____

17. Of the following, what will be your top-3 best interventions to support the radiographers affected by stress during COVID-19 and beyond?	
Social networks (Family, Friends, Work, colleagues, Virtual networks)	
Provisions of psychological support (Psychologists, Psychiatrist, counselling)	
Introduction of incentives (Flexible work policies, Compensation)	
Access to workplace resources (PPE, rest and sleep rooms)	
Trainings and workshops (on the use of PPE, Patient care protocols, stress management)	
Physical activities (Team buildings, Sports, Exercise)	
Religion (Faith-based activities)	
Develop Hobbies (Sports, cooking, movies, music, reading)	
Others	

For “Others” state these: _____

F. Suggestion

18. How do you think COVID-19-related occupational stress could be better managed by your employer? Please write your suggestions in the space provided below.

_____

_____

19. Any other comments relative to the COVID pandemic are welcomed:

_____

_____

_____

This is the end of the survey. Thank you for your time.

APPENDIX C- DATA WORKSHEET

This document was converted into an EXCEL spreadsheet.

Socio-demographic information

Variables	Groups	Number of respondents (n)	%
Gender	Female		
	Male		
	Others		
Total			
My rank	Just a radiographer		
	Radiographer with managerial role		
	Other		
Total			
Age group	20 - 29		
	30 - 39		
	40 - 49		
	50 - 59		
Total			
Employer	//////		
Government	//////		
Private	/////		
Total			

Stress / Stressors

Variable	Group	Number of respondents (n)	%
I know what occupational stress is	Yes		
	No		
	Not sure		
	Total		
I have suffered occupational stress myself	Yes		
	No		
	Not sure		
	Total		
Feel stressed due to the COVID-19 pandemic?	Yes		
	No		
	Not sure		
	Total		
Level of occupational stress due to COVID-19	Low		
	Intermediate		
	High		
	Not applicable		
	Total		

Statement	SA	A	N	D	SD
Workload: the radiology workload at my hospital has increased during the COVID-19 pandemic					
PPE: the personal protective equipment at my workplace during the COVID-19 outbreak was available					
Fear: I am fearful of contracting the Covid-19 from the workplace					
Fear: I am fearful of spreading the COVID-19 from the workplace to others					
Staff: there are enough staff complement at my work to deal with the COVID-19 pandemic workload					
Preparedness: my work has prepared me to deal with COVID-19 patients during the outbreak					
Cleaning material: supply as an infection control measure is available at my workplace					
Disinfectant material: supply as an infection control measure is available at my workplace					
Physical distancing: my workplace practices the physical distancing as a preventative form against contracting the COVID-19 virus					
Adaptation: I find it difficult adapting to sudden new changes in the workplace due to the COVID-19 pandemic					
Support: I am receiving support from the management to keep me motivated during the COVID-19 pandemic					
Appreciation: I feel I am appreciated for the work I am doing during the COVID-19 pandemic					

Key: SA - Strongly agree, A – agree, N – Neutral, D – Disagree, SD – Strongly disagree

	Low	Intermediate	High	Not applicable
Increased workload				
Lack of personal protective equipment (PPE)				
Discomfort caused by wearing the PPE				
Fear of contracting the coronavirus				
Fear of spreading coronavirus to others				
Shortage of staff				
Lack of preparedness				
Lack of cleaning material				
Lack of disinfectant material				
Absence of physical distancing at workplace				
Sudden changes in work procedure due to COVID-19 pandemic				
Unavailability of support from the management				
Lack of appreciation for the work you are doing				

Key: L – Low, I – Intermediate, H – High, NA – Not applicable

Stress management interventions

Variable	Group	Number of respondents (n)	%
Support availability	Yes		
	No		
	Not sure		
	Total		
Explained type of support measures available:			
In need of professional help	Yes		
	No		
	Not sure		
	Total		
For immediate support	Employer		
	Supervisor		
	Colleagues		
	Family		
	Friends		
	Others		
	Total		

Best interventions to support stress during COVID-19 and beyond

Variable	Number of respondents (n)	%
Social networks		
Psychological support		
Incentives		
Workplace resources		
Training and workshops		
Physical activities		
Religion		
Develop Hobbies		
Others		
Total		

Of the following, what will be your top-3 best interventions to support stress during COVID-19 and beyond?	(N)	%
Social networks (Family, Friends, Work, colleagues, Virtual networks)		
Psychological support (Psychologists, Psychiatrists, counselling)		
Incentives (Flexible work policies, Compensation)		
Access to workplace resources (PPE, rest and sleep rooms)		
Training and workshops (on the use of PPE, Patient care protocols, stress management)		
Physical activities (Sports, Exercise)		
Religion (Faith-based activities)		
Develop Hobbies (Sports, cooking, movies, music, reading)		

Dealing/coping with work-related stress (Personal Perspective)

From a personal perspective, what are your methods/strategies of coping with stress related to the COVID-19 pandemic (select only those that apply)

Variable	Number of respondents (n)	%
No coping needed		
I cry in silence		
I Isolate myself		
I eat		
I drink		
I smoke		
I take a holiday		
I look for professional help (Psychologist, GP, etc)		
I spend time and talk with friends/family		
I spend time looking at and admiring nature		
I do meditation/spiritual/religious activities		
I develop hobbies (exercise/sport/television/reading/cooking/music etc)		
Others		

Suggestions:

How do you think COVID-19-related occupational stress could be better managed by your employer? Please write your suggestions in the space provided below.

Any other comments relative to the COVID-19 pandemic are welcomed:

_____

_____

_____

APPENDIX D - APPLICATION FOR RESEARCH ETHICAL CLEARANCE

P O Box 50650
Bachbrecht
Windhoek

23 July 2021

Ms C Lackay
The Chairperson
Research Ethics Committee
Faculty of Health & Wellness Sciences
Cape Peninsula University of Technology
PO Box 1906
Bellville 7535
South Africa

Dear Ms Lackay

APPLICATION FOR RESEARCH ETHICAL CLEARANCE

I am a Master of Science (Radiography) student at Cape Peninsula University of Technology. As a Master's student, the university requires that I conduct a research study for the fulfilment of an award towards this degree. I am hereby writing, requesting your office to grant me the ethical clearance to collect data for my study.

The proposed study is titled *"Occupational Stress among Diagnostic Radiographers during the COVID-19 Pandemic; a Namibian Perspective"*. The study's main objectives are: (1) to observe radiographers' occupational stress and stressors caused by the COVID-19 pandemic, (2) to ascertain coping strategies of radiographers to manage occupational stress due to the COVID-19 pandemic, and (3) to identify and describe workplace interventions that can be used to mitigate the effects of stress on radiographers during future pandemics.

The study will be conducted in Namibia after the ethics approval from the Research Ethics Committee of the Faculty of Health and Wellness Sciences of the Cape Peninsula University of Technology has been granted.

Invitation letters with a study description and a link to the study survey will be sent electronically to the participants. Participation in this study will be voluntary. No one will be pressured or coerced to take part. The participants may withdraw at any time for any reason. Participants will be informed that the information and data obtained from this study will be treated confidentially and participants' identity and the name of the research site will not be revealed during publication of the results. The participants' identities will remain anonymous to protect their privacy. No personal or identifying information such as name or staff number is required to enable the participants to complete the survey.

The information may be retained, analysed, stored and discarded accordingly after the completion of the thesis. Data collected and other research-related information will be kept on a password-protected laptop which is usually stored in a secure location at the home of the researcher. Participant's information will not be shared with third parties other than my supervisors and statisticians only if the need arises. Encryption means will be used where information is to be shared over the internet.

I anticipate that the study findings will contribute toward the development of strategies to mitigate the effects of stress on diagnostic radiographers.

A full copy of my research proposal has been attached for your attention.

Your support to allow me to complete this study will be appreciated. Yours Faithfully

Festus S Shidolo (Mr.)
The Researcher
Cellphone: +264 81 2834 925
Email address: fizitus@gmail.com

APPENDIX E – ETHICS CLEARANCE CERTIFICATE: CPUT

Cape Peninsula University of Technology

HEALTH AND WELLNESS SCIENCES RESEARCH ETHICS COMMITTEE (HW-REC)
Registration Number NHREC: REC- 230408-014

P.O. Box 1906 • Bellville 7535 South Africa
Symphony Road Bellville 7535
Tel: +27 21 959 6917
Email: sethn@cput.ac.za

1 March 2022
REC Approval Reference No:
CPUT/HWS-REC 2022/H5

Faculty of Health and Wellness Sciences

Dear Mr Shidolo

Re: APPLICATION TO THE HWS-REC FOR ETHICS CLEARANCE

Approval was granted by the Health and Wellness Sciences-REC to **Mr FS Shidolo** for ethical clearance. This approval is for research activities related to research for **Mr FS Shidolo** at Cape Peninsula University of Technology.

TITLE: Occupational Stress amongst Diagnostic Radiographers during the COVID-19 Pandemic; a Namibian Perspective

Supervisor: Mr A Speelman and Ms V Daries

Comment:

Approval will not extend beyond 2 March 2023. An extension should be applied for 6 weeks before this expiry date should data collection and use/analysis of data, information and/or samples for this study continue beyond this date.

The investigator(s) should understand the ethical conditions under which they are authorized to carry out this study and they should be compliant to these conditions. It is required that the investigator(s) complete an **annual progress report** that should be submitted to the HWS-REC in December of that particular year, for the HWS-REC to be kept informed of the progress and of any problems you may have encountered.

Kind Regards

Mrs Carolynn Lackay
Chairperson – Research Ethics Committee
Faculty of Health and Wellness Sciences

APPENDIX F - LETTER TO THE EXECUTIVE DIRECTOR: MoHSS

PO Box 50650
Bachbrecht
Windhoek

23 July 2021

Mr B Nangombe
The Executive Director
Ministry of Health and Social Services
Private Bag 13198
Windhoek
Namibia

Dear Mr Nangombe

REQUEST FOR PERMISSION TO CONDUCT RESEARCH

I am a Master of Science (Radiography) student at the Cape Peninsula University of Technology. As a Master's student, the university requires that I conduct a research study for the fulfilment of the award towards this degree.

The proposed topic of my study is "*Occupational Stress among Diagnostic Radiographers during COVID-19 Pandemic; a Namibian Perspective*". The study's main objectives are: (1) to observe radiographers' occupational stress and stressors caused by the COVID-19 pandemic, (2) to ascertain coping strategies of radiographers to manage occupational stress due to the COVID-19 pandemic, and (3) to identify and describe workplace interventions that can be used to mitigate the effects of stress on radiographers during future pandemics.

I plan to conduct the study among the diagnostic radiographers working in the public radiology services and private radiology practises in Namibia. It is important to note that this study will not interfere with normal working hours, as the participants

choosing to participate can complete the study survey during their convenient free time (lunch or at home) using their own computer or cellular phone. I plan to have data collection during the year 2022 following ethics approval from the Research Ethics Committee of the Faculty of Health and Wellness Sciences of the Cape Peninsula University of Technology.

Participation in this study will be voluntary. No one will be pressured or coerced to take part. The participants may withdraw at any time for any reason. The participants will be informed that the information and data obtained from this study will be treated confidentially and participants' identity and the name of the research site will not be revealed during publication of the results. The participants' identities will remain anonymous to protect their privacy. No personal or identifying information such as name or staff number is required to enable the participants to complete the survey.

The information may be retained, analysed, stored and discarded accordingly after the completion of the thesis. Data collected and other research-related information will be kept on a password-protected laptop which is usually stored in a secure location at the home of the researcher. Participant's information will not be shared with third parties other than my supervisors and statisticians only if the need arises. Encryption means will be used where information is to be shared over the internet.

The study will not direct interfere with normal working hours or participant's workload as they will be encouraged to complete the survey during their free time as far as possible. No government consumables will be used as this will be an electronic survey.

I hereby apply for permission to undertake research among the radiographers in Namibia.

Attached for further details are: (1) A copy of my research proposal and (2) a letter of permission from the Research Ethics Committee of the Cape Peninsula University of Technology.

In case of any queries, please do not hesitate to contact me or my supervisor Dr. A. Speelman by e-mailing him at speelmanA@cput.ac.za

Your support to allow me to complete this study will be sincerely appreciated.

Yours Faithfully

Festus S Shidolo (Mr)

The Researcher

Cellphone: +264 81 2834 925

Email address: fizitus@gmail.com

APPENDIX G – PERMISSION LETTER TO CONDUCT RESEARCH: MoHSS

REPUBLIC OF NAMIBIA

MINISTRY OF HEALTH AND SOCIAL SERVICES

Ministerial Building
Harvey Street
Private Bag 13198, Windhoek

OFFICE OF THE EXECUTIVE DIRECTOR

Tel: No: 061 -203 2507
Fax No: 061-222 558
Andreas.Shipanga@mhss.gov.na

Ref: 17/3/3/FSS
Enquiries: Mr. A. Shipanga

Date: 06 April 2022

Mr. Festus S. Shidolo
PO Box 50650
Bachbrecht
Windhoek

Dear Mr. Shidolo

Re: *Occupational Stress amongst Diagnostic Radiographers during COVID – 19 Pandemic: A Namibian Perspective.*

1. Reference is made to your application to conduct the above-mentioned study.
2. The proposal has been evaluated and found to have merit.
3. **Kindly be informed that permission to conduct the study has been granted under the following conditions:**
   - 3.1 The data to be collected must only be used for academic purpose;
   - 3.2 No other data should be collected other than the data stated in the proposal;
   - 3.3 Stipulated ethical considerations in the protocol related to the protection of Human Subjects should be observed and adhered to, any violation thereof will lead to termination of the study at any stage;
   - 3.4 A quarterly report to be submitted to the Ministry's Research Unit;
   - 3.5 Preliminary findings to be submitted upon completion of the study;
   - 3.6 Final report to be submitted upon completion of the study;
   - 3.7 Separate permission should be sought from the Ministry for the publication of the findings.
4. All the cost implications that will result from this study will be the responsibility of the applicant and **not** of the MoHSS.

Yours sincerely,

BEN NANGOMBE
EXECUTIVE DIRECTOR

EXECUTIVE DIRECTOR

All official correspondence must be addressed to the Executive Director.

APPENDIX H - LETTER TO THE HEADS OF RADIOGRAPHY DEPARTMENTS

P O Box 50650
Bachbrecht
Windhoek

23 July 2021

Department:

_____

_____

_____

_____

Attention: _____

REQUEST FOR PERMISSION TO CONDUCT RESEARCH

I am a Master of Science (Radiography) student at the Cape Peninsula University of Technology. As a Master's student, the university requires that I conduct a research study for the fulfilment of the award towards this degree.

The proposed topic of my study is "*Occupational Stress among Diagnostic Radiographers during COVID-19 Pandemic; a Namibian Perspective*". The study's main objectives are: (1) to observe radiographers' occupational stress and stressors caused by the COVID-19 pandemic, (2) to ascertain coping strategies of radiographers to manage occupational stress due to the COVID-19 pandemic, and (3) to identify and describe workplace interventions that can be used to mitigate the effects of stress on radiographers during future pandemics.

I plan to conduct the study among the diagnostic radiographers working in public radiology.

The study will not interfere with normal working hours, as the participants choosing to participate can complete the study survey during their convenient free time (lunch or at home) using your own computer or cellular phone. No government consumables will be used as this will be an electronic survey. I plan to have data collection during the year 2022 following ethics approval from the Research Ethics Committee of the Faculty of Health and Wellness Sciences of the Cape Peninsula University of Technology.

Participation in this study will be voluntary. No one will be pressured or coerced to take part. The participants may withdraw at any time for any reason. The participants will be informed that the information and data obtained from this study will be treated confidentially and participants' identity and the name of the research site will not be revealed during publication of the results. The participants' identities will remain anonymous to protect their privacy. No personal or identifying information such as name or staff number is required to enable the participants to complete the survey.

The information may be retained, analysed, stored and discarded accordingly after the completion of the thesis. Data collected and other research-related information will be kept on a password-protected laptop which is usually stored in a secure location at the home of the researcher. Participant's information will not be shared with third parties other than my supervisors and statisticians only if the need arises. Encryption means will be used where information is to be shared over the internet.

I hereby apply for permission to undertake research among the radiographers of your department. Attached for further details are; (1) A copy of my research proposal, (2) a letter of permission from the Research Ethics Committee of the Cape Peninsula University of Technology and (3) approval/permission from the executive director of the Ministry of Health and Social Services.

In case of any queries, please contact me personally or my supervisor Dr. A Speelman by e-mailing him at speelmanA@cput.ac.za

Your support to allow me to complete this study will be sincerely appreciated.

Yours Faithfully

Festus S Shidolo (Mr)

The Researcher

Cellphone: +264 81 2834 925

Email address: fizitus@gmail.com

APPENDIX I – PERMISSION LETTER TO CONDUCT RESEARCH: SITE A

22 April 2022

Festus S Shidolo
P O Box 50650
Bachbrecht
Windhoek

Re: Occupational Stress amongst Diagnostic Radiographers during COVID-19 Pandemic; a Namibian Perspective

Dear Mr., Shidolo,

Thank you for choosing [redacted] Academic Hospital for your research project.

1. We wish to inform you that your application to conduct a research study has been granted.
2. Once the study has been concluded, we request that you avail the study findings to [redacted] through the Unit of Training & Development.
3. The data collected should be for academic purposes only.
4. No data should be collected other than the data stated in the proposal.
5. [redacted] shall not bear responsibility of costs relating to the study.
6. We encourage you to uphold all necessary ethical considerations throughout your study.

Sincerely Yours

APPENDIX J – PERMISSION LETTER TO CONDUCT RESEARCH: SITE B

22 March 2022

Dear Mr. F Shidolo,

RE: Permission for data collection

grants you permission to collect data for your research **"Occupational Stress amongst Diagnostic Radiographers during COVID-19 Pandemic; a Namibian Perspective"**

Kind regards,

Clinical Manager

APPENDIX K – PERMISSION EMAIL TO CONDUCT RESEARCH: SITE C

[redacted]

to me

Good afternoon Festus

You have permission to conduct your research at [redacted]

Kind regards,

[redacted]

[redacted]

IMPORTANT: The contents of this email and any attachments are confidential. It is strictly forbidden to share any part of this message with any third party, without a written consent of the sender. If you received this message by mistake, please reply to this message and follow with its deletion, so that we can ensure such a mistake does not occur in the future.

APPENDIX L1 – PERMISSION LETTER TO CONDUCT RESEARCH: SITE D1

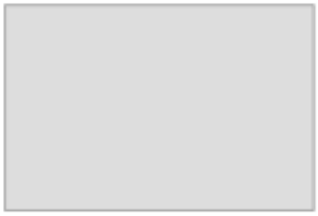
Dear Mr Festus Shidolo

Please receive your official letter of approval from Erongo Radiology to conduct your research on our radiographers through your electronic survey and other means as stipulated in your proposal.
Attached is the signed letter and signed original document by

Looking forward to hearing from you in this regard.

Yours

Chief Radiographer



APPENDIX L2 – PERMISSION LETTER TO CONDUCT RESEARCH: SITE D2

[redacted]

Approved
01/04/2022

P O Box 50650
Bachbrecht
Windhoek
16 March 2022

Department:
[redacted]

Attention: Ms. [redacted]

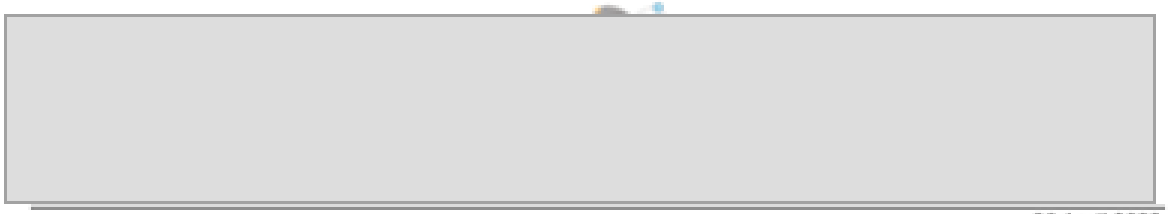
REQUEST FOR PERMISSION TO CONDUCT A RESEARCH

I am a Master of Science (Radiography) student at the Cape Peninsula University of Technology. As a Master's student, it is the university's requirement that I conduct a research study for the fulfilment of award toward a Master's degree.

The proposed topic of my study is "Occupational Stress amongst Diagnostic Radiographers during COVID-19 Pandemic; a Namibian Perspective". The study's main objectives are; (1) to explore radiographers' occupational stress and stressors caused by the Covid-19 pandemic, (2) to ascertain coping strategies of radiographers to manage occupational stress due to the Covid-19 pandemic, and (3) to identify and describe workplace interventions that can be used to mitigate the effects of stress on radiographers during future pandemics.

I plan to conduct the study among the diagnostic radiographers working in the public and some private radiology.

APPENDIX M – PERMISSION LETTER TO CONDUCT RESEARCH: SITE E



20 April 2022
Ref: MI 1.2.6

Dear Mr Shidolo

RE: PERMISSION TO CONDUCT RESEARCH IN FULFILLMENT OF STUDIES FOR BSC (RADIOGRAPHY)

Your request to conduct research [redacted]naging Diagnostic Radiology Practice under the topic "Occupational Stress amongst Diagnostic Radiographers during COVID-19 Pandemic; a Namibian Perspective" and in fulfilment of a Master of Science (Radiography) at the Cape Peninsula University of Technology bears reference and served at the Partners Meeting of 05 April 2022.

Permission has been granted (Ref: PM/05.04.2022/9.1) for you to request staff to complete the questionnaire under the following conditions:

- Permission is granted with the understanding that this does not negatively impact upon the operations.
- It is recognized that Ethics Committee approval of the studies has been obtained.

Yours Sincerely