Practice-related hygiene behaviours utilised by Chiropractors pre, during and post the COVID-19 pandemic in South Africa

By

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I, Jan-Frederik Enslin, do hereby declare that this dissertation is representative of my own work in both conception and execution (except where acknowledgements indicate to the contrary)

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DEDICATION

I dedicate this dissertation to Zanelé Enslin, my beautiful wife, and my best friend.

Thank you for being there for me during the good times and the bad times. You helped me through these past six years of studies, and I would never have been able to get here without you.

With each late night and early morning, you stood by me, offering encouragement, and understanding when the weight of research threatened to overwhelm. Your belief in my abilities never wavered, even when my own confidence faltered.

This dissertation stands as a testament not only to my academic endeavours but also to the profound influence of your presence in my life. Your strength, wisdom, and boundless love have sustained me through the challenges, making this journey not just mine, but ours.

For all the moments we shared, for every word of encouragement whispered, and for the countless sacrifices made, I dedicate this work to you, my beloved partner and confidante.

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ABSTRACT

Background: The COVID-19 pandemic had an impact on the delivery of healthcare services worldwide. The Allied Health Professions Council of South Africa implemented regulations to control the spread of the virus, including social distancing, face masks/shields, hand sanitisation, surface disinfection, and protective shields. Chiropractors had to incorporate new hygiene measures to ensure the safety of their patients and themselves. Without adherence to proper hygiene protocols, manual therapy poses a substantial risk of transmission for both the practitioner and the patient. There is limited information available regarding the changes made by chiropractors to their practices in response to the pandemic and if these changed behaviours are still being implemented. Exploring and understanding changes in behaviour can help identify areas where chiropractors may need additional support or resources to adapt to new circumstances and can provide valuable information on how the pandemic has impacted the field of chiropractic care. Additionally, by studying how chiropractors adapted during the pandemic can help gain insight into best practices for future challenges or crises that may arise, as well as can help improve patient care and outcomes in the future.

Aim: To determine the practice-related hygiene behaviours of chiropractors before, during and post the COVID-19 pandemic in South Africa.

Methodology: An anonymous online survey was completed by registered Chiropractors in South Africa (*n*=119) registered with the Allied Health Professions Council of South Africa, having provided informed consent. The survey consisted of questions related to practice hygiene behaviours pre, during and post the COVID-19 pandemic and distributed via a link on QuestionPro®. The survey closed on 02/02/2024.

Results: The study examined the distribution of hand and equipment disinfection in a healthcare setting, before and after the COVID-19 pandemic. The response rate for the survey was 22.45%. A total of 36% of chiropractors had been practicing for seven years and 60% lived in urban or major cities. Most practitioners returned to their work in level 4 of lockdown and practiced as a sole practitioner. The study found a significant statistical difference that sanitiser availability and the use of personal protective equipment were less prevalent before and after the pandemic than during the pandemic. Most chiropractors (78%) felt that the COVID-19 hygiene protocols made them more aware about practice hygiene behaviours. However, 30% of chiropractors believed they were likely to contract COVID-19 if they did not adhere to proper hygiene practices. Barriers to implementing hygiene practices during COVID-19 included patient reluctance, lack of time, resources and

difficulty in adhering to hygiene practices. Half of the chiropractors agreed to continue with good hygiene practices post COVID-19.

Conclusion: The COVID-19 pandemic resulted in increased adherence to practice related hygiene behaviours with the implementation of safety precautions such as protective screens and face masks. Many of the chiropractors continued to utilise these behaviours after the pandemic.

Key words: Hygiene practices, chiropractic, COVID-19 pandemic, South Africa.

TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

AHPCSA:	Allied Health Professions Council of South Africa
CASA:	Chiropractic Association of South Africa
DUT:	Durban University of Technology
HBM:	Health belief model
IREC:	Institutional Research Ethics Committee
PPE:	Personal protective equipment
SARS:	Severe acute respiratory syndrome
WFC:	World Federation of Chiropractic

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND TO THE STUDY

Primary health care is a comprehensive approach to organising and strengthening national health systems to bring health and wellness services closer to communities. It consists of three components: creating integrated health services, addressing broader health determinants through multisectoral policy and action, and empowering people, families and communities, to take control of their health (World Health Organization 2024). It is recognised as the most inclusive, equitable and cost-effective approach to achieving universal health coverage and improving the resilience of healthcare systems to prepare for, respond to, and recover from crises (World Health Organization 2024).

South Africa faces significant challenges in healthcare due to a high burden of disease, high maternal, neonatal, and child morbidity, elevated levels of trauma and violence, and growing rates of non-communicable diseases (Meyer *et al.* 2017; Oleribe 2022). The South African health system is divided into public and private sectors, with the former run by provincial government health ministries. Chronic underfunding of public health has severely impacted the ability of African countries' current health systems to meet healthcare needs, leading to issues such as negative staff attitudes, long wait times, poorly maintained facilities, poor infection control and impaired staff and patient safety and security (Malakoane *et al.* 2020; Coovadia 2009).

A sizeable portion of healthcare involves disease or infection control management practices. Microorganisms are transmitted through air-borne particles, droplet/liquid particles, or via fomites (objects or materials that may be contaminated with viable viruses) (World Health Organization 2021a). Air-borne or droplets can spread from an infected person's mouth or nose when the person coughs, sneezes, sings, breathes, or talks. Current evidence suggests that viruses travel mostly between people in close contact with one other, often within 1 metre (short-range) (World Health Organization 2021a). Healthcare practices are required to reduce or prevent the spread of viruses and germs. This can be by patient screening, questionnaires, isolation of infected individuals, supply and use of personal protective equipment (PPE) (e.g. medical masks, gloves) for healthcare workers and patients, adequate access to supplies for hand hygiene (alcohol-based hand rub or soap and water), maintenance of social distancing (at least 1 metre), ensuring public inside facilities are well-ventilated, safe management of health-care waste and regular sanitisation of surfaces and equipment/ objects (World Health Organization 2021a).

In late December 2019, the first case of severe acute respiratory syndrome coronavirus (SARS) was detected, with five patients being hospitalised, followed by one of these patients dying. By January 2020, 41 patients that were admitted to hospital with the coronavirus (COVID-19) infection (Rothan and Byrareddy 2020). The first case of COVID-19 can be traced back to Wuhan City in China (Liu, Kuo and Shih 2020). The virus spread quickly across the world, causing a global pandemic (Rothan and Byrareddy 2020). The virus caused a severe acute respiratory syndrome (SARS) with high fever, cough and fatigue in preliminary stages (Rothan and Byrareddy 2020).

The first COVID-19 case in South Africa was detected on the 5th of March 2020, in KwaZulu-Natal (Stiegler and Bouchard 2020). The patient returned from Milan, Italy, and was considered as patient zero (Stiegler and Bouchard 2020). Following this, the South African government announced that regulated lockdown levels would be implemented to reduce the spread of the virus (Republic of South Africa 2020a). On the 25th of March 2020, statutory health bodies released regulations to assist healthcare providers, which stipulated the rules and regulations (Republic of South Africa, 2020b). During the level 5 lockdown only healthcare practitioners that were required in hospitals and as frontline staff were allowed to work (Landman, Sewpersadh and Peterson 2022).

The COVID-19 pandemic has had a significant impact on healthcare practices worldwide. According to Ornell *et al*. (2020), nurses and physicians who treated COVID-19 patients experienced a high incidence of stress, anxiety and post-traumatic stress disorder; with women and nurses experiencing higher levels of anxiety, than men and physicians, respectively (Ornell *et al*. 2020). This was explained by the fact that nurses are front line workers; working longer shifts and having more frequent interaction with patients, which can quickly lead to exhaustion and tension (Ornell *et al*. 2020). In a similar study, it was found that physicians' social support levels were significantly associated with efficacy and sleep quality, but adversely associated with anxiety and stress (Ornell *et al*. 2020).

The unprecedented impact of COVID-19 on healthcare practitioners has been an important focus for public health. This has included implementing a range of infection control measures within clinical practice settings, such as the use of PPE and delivering public health information and advice to patients to help reduce the spread of COVID-19. While managing these responsibilities, practitioners also faced substantial personal burden in managing the negative impacts of COVID-19 on their business and finances (Moore *et al.* 2022).

A specific group of healthcare workers that were affected by this virus and the regulations surrounding the virus, were chiropractors. Chiropractors are healthcare professionals who

provide basic care services and were primary contact healthcare workers during the COVID-19 pandemic. (Landman, Sewpersadh and Peterson 2022). The WFC defines chiropractic as “A health profession concerned with the diagnosis, treatment, and prevention of mechanical disorders of the musculoskeletal system, and the effects of these disorders on the function of the nervous system and general health WFC (2001). Emphasis is placed on manual treatments including spinal adjustment and other joint and soft-tissue manipulation” WFC (2001).

According to the directive given on 24 March 2020, by the AHPCSA to curb the spread of COVID-19, chiropractors were instructed to reduce their active practice to consulting only those patients that were deemed ‘emergency cases,’ and were required to carry a pass consisting of their AHPCSA registration certificate. Chiropractors were required to adhere to strict hygiene practices to ensure that all precautions were in place to limit the risk of becoming infected, or their patients being infected with COVID-19. Once levels started easing, chiropractors were allowed to return to practice. The COVID-19 pandemic highlighted the need for improved hygiene practices in healthcare settings (AHPCSA Executive Committee 2020), which led to the development of guidelines and protocols for healthcare practitioners to follow. In South Africa, the Chiropractic Association of South Africa (CASA) issued guidelines for chiropractors to follow, to ensure the safety of their patients and themselves (AHPCSA Executive Committee 2020).

Recent research has provided important insights into the public health response and impact of the pandemic on various healthcare professions (Chemali 2022). A survey of chiropractors from six countries (Australia, Canada, Denmark, Hong Kong, United Kingdom, and United States) concluded that substantial infectious control measures were put in place, in response to COVID-19. These included the sanitising of treatment tables, increased hand hygiene practices and increased social distancing within the practice setting (Moore *et al*. 2022). However, few studies report on whether or not the behavioural changes undertaken by healthcare practitioners during the pandemic led to long term changes in practice hygiene.

Healthcare providers, such as chiropractors, engage in direct physical contact with patients to administer the required treatment. This action breaches the recommended one metre distance between people, as set out by the World Health Organization and the South African Government (South African Government 2023). This results in several health risks to patients and practitioners; emphasising the need for chiropractors to adhere to all other practice-related hygiene behaviours. Many observational studies and reports have shown that compliance with hand hygiene among healthcare providers is still very low in developed and developing countries. This has been attributed to several factors, such as a shortage

in hand hygiene tools, irritation caused by hand hygiene products, overcrowding and lack of time, lack of effective leadership and administrative support, as well as a lack of adequate knowledge, awareness and positive attitudes toward the best hand hygiene practices (Mutairi *et al*. 2020).

An individual's health behaviour is determined by their perceived susceptibility to a health problem, the perceived severity of the problem, and the perceived benefits and barriers of acting to prevent or treat the problem (Abraham and Sheeran 2015). Numerous factors influence chiropractors' hygiene behaviours. For example, chiropractors may perceive themselves as susceptible to COVID-19 due to the proximity they have to patients (Abraham and Sheeran 2015).

The COVID-19 pandemic has brought about a renewed focus on hygiene practices in chiropractic clinics in South Africa. This study aimed to determine if chiropractors have had to adapt their hygiene behaviours to new protocols, to ensure the safety of their patients and staff, including increased cleaning and disinfecting, use of PPE and physical distancing. Since the evolution of the pandemic, it is likely that some of these hygiene practices will become permanent fixtures in chiropractic practices across the country, as chiropractors adapt their practices to ensure the safety of their patients and themselves. This research aimed to investigate the hygiene behaviours utilised by chiropractors in South Africa pre, during and post the COVID-19 pandemic.

1.2 RESEARCH PROBLEM, AIM AND OBJECTIVES

1.2.1 Research Problem

COVID-19 (CDC 2020) is a disease caused by a virus named SARS-CoV-2. The two main and unique features of the virus are its low pathogenicity and high transmissibility. It is a highly infectious disease, with reported fatality amongst individuals with pre-existing chronic illnesses and in the elderly. Transmission of the virus between humans occurs through airborne droplets, touch, or contact of an infected person, or from a contaminated surface (Miller *et al*. 2020). Since 2020, no record of a specific treatment that exists to treat the virus and, hence, the management of COVID-19 has focused on reducing the risk of viral transmission through infection prevention and control measures. A heightened focus on personal hygiene habits, such as handwashing, wearing masks and maintaining social distancing to curb the spread of the virus was evident, and it became crucial to investigate whether individuals were following these guidelines consistently and correctly, or not (Stangerup *et al.* 2021). Furthermore, variations in adherence to hygiene practices may exist based on factors such as age, education level or socio-economic status.

Understanding these factors can help public health authorities tailor their messaging and interventions to promote better compliance with recommended hygiene practices (Stangerup *et al.* 2021).

Research studies have shown that proper hygiene practices play a crucial role in controlling infectious diseases such as COVID-19. A study by Wang *et al.* (2020a), for example, found that frequent handwashing was associated with a reduced risk of contracting respiratory infections. Similarly, research by Cheng *et al.* (2021) highlighted the importance of mask-wearing in reducing viral transmission within communities. Despite these findings, challenges in promoting consistent adherence to hygiene practices may occur. Factors such as misinformation, fatigue from prolonged pandemic restrictions, or lack of access to sanitation facilities, could hinder individuals' ability to practice good hygiene habits effectively. Further research is therefore needed to identify barriers to compliance and develop strategies to overcome them, if we are to achieve better control of viruses such as COVID-19.

A study by Choi *et al.* (2021) found that individuals washed their hands with soap and water more frequently after the COVID-19 outbreak, than they did before. Likewise, the frequency of handwashing, as well as the average handwashing duration, increased during the COVID-19 pandemic (Choi *et al.* 2021). This study seeks to examine the changes in human behaviour that have occurred before and after the pandemic, with the goal of providing insights to guide public health initiatives and interventions. Understanding and tracking changes in hygiene behaviours can also help monitor the effectiveness of public health campaigns and policies, aimed at preventing the spread of infectious diseases. This information can also guide decision-making and resource allocation for future outbreaks or public health emergencies.

1.2.2 Aim

This study aimed to determine the practice-related hygiene behaviours of chiropractors before, during and post the COVID-19 pandemic in South Africa.

1.2.3 Objectives of the Study

1. To determine the hygiene practices of chiropractors before, during and after the COVID-19 pandemic.
2. To assess a change in practice-related hygiene behaviours by chiropractors in response to the COVID-9 pandemic.

1.3 RATIONALE

The COVID-19 pandemic has impacted the delivery of healthcare services, worldwide, especially concerning manual practitioners, who come into close contact with patients during their treatment sessions (Elhaty *et al.* 2020). The COVID-19 pandemic brought about a meaningful change in the way healthcare practitioners have had to conduct their practices (Corlette *et al.* 2021). During the pandemic, chiropractors, as part of the healthcare community, had to incorporate new hygiene measures to ensure the safety of their patients and themselves. Without adherence to proper hygiene protocols, manual therapy posed a substantial transmission risk for the practitioner and the patient (Puhl *et al.* 2011). Limited information is available regarding the changes made by chiropractors to their behaviour in response to the pandemic, and if changed behaviours are still being implemented. Exploring and understanding changes in behaviour can help identify areas where chiropractors may need additional support, or resources to adapt to new circumstances, and can provide valuable information on how the pandemic has impacted the field of chiropractic care. Additionally, by studying how chiropractors adapted during the pandemic, we can gain insight into best practices for future challenges or crises that may arise, as well as can help improve patient care and outcomes in the future.

Research by Moore *et al.* (2022) has provided important insights into the public health response and impact of the pandemic on various healthcare professions. During the pandemic, chiropractors, like other healthcare practitioners, implemented hygiene practices (Moore *et al.* 2022). Although there was good uptake to implement infection control (Moore *et al.* 2022), little evidence describing how hygiene behaviours may have changed from pre, to during and post the pandemic exists.

The COVID-19 pandemic has underscored the importance of strict adherence to hygiene practices in healthcare settings and prompted ongoing efforts to improve infection prevention strategies. Studies have suggested that non-compliance with hygiene practices by healthcare workers has led to the spread of pathogens, due to the lack of standard operating procedures (SOPs) (Amod, Swalaha and Reddy 2021). In a teaching hospital in Nigeria, the findings were low compliance with hygiene practices until protocols were put in place (Amod, Swalaha and Reddy 2021). Miragalia *et al.* (2022) concluded that most research was conducted in hospital settings, but not in chiropractic offices situated in areas outside hospitals. This study aimed to explore and compare the use of hygiene practices before, during and after COVID-19; to assess a change in practice-related hygiene behaviours and address the paucity in the literature assessing these factors, within the South African context. This study, therefore, aimed to assess basic essential knowledge, awareness, and the use of hygiene practices by chiropractors in South Africa.

1.4 DELIMITATIONS OF THE STUDY

This study was limited to chiropractors practicing in South Africa, and those who were practicing during the COVID-19 pandemic. It utilised a survey to obtain the information, which did not allow participants to add additional thoughts or insights. The survey was administered electronically through the AHPCSA, and allowed practitioners to self-select to partake, and may, therefore, not be representative of the wider population.

1.5 SCOPE OF THE STUDY

The study focused on the hygiene practices implemented by chiropractors in South Africa before, during and after the COVID-19 pandemic. It included investigation of the specific hygiene protocols followed by South African chiropractors in their practices, such as handwashing, disinfection of equipment and surfaces, wearing PPE, social distancing, other infection control practices, and any changes or adaptions made in response to the COVID-19 pandemic. The health belief model (HBM) was used to frame the project and direct it. Barriers and attitudes to hygiene practices were determined (Green *et al*. 2020).

1.6 OUTLINE OF THE THESIS

Table 1.1: An overview of the structure of the dissertation

CHAPTER	OUTLINE
Chapter One	This chapter will introduce the study. It outlines the problem statement, aim and objections, and the rationale for the study.
Chapter Two	This chapter will include a comprehensive review of the literature relating to the study. Practice-related hygiene behaviours utilised by chiropractors, as well as the impact of COVID-19 pandemic will be explored in detail.
Chapter Three	This chapter will elaborate on the methodology used for study collection, outlines the processes. This chapter will expand on the research design, data processes used, and ethical considerations.
Chapter Four	This chapter will be a presentation of the findings/results of the study.
Chapter Five	This chapter will contain discussions of the findings. The significance of the findings is accentuated with reference to the research aims and objectives.
Chapter Six	This chapter stipulates the conclusion, limitations, and recommendations of the dissertation.

1.7 CONCLUSION OF THE CHAPTER

This chapter served as an introductory chapter to the study. The background to the study, the study aims, objectives and the research problem were elaborated. An outline of the thesis was also presented. The following chapter will discuss the literature relevant to this study.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

Complementary and alternative medicine (CAM) practitioners, like other healthcare practitioners, are required to maintain hygiene practices to prevent the spread of infection to themselves and their patients. To curb infection, the practitioner is required to implement and utilise hygiene practices, such as hand washing, sanitising surfaces and equipment. This may require behaviour modification. During the COVID-19 pandemic, healthcare practitioners played a crucial role in promoting and facilitating safe hygiene practices, by educating, and implementing protocols to protect themselves and their patients, to help decrease the spread of the virus.

This chapter will provide a review of the literature relating to chiropractic, the COVID-19 pandemic practice-related hygiene behaviours and models explaining behaviour change. Literature to write this chapter was obtained from the following databases: Google Scholar, Elsevier, National Institutes of Health, World Health Organization, ScienceDirect and PubMed. The key words used were chiropractic, COVID-19, hygiene, behaviour, personal protective equipment. Where possible, the most recent literature has been cited. The key words used were hygiene practices, chiropractic, COVID-19 pandemic, South Africa.

2.2 CHIROPRACTIC

2.2.1 Definition of Chiropractic

The term “chiropractic” was derived from the Greek terms ‘*cheiro*’ which means ‘hand’ and ‘*praktikos*’ which means ‘doing’ or ‘action’, as defined by the World Federation of Chiropractic (WFC) (2022). Chiropractic is defined by the WFC as:

> *a health profession concerned with the diagnosis, treatment, and prevention of mechanical disorders of the musculoskeletal system, as well as the effects of these disorders on nervous system function and general health. Manual treatments, such as spinal adjustment and other joint and soft-tissue manipulation, are prioritised* ((WFC 2022).

In South Africa, chiropractors are considered as primary care providers and are governed by the AHPCSA. Furthermore, according to the credentials required for registration with the AHPCSA chiropractors must have earned a five-year full-time master’s degree to practise

in South Africa. To become a chiropractor, one can study at the Durban University of Technology or at the University of Johannesburg. Currently in South Africa there are over 500 chiropractors (AHPCSA 2015).

A chiropractor is a type of healthcare provider who works to alleviate pain and enhance patients' functionality. They are primarily concerned with the diagnosis and treatment of neuromuscular illnesses. Chiropractors treat back pain by manipulating the spine, performing soft tissue therapy, and educating their patients about exercise, ergonomics, and other therapies. Chiropractors hope to decrease spinal nerve irritation by restoring spinal mobility, which will alter an individual's reflexes. Chiropractors may also refer patients to other healthcare providers for specific therapies they are unable to provide. Chiropractors can help with low back pain, neck pain, headaches, repetitive strains, traumas, and arthritic pain (Yeomans 2013; Ernst 2008). The profession does not utilise prescription medicines or surgery (WFC 2000).

Daniel David Palmer established the chiropractic profession. Chiropractic began as a separate healthcare profession in the United States in the 1890s. The profession spread from North America to the rest of the world in the 1960s and 1970s. Improved education and licencing requirements, considerable research, research texts and scientific publications, legal recognition and laws implemented in other nations contributed to the profession's growth (WFC 2000).

2.2.2 The Scope of Chiropractors

Chiropractors are in high demand around the world, for the treatment of spinal pain and dysfunction. Chiropractors strive to prevent future recurrence, or to keep patients at their best once they have improved (Leboeuf-Yde and Hestbaek 2008).

To practice in South Africa, chiropractors must be registered with the AHPCSA. Section 2 of the AHPCSA ACT, 63 of 1982, states that once registered with the AHPCSA, a chiropractor may (AHPCSA 2015):

(i) diagnose, treat, or prevent physical and mental disease, illness, or deficiencies in people.

(ii) prescribe or dispense medicine; and

(iii) give or prescribe treatment for such diseases, sickness, or deficiencies in humans.

Chiropractors in South Africa acknowledge the biopsychosocial paradigm of healthcare and manage their patients utilising evidence-based practises. Chiropractors use a variety of

manual therapy methods, including spinal and extraspinal manipulation and mobilisations (Hartvigsen and French 2020).

The average chiropractic patient seeks care for musculoskeletal problems, primarily low back pain (50%) and neck pain (23%). Although practise approaches differ, the majority of people seeking chiropractic care should expect spinal manipulation. Furthermore, one-third of patients may get patient education, exercises, and soft-tissue therapy as part of their treatment plan (Hartvigsen and French 2020).

Chiropractors, like most other healthcare professionals, attend congresses, conferences, and seminars on a regular basis, to advance their professional education. Patient education and advice on how to execute activities of daily living, exercises, and rehabilitation are frequently part of their treatment plans. South African chiropractors are also educated to analyse diagnostic pictures and suggest patients for appropriate imaging. Dry needles, transcutaneous electrical nerve stimulation devices, shockwave therapy, and ultrasound therapy have also been discovered as effective treatment techniques for South African chiropractors (Johl *et al.* 2017).

Chiropractors within South Africa use the biopsychosocial model to navigate their treatments. The psychosocial aspect of musculoskeletal pain needs to be addressed, to treat a patient in its entirety (Vranceanu *et al.* 2022). Often, musculoskeletal presentations may require expertise from other professions, which is why chiropractors refer to or collaborate with other healthcare professionals. Chiropractors within South Africa, therefore, practice in a multidisciplinary domain (Toloui-Wallace *et al.* 2022).

2.2.3 Chiropractic Diversity in South Africa

Globally, little information is available about diversity in the chiropractic profession' in terms of gender, race, ethnicity, and practice community. This knowledge is significant, since professional representation of major equity-seeking groups may have an impact on the quality of care and access for vulnerable populations (Southerst *et al.* 2022).

Something to consider in the South African context is rural to urban migration of individuals in search of employment opportunities. Communities within rural developments often cannot afford private healthcare, such as chiropractic treatment. The income levels within an area can determine which essential services people receive and how they are delivered. Significant disparities in health outcomes exist in African countries due to inequalities in education level, social status, income, gender and ethnicity (Melka *et al.* 2021)

2.3 PRACTICE-RELATED HYGIENE BEHAVIOURS

2.3.1 Definition of Practice-Related Hygiene Behaviours

Hygiene refers to the practice of keeping oneself and one's living and working areas clean, in order to prevent illness and disease (Altun, Cinar and Dede 2013). Hygiene is an old notion pertaining to medicine, as well as personal and professional care practises relevant to most aspects of living, yet it is often incorrectly associated with cleanliness (Rouf, Begum and Akter 2016). In medicine, hygiene practises are used as preventative measures to limit the occurrence and spread of disease (Rouf, Begum and Akter 2016). Practice-related hygiene behaviours, therefore, refers to a set of regular practices and behaviours that medical professionals adopt in their work environments to ensure optimal hygiene. Such behaviour protects individuals against exposure to bacterial and viral infections, such as COVID-19. The maintenance of good hygiene is the most effective way to prevent the spread of communicable disease (Altun, Cinar and Dede 2013).

2.3.2 Health Belief Model

Behaviour change can be guided by a model such as HBM. This is a widely used theoretical framework in health behaviour research. The HBM proposes that an individual's health behaviour is determined by their perceived susceptibility to a health problem, the perceived severity of the problem, and the perceived benefits and barriers of acting to prevent or treat the problem (Abraham and Sheeran 2015).

The HBM can be used to better understand the elements that influence people's hygiene routines. The model tackles a number of essential elements, including perceived vulnerability to illness, perceived severity of the illness, perceived benefits associated with acting, perceived barriers to action, cues to action and self-efficacy (Glanz, Rimer and Viswanath 2008).

According to the HBM, personal beliefs like anxiety and fear can have a substantial impact on one's behaviour. For example, if a person believes they are more likely to get an illness because of poor hygiene practices, they may be more motivated to take steps to improve their hygiene. Similarly, fear or worry about the repercussions of not practicing excellent hygiene can be effective motivators for behaviour change. One's professional persona might also have an impact on personal attitudes and behaviours around hygiene practices. For example, healthcare practitioners who have received infection control training may be more aware of the necessity for appropriate hygiene and are more likely to follow recommended recommendations in their professional and personal life (Glanz, Rimer and Viswanath 2008).

Human behaviour is determined by a complex interaction of cognitive processes, emotions, social influences, environmental circumstances and individual features. The HBM provides a framework for understanding how these numerous factors influence health-related behaviours. In the context of this research, the HBM will be applied to understand the hygiene behaviours of chiropractors. The HBM can help explain why some chiropractors may have followed stricter hygiene procedures than others.

For example, their perceived susceptibility to contracting COVID-19, as well as their moral and ethical obligation to protect and minimise risk to their patient, may influence their use of personal protective equipment (PPE), while their perceived severity of the disease may influence their role of occupational guidelines. The perceived benefits and barriers of adopting these behaviours may also affect their compliance with hygiene protocols. For example, chiropractors who believe they are susceptible to contracting or spreading COVID-19, may be more inclined to use handwashing, mask-wearing, and social distancing precautions in their practice (Glanz, Rimer and Viswanath 2008). Similarly, persons who believe in the seriousness of COVID-19 and understand the repercussions of not following proper hygiene measures may be more motivated to follow prescribed rules. In the context of chiropractic care during the COVID-19 pandemic, the HBM can be used to identify factors that influence chiropractors' hygiene behaviours. For example, chiropractors may perceive themselves as susceptible to COVID-19 due to the proximity they have with patients. They may also perceive the severity of the health threat, as COVID-19 can result in serious illness or death (Abraham and Sheeran 2015). Furthermore, chiropractors who understand the importance of good hygiene practices for themselves and their patients, are more likely to prioritise these behaviours in their daily routines. On the other hand, obstacles such as a lack of access to PPE or time constraints may prevent chiropractors from fully applying suggested hygiene practices (Glanz, Rimer and Viswanath 2008).

Using the HBM in this study allows researchers to acquire a better knowledge of the various factors impacting chiropractors' cleanliness behaviours, before, during, and after COVID-19. This information can help inform public health activities aimed at encouraging healthcare providers to follow cleanliness requirements.

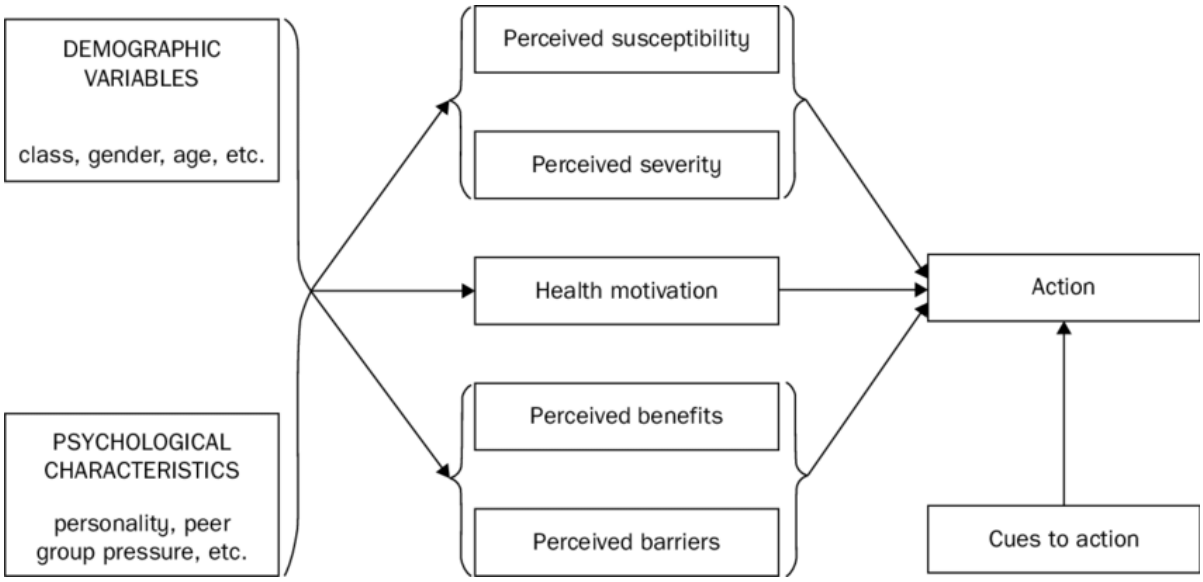

Figure 2.1: The health belief model (Green et al. 2024)

2.3.3 Factors Influencing Adherence of Healthcare Practitioners to Practice-Related Hygiene Behaviours

Several observational studies or initiatives to enhance adherence have objectively identified risk variables for poor hand hygiene adherence. Being a doctor or a nursing assistant, rather than a nurse, was consistently linked to lower adherence (Pittet 2001). Furthermore, compliance with hand washing may vary among doctors of different specialties. Professional category, hospital ward, time of day/week, and the type and intensity of patient care, defined as the number of opportunities for hand hygiene per hour of patient care, were all predictor variables. Non-compliance was lowest among nurses as compared to other healthcare workers, and on weekends. Non-adherence was higher in intensive care units than in internal medicine, during operations with a high risk of bacterial contamination, and when patient care was intense. In other words, as the demand for hand cleanliness increases, so does adherence. Intensive care units had the lowest adherence rate (36%) because indications for hand hygiene were more frequent. The highest rate of adherence (59%) was seen in paediatrics, where the average intensity of patient care was lower than in other fields (Miller *et al.* 2020). External factors such as time constraints, workload pressures and competing priorities can also impact the healthcare practitioner's ability to adhere to practice-related hygiene behaviours. In busy clinical settings, it can be challenging for staff to consistently follow all recommended protocols (Miller *et al.* 2020).

Perceived barriers to adherence include skin irritation from hand hygiene agents, limited access to hand hygiene supplies, disruption of healthcare worker-patient relationships,

prioritising of patient needs over hand hygiene, use of gloves, forgetfulness, lack of knowledge regarding guidelines, insufficient time for hand hygiene, heavy workload, understaffing, and a lack of scientific evidence. Barriers to appropriate hand hygiene practices includes a lack of knowledge of hand hygiene recommendations, a failure to recognise hand hygiene opportunities during patient care, and a lack of awareness of the risk of pathogen cross-transmission. Furthermore, some healthcare workers claimed they cleansed their hands, when necessary, despite evidence to the contrary (Miller *et al.* 2020).

Organisational culture also plays a significant role in influencing adherence to hygiene behaviours among healthcare practitioners. Hospitals and healthcare facilities that prioritise patient safety and infection control create an environment where staff feel motivated and supported to follow proper hygiene protocols. Another factor that can influence adherence, is the availability of resources and infrastructure to support hygiene practices. Adequate access to hand washing facilities, PPE and disinfectants, is essential for practitioners to follow proper hygiene protocols, and a lack of these resources can hinder their ability to regularly maintain good hygiene practices (Miller *et al.* 2020).

2.3.4 Influence of Demographics on Adherence to Hygiene Behaviours

Demographic factors play a significant role in determining how likely individuals are to adhere to hygienic behaviours. Age, gender, education level and socio-economic status have an impact on an individual's likelihood of adopting suggested hygiene measures.

Aiello, Larson and Levy (2007) found that older people were more likely to practice good hand hygiene compared to younger people. This could be attributed to the fact that older people have a greater understanding and experience of the importance of hand cleanliness in limiting the transmission of illnesses.

Gender also plays a role in adherence to cleanliness practices. A study by Suen *et al.* (2019) revealed that women are more likely to adhere to hygiene practices and have more knowledge about hand hygiene compared to men. This may be influenced by societal ideals regarding cleanliness and personal hygiene.

Education level is another demographic variable that influences adherence to cleanliness practices. Research conducted on healthcare has shown that people with higher levels of education are more likely to use good handwashing procedures and other hygiene practices. This could be because educated individuals have better access to knowledge about the importance of cleanliness and are more likely to understand the consequences of not adhering to good practices.

Socio-economic status is also an important factor that can influence adherence to hygienic behaviours. Socio-economic status is another important demographic component that can influence adherence to hygienic behaviours. Curtis and Cairncross (2003) stated that people from lower socio-economic backgrounds may experience challenges such as inadequate access to clean water and sanitation facilities, which can make it difficult for them to maintain appropriate hygiene habits.

2.4 THE COVID-19 PANDEMIC

2.4.1 Definition of the COVID-19 Pandemic

At the end of 2019, Wuhan City, China, had an outbreak of a new respiratory virus, labelled COVID-19. The outbreak rapidly spread globally, with the World Health Organization declaring the COVID-19 pandemic on 15 March 2020 (World Health Organization 2020). The virus's symptoms can range from mild flu-like symptoms to severe acute respiratory distress syndrome, which is associated with a high risk of death. To date, the virus has developed multiple variants and subvariants (World Health Organization 2024)

The COVID-19 virus binds to the angiotensin-converting-enzyme 2 receptor with extreme affinity. This cell is found on the surface of many diverse types of cells in the body. It also binds to a polybasic cleavage site at the S1/S2 spike junction, which regulates infectivity and host range (Nao *et al.* 2017; Andersen *et al.* 2020). The nature of the virus has evolved mechanisms to evade detection by the immune system. It can, for example, suppress the production of interferons, which are signalling molecules that help alert the immune system to a viral infection. This allows the virus to replicate unchecked and spread more easily between hosts and within the body itself (Lippi and Plebani 2020).

The COVID-19 virus is primarily transmitted through the respiratory tract. The virus has also shown to be very infectious and effective (Han *et al.* 2020; Leung *et al.* 2020). Other modes of transmission have been identified, including saliva, urine, eyes, the oral-faecal pathway and inanimate surfaces. Multiple modes of transport allow for COVID-19 to infect hosts in various ways (Colavita *et al.* 2020; Han *et al.* 2020; Holshue *et al.* 2020; Wyllie *et al.* 2020; Chan *et al.* 2021). The virus's incubation time ranges from 2.1 to 11.1 days, with a mean of 6.4 days. This period allows for the virus to remain undetected, possibly allowing for further spread (Backer, Klinkenberg and Wallinga 2020).

Patients with a low immune system before infection with COVID-19, reported more fatal symptoms and side effects (Bhargava *et al.* 2020; Wang *et al.* 2020b). Patients infected with COVID-19 may exhibit symptoms ranging from mild to severe. The bulk of the carriers have also presented with no symptoms. This asymptomatic state caused a lot of

vulnerability as those who are undetected tended to practice less caution with preventative measures and may have unknowingly spread the virus. Fever (83%), cough (82%) and shortness of breath (31%) were the most prevalent symptoms in COVID-19 infected patients (Wang *et al.* 2020c).

2.4.2 Epidemiology of the COVID-19 Pandemic

The COVID-19 virus was discovered in late 2019, and by December 2019, 90% of COVID-19 infections had been identified in Hubei, China. The virus quickly spread across Europe and America, and by March 2020, Italy, Spain, France, Iran, Germany and the United States had reported the highest number of COVID-19 cases (Rauf *et al.* 2020). The virus's basic reproduction number was estimated to reach 2.2-2.4 in 2020. As a result of one COVID-19 case failing to isolate, two more COVID-19 cases were anticipated to emerge (Wu *et al.* 2020).

The COVID-19 virus was expected to cause death in 11%-15% of affected people. The death rate for cases without comorbid diseases was 0.9%, while the death rate for patients with comorbid conditions was 10.51%. It was also discovered that people above the age of 80 were more likely to be significantly impacted by the viral infection than those under the age of 60 (Chinese Centre for Disease Control and Prevention 2020).

Practitioners were instructed to prevent any individuals infected with the COVID-19 virus, including both patients and staff, from entering their medical practices. Important risk symptoms are cough, fever (above 38 degrees Celsius), sore throat, malaise, exposure to anyone with suspected or diagnosed COVID-19 in the previous 14 days, anyone who worked or attended a clinic facility treating COVID-19 patients and travelled internationally or domestically in the last 14 days. Other factors relating to patient considerations were certain groups identified as higher risk because of the severity of the disease. These groups included those over 60 years of age with pre-existing conditions (asthma, chronic lung conditions, hypertension, autoimmune disease, organ transplants, cancer, immunocompromised, obesity, liver, or kidney conditions). Practitioners were asked to consider whether the increased risk associated with these groups necessitated face-to-face consultation or treatment. Alternative consultations for consideration in these groups are telemedicine (AHPCSA Executive Committee 2020).

2.4.3 Transmission of the COVID-19 virus

The virus spreads through airborne particles by sneezing, talking, or coughing droplets. Like the Middle East respiratory syndrome coronavirus, it can be transferred through physical contact or infected fomites. The virus enters the body via the mucosal lining of the mouth,

nose, and eyes (Yang *et al.* 2013; Rauf *et al.* 2020). The virus is highly contagious, and the risk of transmission is higher in sick patients than in asymptomatic carriers (Chavez *et al.* 2021).

People were strongly advised to use face masks and hand sanitizer to restrict community transmission and control the spread of the COVID-19 virus (Prajapath, Heli and Chandarana 2022; Park 2020). Mask use, in combination with other measures, is particularly effective in minimising transmission (Eikenberry *et al.* 2020). People, particularly medical doctors, also had to avoid common practices such as handshaking, since it is an established cause of microbial transmission (Jain, Shaikh and Malhotra 2020).

2.4.4 The Effect of the COVID-19 Pandemic on Healthcare Delivery

The COVID-19 pandemic demonstrated that even the most advanced healthcare systems' emergency rooms could not handle a significant inflow of seriously ill patients (Rosenbaum 2020). Elective or semi-elective procedures were postponed or cancelled as a result. Surgical wards were reorganised to treat COVID-19 patients who required intensive care, and any follow-up medical appointments were postponed. Furthermore, asymptomatic or mildly symptomatic individuals were instructed to remain at home, while healthcare providers monitored their symptoms (Ciotti *et al.* 2020).

South Africa's government recorded a total of 3,088 deaths over the first 100 days of the pandemic, from March 28 to July 3, 2020 (Pillay-van Wyk 2020). Currently, only 102,595 deaths have been reported among the 4 076 463 COVID-19 cases registered in South Africa (Worldometer 2023). The actual number of deaths is thought to be much higher, however, as people who died during the pandemic may have died from causes other than COVID-19 (Vandoros 2020)

2.4.5. Recommended COVID-19 Protocols for Chiropractors

As COVID-19 cases started to rise, the South African government imposed a national lockdown starting on the 26th of March 2020. All shops, schools, universities, restaurants and business had to close, as they were considered non-essential. Under level 5 this included chiropractic practices. Although chiropractors are considered primary-contact health practitioners, only those healthcare practitioners that were required in hospitals and as frontline staff were allowed to work during the level 5 lockdown (Landman, Sewpersadh and Peterson 2022). According to the directive given on 24 March 2020, by the Allied Health Professions Council (AHPCSA), chiropractors were allowed to practice only in emergency cases and were required to carry a pass consisting of their AHPCSA registration certificate. This was confirmed by the South African National Department of Health. Chiropractors were

required to adhere to strict hygiene practices to ensure that all precautions were in place to limit the risk of becoming infected, or their patients being infected with COVID-19. The COVID-19 pandemic has highlighted the need for improved hygiene practices in healthcare settings. This has led to the development of guidelines and protocols for healthcare practitioners to follow.

In South Africa, CASA has issued guidelines for chiropractors to follow, to ensure the safety of their patients and themselves. The guidelines were developed to assist practitioners to uphold good hygiene practices, specifically in response to the pandemic (AHPCSA Executive Committee 2020). Considering the mode of transmission of the virus, personal, respiratory, and surface hygiene was, therefore, the focus of interventions (AHPCSA Executive Committee 2020).

All the guidelines for good practice hygiene can be found on the official AHPCSA website (AHPCSA Executive Committee 2020), as follows:

1. **Stopping the Spread of the Virus Via:**

   Personal hygiene through washing hands (with soap and water) and/or disinfection of hands with sanitizer. It was recommended that a minimum of 70% ethyl or isopropyl alcohol solution is required for adequate disinfection.

   Respiratory hygiene by covering of the mouth and nose when sneezing or coughing either in the elbow or a tissue, that must be immediately discarded into a waste bin that can close.

   Surface hygiene by cleaning and disinfecting general surfaces (with appropriate solutions) that may have been exposed to virus containing droplets.

   Social distancing which entails keeping a distance of at least 1.5 metres between people. This is a precaution in case a person sneezes or coughs, resulting in expelling virus containing droplets.

2. Hand Washing:

The following figure demonstrates the correct method to wash hands.

Figure 2.2: The correct method of hand washing

3. Personal Protection Equipment (PPE):

Given the close contact nature of healthcare, the wearing of PPE by practitioner and patient was essential. Adherence to safety directives and protocols were required at all times:

Face masks are to be worn at all times. A guide for using a face mask was described in detail (i.e., bring the mask up to nose level and check for obvious tears or holes in either side of the mask).

A clinic jacket or gown to protect underlying clothes to avoid contaminated clothes being taken home, was advised.

Gloves were only advised if the practitioner was performing techniques that require barrier protection. Hand hygiene was emphasised as more important.

Face masks/ eye protection was mainly recommended for aerosolised treatment approaches.

Minimal protocol included no jewellery (as it becomes difficult to effectively clean), no sleeves (since hand washing should be up to an including the elbows), adherence to face masks for the doctor and patient, and clothes worn should be washed after practice (with high temperature with washing powder with a proper oxidising agent).

4. **Minimum Protocols for Patient Screening and Arrival at Practice:**

Patients should be called and assessed the day before consultations, and they should be asked to take necessary action if they have any risk signs or history.

Appropriate signage at the practice's front door should inform patients about hygiene and screening procedures.

Patients should be prevented from accessing the practise without permission.

All patients should be given hand sanitiser and told to wait outside.

To reduce droplet spread, all patients should wear or be given a face mask.

When patients arrive, they must be examined for risk factors and, preferably, sign that they have no risk symptoms or history.

Consent forms should acknowledge the dangers associated with potential COVID-19 exposure.

Temperature testing/screening of patients before to or during their visit to the practise.

Appropriate medical and administrative records must be kept to assist tracing if a patient develops symptoms.

A record of all those who come into the practise on any given day should be preserved.

5. **Patient Distancing:**

Patients were required to always maintain social distancing. Mechanisms to achieve this were suggested:

Patients were asked to wait in their cars and were only called to reception when it was necessary. This was to ensure that no patients were in the waiting area.

Patients should not have contact with other patients and in cases where this was not possible, patients should be spaced three metres apart.

Rooms must stay open with adequate air flow to aid in the lamination of potential airborne droplets,

Patients should only be accompanied if they are minors or require help. Family members or friends should be asked to stay in the car.

Enough time between consultations was essential to allow for ventilation and surface hygiene practices (15 minutes was advised).

6. Cleaning, Disinfection and Surface Hygiene Procedures:

Minimum protocols for practitioners included:

Cleaning surfaces includes the complete bed (not just the head piece), examination couch, tables, chairs, and door handles.

Any equipment used during the consultation or treatment, such as blood pressure cuffs, diagnostic equipment, wedges/blocks, activators, fascial release equipment, etc., should be completely cleaned and/or disinfected between patients.

Cleaning solutions containing at least 70% ethyl or isopropyl alcohol, or 0.5% sodium hypochlorite (or approved cleaning detergent) are recommended: test cleansers on tiny areas before use, as they can damage surfaces.

Surfaces must be cleansed and disinfected at the beginning and end of each day.

Floor surfaces and general areas should be cleaned as needed, using an appropriate cleaning product.

Other recommendations:

Remove any objects from the waiting or consulting rooms that are unnecessary or that patients may come into contact with, such as books, magazines, children’s toys, pencils, models and so on.

If towels are to be used, they must be changed after each patient consultation and laundered by the practice to ensure adequate cleaning; this is preferable to having a patient bring in their linen or towels.

If gowns are provided for patients, they must be removed for laundering between patients and must not accumulate in changing rooms; the practitioner is responsible for cleaning these to ensure that they are adequately cleaned. Wherever possible, disposable linen savers, single-use paper towels, and other consumables should be used.

Practices should have adequate waste management, including the separation of medical waste from regular trash, the safe mounting or storage of all needle and sharp containers, and the storage of all used and full medical waste bins and sharps containers in a dedicated and locked place.

7. Staff in the Practice:

All practising personnel must be familiar with screening and hygiene protocols, which should be clearly written down and exhibited, or made publicly available. Minimum protocol includes:

A protocol for personnel disinfection and hygiene should be implemented.

All employees must wear PPE as instructed, including a face mask at all times.

Consideration must be made to ensure proper workplace separation and the usage of / disinfection of shared office equipment, telephones, and so on.

Daily temperature monitoring and recording of staff.

After each patient, staff members must practise strict hand hygiene and ensure that reception areas, pens, clipboards, credit card machines and credit cards are cleansed (ask patients to bring their own pen, gown, shorts, etc.).

Ensure that waiting room chairs, door handles, and other surfaces are cleaned between patients.

Cleaning personnel: They must have proper training and PPE because they are a vital link in the process.

All mops and cleaning supplies should be left in the detergent.

8. Protocol if the Practice is Exposed to a Confirmed COVID-19 Patient:

Close off places visited by those who are ill.

Open outside doors and windows and use ventilating fans to promote air circulation in the space. Wait 24 hours or as long as possible, before beginning cleaning and disinfection.

Cleaning personnel should clean and disinfect all locations and equipment utilised by sick people, paying special attention to regularly touched surfaces.

If the person with suspected/confirmed COVID-19 visited or used the facility more than seven days ago, additional cleaning and disinfection is not required.

If surfaces are filthy, they should be washed with detergent or soap and water before disinfection.

2.4.6 Adherence of Healthcare Workers to Recommended Protocols Pre COVID-19

A study by Kumar *et al.* (2021) found that even though healthcare workers reported that they were aware that hands, electronic devices, aprons, and stethoscopes are potential fomites causing cross transmission, and also agreed to having a fair knowledge of hygiene practices, some shortcomings in their responses were evident. The study found similar results in other studies with regards to poor compliance and practice of infection prevention and hygiene practices amongst healthcare workers (Kumar *et al.* 2021).

Kumar *et al.* (2021) concluded that the majority of healthcare workers only completed hand washing following patient contact, exposure to body fluids and aseptic procedures, while slightly more than half did so before touching the patient and the surroundings. Furthermore, 13.6% only did so when it was clearly filthy. A similar survey revealed that 86% of participants were aware that hands can be a vehicle of transmission, whereas only 53.8 and 32.5% knew about the movements and steps of hand cleanliness (Allegranzi 2011). A metanalysis revealed compliance of 52% for hand hygiene (Gammon, Morgan-Samuel and Gould 2008). Poor compliance, despite adequate information, is considered a significant bottleneck for effective infection control and prevention (Kumar *et al.* 2021). A lack of time has also been cited as a reason for inadequate hand hygiene, with “being busy” cited as a factor influencing hand hygiene behaviour (Larson and Killien 1982).

While assessing how COVID-19 pandemic resulted in changes in behaviour, Choi *et al.* (2021) reported that individuals washed their hands with soap and water more frequently and on average for longer durations during the COVID-19 pandemic.

Overall, a lack of adherence by healthcare workers practicing hygiene behaviours was apparent before the COVID-19 pandemic.

2.4.7 South Africa’s Response to COVID-19

South Africa implemented a state wide lockdown in late March 2020, just weeks after confirming its first case of COVID-19. The lockdown was one of the world’s most stringent and included movement restrictions, commercial closures and gathering bans, which were enforced by police and military troops. This rapid and severe approach was designed to slow the virus’s spread and avoid overwhelming the country’s healthcare system (Devermount and Mukulu 2020).

South Africa implemented pre-emptive measures, such as forming a national command council to coordinate the government's reaction to the epidemic and expanded testing capacity through the use of mobile testing units and drive-through testing facilities. The government also initiated a contact tracing programme to identify and isolate anyone who had been exposed to the virus. This included 5 levels of lockdown. Level 5 had drastic measures in place to stop the spread of the virus and save lives. Level 4 had extreme precautions to limit community transmission while allowing for some activity. Level 3 had restrictions on many activities including the workplaces to address the high risk of transmission. Level 2 had physical distancing restrictions on leisure and social events to prevent the resurgence of the virus. In level 1, most normal activity resumed with precautions and guidelines needed to be followed (Moonasar *et al.* 2021).

Despite these attempts, South Africa struggled to apply social distancing standards in overcrowded informal settlements and townships where residents live in close quarters, making it difficult to follow physical separation guidelines. The country also experienced shortages of PPE for healthcare personnel, and delays in vaccine distribution due to global supply chain concerns. Regardless, the World Health Organization committed to deploying technical experts to support South Africa's COVID-19 response (World Health Organization 2021b).

Overall, South Africa's response to COVID-19 pandemic was marked by prompt and decisive action in enforcing rigorous lockdown measures, while it also encountered problems due to socio-economic considerations and healthcare infrastructure limits (Moonasar *et al.* 2021).

2.5 CONCLUSION

The literature relevant to the topic was reviewed and discussed in this chapter, which outlined the COVID-19 pandemic and chiropractic. The following chapter will discuss the methodology of this study.

CHAPTER THREE

METHODOLOGY

3.1 INTRODUCTION

This chapter presents the methodology of the study, covering the study design, participant recruitment, sample size and characteristics, survey development, data analysis methods and ethical issues employed in this study.

3.2 STUDY DESIGN

A questionnaire was employed using a quantitative, descriptive, retrospective design. To explain the phenomena, a quantitative approach employing numerical data analysis facilitated the quantification of the phenomena (Rutberg and Bouikidis 2018). In order to describe the phenomena, the data's salient characteristics were identified and summarised using a descriptive design (Kaur, Stoltzfus and Yellapu 2018). Participants were required to recall events from the past for analysis (Song 2010).

3.3 STUDY POPULATION AND SAMPLE SIZE

The study population included chiropractors registered with the AHPCSA who were practicing pre, during and post the COVID-19 pandemic in South Africa. According to the AHPCSA records, the number of chiropractors registered in 2023 was 954, from this number the new graduates (*n*=147) and deregistration's (*n*=84) were excluded from this number as the new registrations were not practicing during the COVID-19 pandemic and the de-registrations were not contactable. The AHPCSA also mentioned that approximately 20% (*n*=190.8) of the registered chiropractors were working outside of South Africa, and thus not eligible to partake were removed from the population size resulting in a final population size of 530 chiropractors.

3.4 STUDY LOCATION AND PERMISSIONS

The study took place on an online platform using an electronic survey tool — QuestionPro®.

3.4.1 Ethics Approval

Approval to distribute a survey for the research was obtained from the Institutional Research Ethics Committee (IREC) (IREC185/23) and the AHPCSA (Appendix A).

3.5 PARTICIPANT RECRUITMENT

The AHPCSA distributed an invitation to chiropractors to partake in the study (Appendix A) which contained a live link to the online survey (Appendix B). Participants then self-selected to partake. The survey was distributed directly to all registered AHPCSA practitioners in South Africa.

3.6 SAMPLING

3.6.1 Sample Size

A total number of 530 chiropractors, who were eligible to partake in the study, were practicing in South Africa at the time of data collection. New graduates were not included in this study as they did not meet the inclusion criteria as they were not practicing before the pandemic started. A minimum sample size of 103 participants was required for generalisability. This was calculated by using an estimate of *p* at 20%, a confidence level of 95%, and a margin for error of 6% using Cochran's formula (Appendix C).

3.6.2 Sample Characteristics

The participants had to meet the following inclusion and exclusion criteria to participate in the study:

3.6.2.1 Inclusion Criteria

The participant was a registered chiropractor with the AHPCSA.

The participant was registered and practicing as a chiropractor pre, during and post the COVID-19 pandemic.

The participant was willing to participate and complete the informed consent form (Appendix D).

3.6.2.2 Exclusion Criteria

Participants who took part in the pilot study.

Chiropractors who graduated after the COVID-19 pandemic.

3.6.3 Measurement Tool

Data collection involved the use of a self-administered questionnaire. This entails a survey that participants complete without having the researcher intervene, which was adapted from a Moore *et al.* (2022) (see Appendix E).

The adapted questionnaire consisted of the domains as outlined in specification matrix, Table 3.1. A specification matrix allows the researcher to stipulate the study objectives and ensure the questions for each objective.

Table 3.1: Specification matrix

Objectives	Types of questions asked	References
To determine the demographic profile and practice background of chiropractors in South Africa.	Demographic and practice background (Adapted questionnaire). Questions 1-10 are included in this.	(Macaskill 2013; Hjorth *et al.* 2016; Moghe, Kotecha and Patil 2020) (Adapted questionnaire)
To determine the hygiene practices of chiropractors before, during and after the COVID-19 pandemic.	Impacts of COVID-19 on practice life pre, during and post the pandemic (Adapted questionnaire). Questions 11-14 are included in this.	(Moore *et al.* 2022) (Adapted questionnaire)
Assessing a change of practice-related hygiene behaviours for chiropractors in South Africa.	Changes in practice-related hygiene behaviours using the HBM (Self-made questions). Questions 15-21 are included in this.	Self-made questions using the HBM (Champion and Skinner 2008)

3.7 RESEARCH PROCEDURE

In order to determine face and content validity, the adapted questionnaire was subjected to focus group and pilot testing following ethical approval.

3.7.1 Focus Group

A focus group assists the researcher in ensuring that important topics are not omitted from the questionnaire and enables dependability and content validity of the research tool (Sim and Waterfield 2019).

Once provisional ethical clearance was obtained, the focus group was held via Microsoft Teams. Regarding the research topic and questionnaire, all focus group participants were invited to offer ideas and recommendations. The questionnaire (Appendix F) was critically analysed by the focus group to ensure a comprehensive format was reached.

The focus group included:

- Two qualified chiropractors
- The researcher
- The research supervisors
- A lecturer in the department of medical microbiology at the Durban University of Technology (DUT)
- Two final year chiropractic students who had undertaken quantitative research.

3.7.1.1 Procedure for the Focus Group

The focus group was conducted as follows:

- Participants were identified by the researcher and supervisor, and they were requested to attend the focus group via email or telephone.
- The sample size was a minimum of six to eight people.
- Students were utilised to not take from the pool of potential participants, but they would have enough exposure to the clinical environment to answer appropriately.
- The meeting took place on Microsoft Teams to accommodate everyone.
- Participants were welcomed to the focus group and were required to read and sign the letter of information (Appendix G), the confidentiality agreement (Appendix H) and the informed consent form (Appendix I) before the meeting.
- The participants were given the opportunity to ask any questions regarding the focus group procedures. By signing the confidentiality agreement, the participants agreed to keep any discussions within the focus group as confidential.
- The focus group discussed the questionnaire, which was recorded on Microsoft Teams, with consent being given by all focus group participants. A transcript was made from the recording and data were stored securely under password protection.
- After reading the questions aloud to the group, the participants were asked to decide whether the questions were clear and to clarify how each question related to the goals and objectives of the study. As a result, the focus group could accept, reject, or remain unsure regarding the inclusion of certain questions in the questionnaire.

The group had to agree unanimously on which questions to include, for them to be included. The participants were then thanked for giving up their time to take part in the focus group.

3.7.1.2 Inclusion Criteria for the Focus Group

- Participants must be 18 years of age and older.
- Chiropractors must have been in practice before the COVID-19 pandemic.
- Quantitative research had to be done by researchers.

3.7.1.3 Exclusion Criteria for the Focus Group

- Participants who were not willing to sign the informed consent form (Appendix I) and confidentiality form (Appendix H)

3.7.2 Pilot Testing

Pilot testing is a small-scale investigation conducted to assess a study's feasibility, specificity, and sensitivity prior to a larger-scale investigation (Leon et al. 2011). This guaranteed the authenticity of the research tool's various sections and inquiries. Pilot study feedback helped refine the questionnaire.

3.7.2.1 Procedure for the Pilot Study

The pilot study was conducted as follows:

- The pilot study was only conducted once provisional ethical clearance was received.
- During the pilot study, the questionnaire was completed by three chiropractors, who met the main study inclusion and exclusion criteria.
- The chiropractors were asked to read the information letter (Appendix J) and complete the informed consent form (Appendix K).
- Feedback from the pilot study was used to improve the questionnaire by adapting it slightly to read easier.
- This verified the authenticity of the various parts and research tool questions. It also evaluated the questions to make sure they were easy to grasp and free of grammatical and format/layout issues.
- Once the pilot study was completed and full ethical approval was granted by the Institutional Research Ethical Committee (IREC), the main study commenced.
- No changes were made to the questionnaire after the pilot study was completed.

3.7.2.2 Inclusion Criteria for the Pilot Study

- Participants were required to be 18 years of age and older.
- Participants were registered chiropractors with the AHPCSA.
- Completed a letter of information (Appendix J) and informed consent form (Appendix K) by the participant.

3.7.2.3 Exclusion Criteria for the Pilot Study

- Participants who refused to sign the necessary consent forms for the pilot study.
- On completion of the pilot study the final questionnaire was sent to IREC to obtain full ethical approval

3.7.3 RESEARCH PROCEDURE

Upon receiving full ethics approval from DUT's Institutional Research Ethical Committee (IREC185/23), the researcher contacted the AHPCSA to distribute the questionnaire. The questionnaire was sent out using an online QuestionPro® link.

As a pre-survey notification (Appendix L), the informed consent form (Appendix D) and information letter (Appendix M), were sent out at the beginning of the survey. The pre-survey notification informed the chiropractors about the survey, highlighting its significance and extending an invitation to take part. To maximise participation and enable the use of a longer questionnaire to gather more data, the pre-survey communication was crucial (Todd *et al.* 2018).

The participants have to give their permission to participate, in the first question of the questionnaire. The remaining questionnaire's questions became available as soon as the participants clicked "Yes," however, they were not permitted to continue with the questionnaire if they clicked "No."

The researcher reached out to the DUT's "QuestionPro®" administrator to obtain access to the programme. In order to guarantee that participants provided consent prior to answering the questionnaire, and that all questions in each section were addressed before moving onto the next, the validated setting was activated. A message would alert the participant to the need to respond to a question, before moving onto the next portion, if they tried to do so without answering. An asterisk was placed next to each of these queries.

To stop a chiropractor respondent from filling out the survey more than once, the "QuestionPro®" settings 'anti-ballot box stuffing' function was turned on. Each participant was given a unique answer identification, and when completing the last question and submitting the questionnaire, digital cookies were kept on their browser. Each question was compulsory to complete and the participant could not progress to the next question without completing the previous question. Should they attempt to access it again, the system would notify them of an issue. This prohibited the participants from completing more than one survey, yet they could still access the same URL and proceed with the questionnaire, even if they chose not to finish it.

Data collected was kept confidential and secure as per the Protection of Personal Information Act, and only the researcher, supervisors and statistician had access to the data collected. All questionnaires were coded. After data collection, the data were captured on an Excel spreadsheet and was analysed by a statistician.

3.8 ETHICAL CONSIDERATIONS

The ethical concerns related to the study comprised of:

Before the data collection process started, IREC approval (Appendix N) was acquired (IREC approval reference number: IREC 185/23).

Before starting the questionnaire, each participant had to complete the informed consent form (Appendix D).

To protect participant' privacy and confidentiality, names were left off the questionnaire. An individual answer ID was used to code the questionnaire. To maintain confidentiality and anonymity, the questionnaire responses from the chiropractors were transformed into data.

In order to protect their autonomy, the participants filled out the questionnaire without the researcher's presence and were not forced to participate in the study. Additionally, it was ensured that the chiropractors gave their consent to participate in the study.

To maintain justice, each participant was given the same respect and treatment.

The research process was conducted with non-maleficence guaranteed. The study did not cause any harm to the participants, nor did it interfere with the chiropractors' ability to complete the surveys. After being stored at DUT for five years, the data will be appropriately removed. The only people who had access to the data were the statistician, researcher, and supervisors.

Participants' names were not included in the questionnaire to ensure they were de-identified and confidentiality. All questionnaires were coded. Privacy was guaranteed (only the registrar to have access to the practitioners' email address) through anonymity (practitioners' response to the questionnaire will be converted into data) and confidentiality will be maintained in the research procedure.

The settings for QuestionPro® were set so that the questionnaire was captured independently. This ensured that the chiropractors' answers remained confidential, and that the researcher was not able to link an answer to a chiropractor.

All data (electronic and hard copy) was stored safely in the Chiropractic Department and will be deleted or destroyed after a period of five years. Upon completion of the study, the electronic data which were generated was stored on USB sticks, hard disks, and online systems for back-up, to ensure safety and integrity of the data set. The research data will be stored for five years and shredded after five years. The confidentiality of the data was maintained by giving a unique identification, only accessible to a researcher.

3.9 DATA ANALYSIS

Microsoft Excel Spreadsheet Software was utilised to accomplish statistical analysis (Microsoft Corporation 2018). For question 14 in the questionnaire (Table 4.5), the individual responses were taken verbatim from the survey and grouped into categories based on the nature of the responses. Categorical data were summarised using count and percentage, and numerical data that used means, ranges, and standard deviations. Correlation matrices and regression was utilised to assess relationships between the data. The data were described and presented as frequency tables, bar charts, and pie charts. The results were exported from QuestionPro® and populated in an Excel spreadsheet, the data were coded and checked, and then analysed by a statistician.

3.10 CONCLUSION

The research methodology employed in this study was described in Chapter Three. It explained the different statistical procedures and sampling strategies utilised to analyse the data. It also discusses the pilot study, ethical issues and how the questionnaire was developed. The findings of this investigation will be presented in the next chapter, Chapter Four.

CHAPTER FOUR

RESULTS

4.1 INTRODUCTION

This chapter presents the results of the statistical analysis of the data from the questionnaire utilised in this study (Appendix F).

4.2 RESPONSE RATE

Following the circulation of the survey, 153 people responded with 34 dropouts (people who started the survey but did not complete it) and 119 completed surveys. This equated to a 22.45% response rate.

4.3 PARTICIPANT DEMOGRAPHICS

The participants had a mean age of 40 (range: 27 to 86), were mostly married (67%, *n*=79), women (54%; *n*=64) who resided predominantly either in Gauteng (26%; *n*=30) or KwaZulu-Natal (25%; *n*=30), with a partner and/or adult under the age of 65 years (65%; *n*=77) as shown in Table 4.1.

Table 4.1: Participant demographic characteristics (*n*=119)

Demographic characteristic	***n* (%)**
Age:	
24-30	26 (22)
31-35	26 (22)
36-40	16 (14)
41-45	13 (11)
46-50	19 (16)
51-55	9 (8)
56+	10 (8)
Sex:	
Male	55 (46)
Female	64 (54)
Relationship status:	
Single	30 (25)
Married	79 (66)
Separated	3 (3)
Divorced	6 (5)
Widowed	0 (0)
Prefer not to say	1 (1)
Geographical location:	
Eastern Cape	15 (13)
Free State	7 (6)
Gauteng	28 (24)

KwaZulu-Natal	30 (25)
Limpopo	7 (6)
Mpumalanga	4 (3)
Northern Cape	2 (2)
North-West	4 (3)
Western Cape	22 (18)
Home environment during lockdown:	
Living alone	14 (12)
Living with a partner and/or other adults under the age of 65	77 (65)
Living with a partner and/or other adults over the age of 65	12 (10)
Living with children under the age of 18 years	38 (32)
Living with a higher personal risk of COVID-19 because of an existing chronic condition	7 (6)
Living with someone else with a higher risk of COVID-19 because of an existing chronic health condition	3 (3)
Living with someone with a disability	0 (0)
None of the above	3 (3)

4.4 PRACTICE CHARACTERISTICS

Table 4.2 shows that a significant percentage of chiropractors have been practicing for seven years (36.13%, *n*=43) and in urban or major cities (60%, *n*=71). Most of the practitioners returned to work in level 4 (31%, *n*=37) and practiced as a sole practitioner (71%, *n*=84), classifying themselves as a mixed/diversified chiropractor (90%, *n*=107). Of the 29% (*n*=35) who practiced in a multidisciplinary setting, the most common healthcare provider they shared office space with was either a physiotherapist (13%; *n*=15) or a general practitioner (12%; *n*=14).

Table 4.2: Practice characteristics of the participants (*n*=119)

Practice characteristics	***n* (%)**
Practice location:	
Rural/remote region	5 (4)
Town/smaller regional city	43 (36)
Major city (urban)	71 (60)
Lockdown level when treatment started:	
Level 5	29 (24)
Level 4	37 (31)
Level 3	25 (21)
Level 2	10 (8)
Level 1	18 (15)
Practice type during lockdown:	
Sole practitioner	84 (71)
Multidisciplinary practice	35 (29)
Type of chiropractic services performed during lockdown:	
Straight chiropractor	12 (10)
Mixed/diversified chiropractor	107 (90)
Years in practice:	
5-10	62 (52)
11-15	19 (16)
16-20	9 (8)
21-25	13 (11)
26-30	8 (7)
31-35	5 (4)

36-40	1 (1)
41+	2 (2)
Healthcare professionals at the multidisciplinary practices:	
Acupuncturist	4 (3)
Audiologist	4 (3)
Biokineticist	12 (10)
Chiropractor	6 (5)
Dentist	5 (4)
Dermatologist	3 (3)
Dietician	4 (3)
General Practitioner	14 (12)
Homeopath	6 (5)
Kinesiologist	2 (2)
Massage Therapist	9 (8)
Nurse	2 (2)
Occupational Therapist	2 (2)
Optometrist	2 (2)
Pharmacist	2 (2)
Pilates instructor	3 (3)
Psychologist	6 (5)
Physiotherapist	15 (13)
Podiatrist	3 (3)
Radiologist	2 (2)
Reflexologist	4 (3)
Skin-care Therapist	2 (2)
Speech Therapist	2 (2)
Yoga instructor	2 (2)

Most straight chiropractors (33.33%; *n=4*) returned to practice during level 3 lockdown, while equal ratios of 16.67% (*n=2*) returned during both level 2 and 4. Only 8.33% (*n=1*) returned during level 5 and the remaining 25% (*n=3*) returned during level 1 lockdown.

Figure 4.1 demonstrates that most of the straight chiropractors only returned to practising after and including level 3 lockdown. The opposite is true for mixed/diversified chiropractors who mostly returned to practice prior to level 3 lockdown.

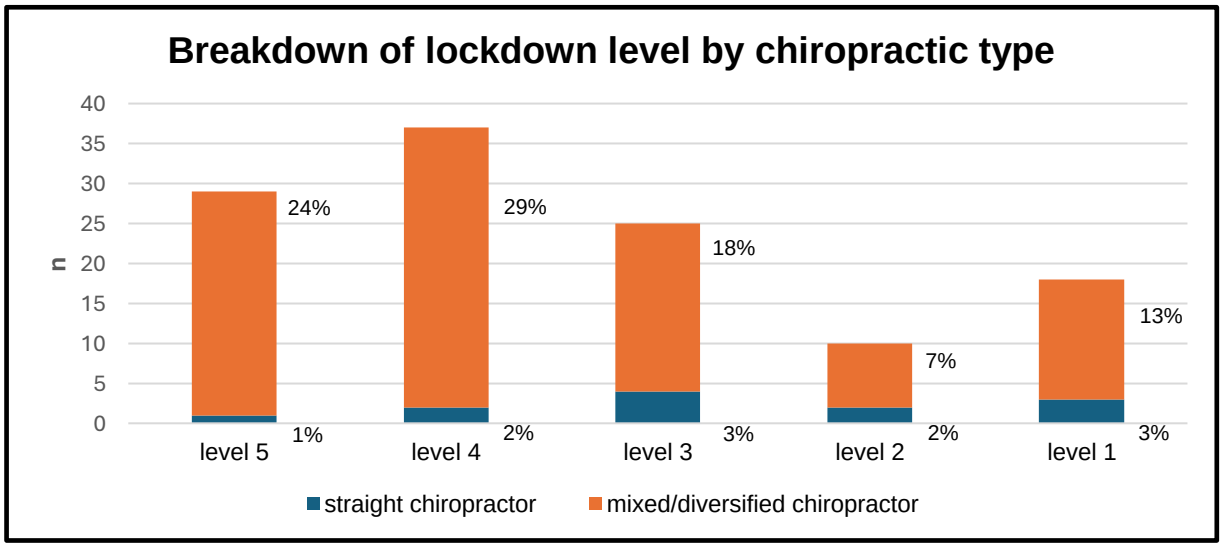

Figure 4.1: The type of practitioner compared to the level of lockdown at which they returned to treating (n=119)

4.5 PRACTICE RELATED HYGIENE BEHAVIOURS PRE, DURING AND POST COVID-19 PANDEMIC

4.5.1. Hand Disinfection

Figure 4.2 shows that most practitioners 'often' or 'always' disinfected their hands, with almost all the participants always disinfecting their hands during the pandemic (87%; *n*=104). Multiple linear regression analysis was significant (R^2=0.64, F (2, 116) =118, *p*<0.001).Pearson correlation analysis revealed a strong, positive correlation between the hand disinfection behaviour and the pre to post pandemic period (r=0.77; β=0.7714; *p*<0.001) and a moderate, positive association between the time during to post pandemic (r=0.41; β=0.4144; *p*<0.001).

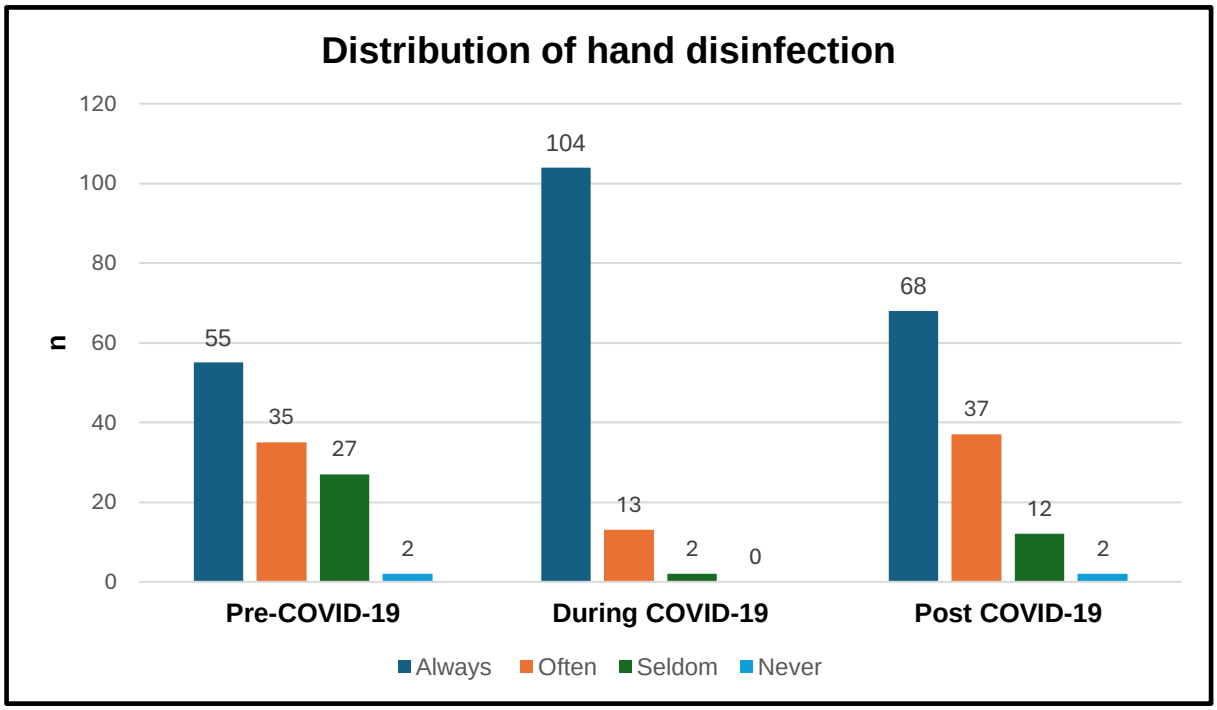

Figure 4.2: The difference between the distribution of hand disinfection pre, during and post COVID-19

4.5.2 Equipment Disinfection

Figure 4.3 shows that prior to the COVID-19 pandemic only 37.8% (*n*=45) of the participants often disinfected their equipment. This increased to 89.9% (*n*=107) "always" disinfecting their equipment during the pandemic, dropping to 52.1% (*n*=62) post pandemic.

Multiple linear regression analysis was significant (R^2=0.42, F (2, 116) =118, p<0.001), as seen in Figure 4.2. Pearson correlation analysis revealed a strong, positive correlation between equipment disinfection and the pre and post pandemic time periods (r=0.634; β=0.634; p<0.001) and a weak positive relationship between equipment disinfection behaviours during and post pandemic (β=0.3479; p<0.001) was found.

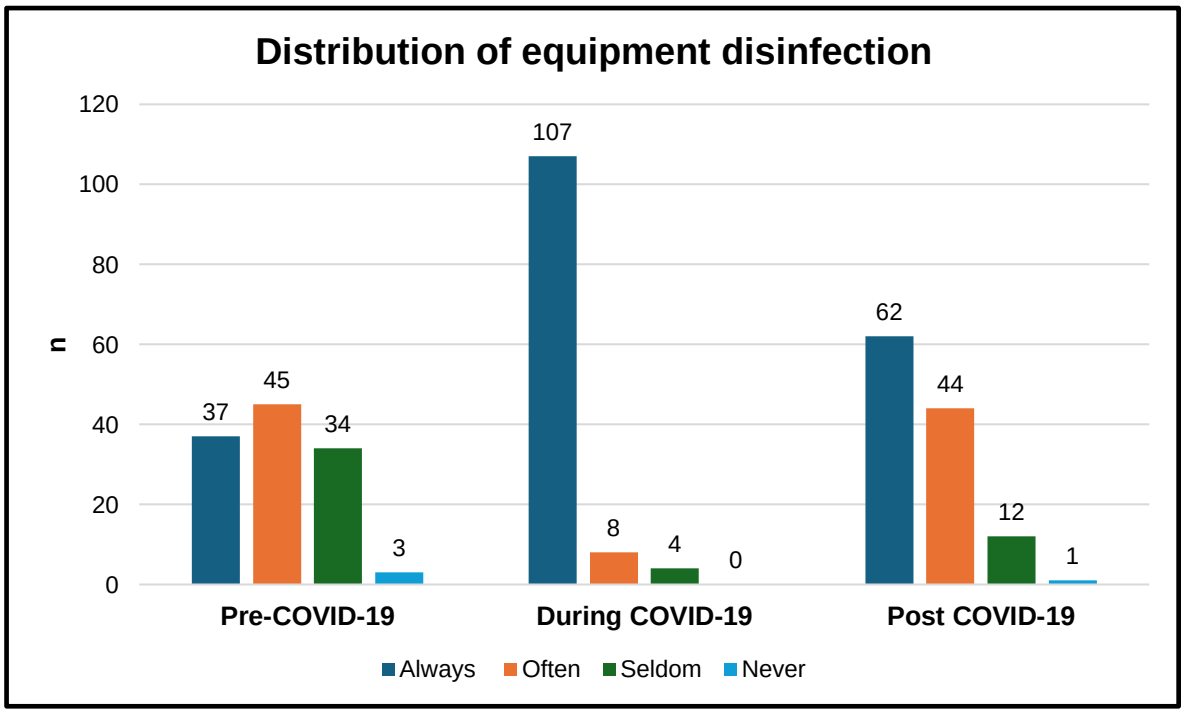

Figure 4.3: The difference between the distribution of equipment disinfection pre, during and post COVID-19

4.5.3 Disinfection of Frequent Contact Areas

Figure 4.4 shows that participants seldom disinfected frequent contact areas prior to the pandemic (52.9% (n=63), which changed significantly, when assessed with multiple linear regression during the pandemic where 56.3% (n=67) "always" disinfected these areas. Post pandemic, this reduced to 47.9% (n=57) (R^2=0.53, F (2, 116) =118, p<0.001), as seen in Figure 4.4. Pearson correlation analysis revealed a strong, positive correlation between equipment disinfection and the pre and post pandemic time periods (r=0.67; β=0.67; p<0.001), and a moderate positive relationship between equipment disinfection behaviours during and post pandemic (r=0.56; β=0.56; p<0.001) was found.

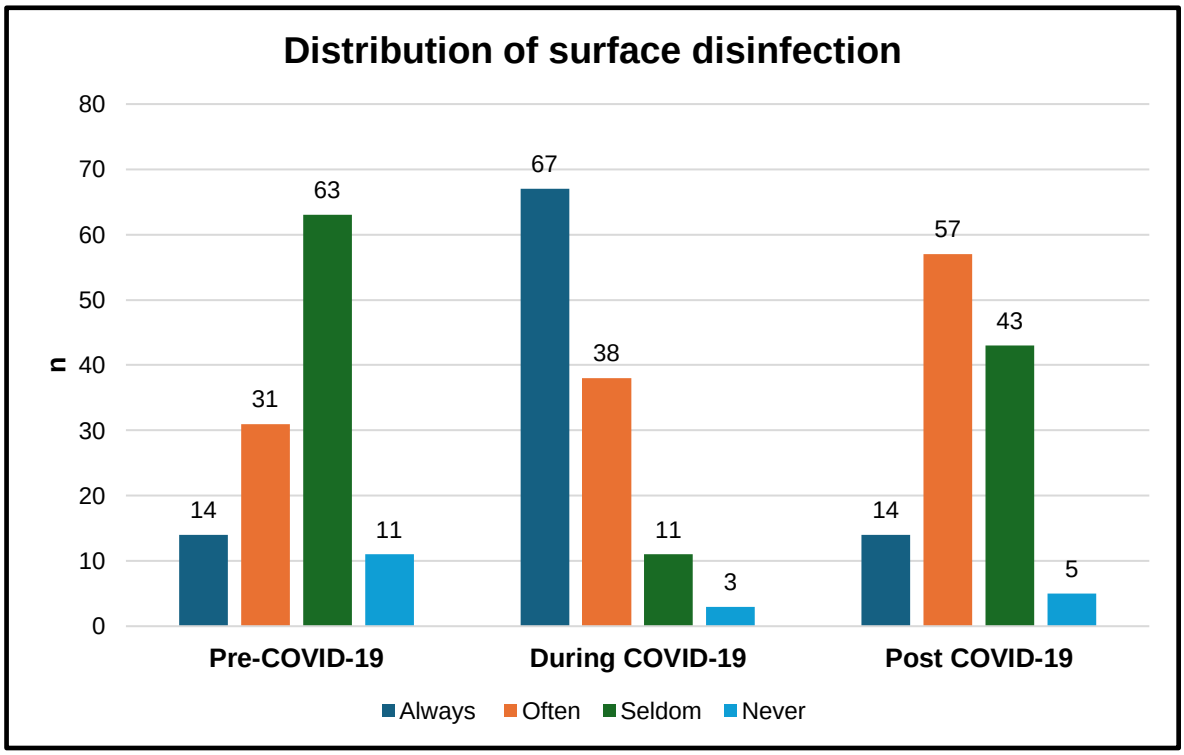

Figure 4.4: The difference between the distribution of disinfection of frequent contact areas pre, during and post COVID-19

4.5.4 Impact of COVID-19 on Practice-Life Pre, During and Post COVID-19 Pandemic

The study analysed the distribution of hand sanitiser and protective screens in a healthcare setting, before and after the COVID-19 pandemic. As shown in Table 4.3, prior to the pandemic, only 27.73% (*n*=33) of participants had sanitiser available for their patients, while the remaining 72.26% (*n*=86) did not. During the pandemic, 99.16% (*n*=118) of participants had sanitiser, while 0.84% (*n*=1) did not. After the pandemic, 79.83% (*n*=95) of participants had sanitiser, while 20.17% (*n*=24) did not. Protection screens were distributed at reception to 10.08% (*n*=12) participants before the pandemic, compared to 89.12% (*n*=107) during the pandemic. However, only 19.33% (*n*=23) had protective screens at reception post pandemic. Social distancing in reception and treatment areas was implemented by 13.45% (*n*=16) of participants before the pandemic, followed by 94.12% (*n*= 112) during the pandemic. Shaking patients' hands was also observed by 78.15% (*n*=93) of participants before the pandemic, while 21.85% (*n*=26) did not. The percentage of participants who shook their patients' hands decreased from 78.15% (*n*=93) to 62.18% (*n*=74) after the pandemic. Face masks were worn by 93,27% (*n*=111) of participants during consultations, while 6,72% (*n*=8) did not wear face masks during the pandemic. Other staff members also wore face masks, with a higher percentage of participants wearing them than those who did

not. A minimum 70% ethyl or isopropyl alcohol sanitiser was used by 36.13% (*n*=43) of participants before the pandemic, followed by 94.12% (*n*=112) during the pandemic, and 78.15% (*n*=93) after the pandemic. Participants and colleagues following social distancing rules were also found to be less prevalent before and after the pandemic.

Table 4.3: Impact of hygiene behaviour pre, during and post COVID-19 pandemic (*n*=119)

Hygiene behaviour	Pre COVID-19		During COVID-19		Post COVID-19		*p* value	r
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)		
	Yes	No	Yes	No	Yes	No		
Available sanitiser	33 (28)	86 (72)	118 (99)	1 (1)	95 (80)	24 (20)	*p*<0.001	0,26
Protective screen	12 (10)	107 (90)	69 (58)	50 (42)	23 (19)	96 (81)	*p*<0.001	0,47
Social distancing	16 (13)	103 (87)	112 (94)	7 (6)	32 (27)	87 (73)	*p*<0.001	0,54
Hand shaking	93 (78)	26 (22)	25 (21)	94 (79)	74 (62)	45 (38)	*p*<0.001	0,51
Face masks	7 (6)	112 (93)	111 (93)	8 (7)	9 (8)	110 (92)	*p*<0.001	0,51
Face masks for other staff members	6 (5)	113 (95)	111 (93)	8 (7)	10 (8)	109 (92)	*p*<0.001	0,76
Hand sanitiser composition	43 (36)	76 (57)	112 (94)	7 (6)	93 (78)	26 (22)	*p*<0.001	0,40
Social distancing	14 (12)	105 (86)	92 (77)	27 (23)	17 (14)	102 (86)	*p*<0.001	0,67

(r = correlation statistic)

4.5.5 The use of Personal Protective Equipment (PPE)

During COVID-19, cloth/standard surgical masks were the most used, followed by N95 masks/respirators. Disposable gloves and protective garments were also widely used. After the pandemic, most participants did not use PPE, with only 11 using disposable gloves. Minimal participants used cloth/standard surgical masks, protective garments, and face/eye shielding after the pandemic.

Table 4.4: The use of PPE (*n*=119)

PPE	During COVID-19 *n* (%)	Post COVID-19 *n* (%)
Cloth/standard surgical mask	105 (88)	8 (7)
N95 respirator/mask	52 (44)	5 (4)
Face and/ eye shielding	35 (29)	2 (2)
Disposable gloves	50 (42)	11 (9)
Protective garments/clothing	44 (37)	6 (5)
None of the above	6 (5)	96 (81)

4.5.6 Protocol That Would Be Followed When COVID-19 Patients Presented at the Practice

Figure 4.5 shows the protocol that would be followed by each chiropractor when a COVID-19 patient presented at the practice. Most practitioners 45% (*n*=53) would provide treatment after the patient's symptoms had passed. The second most selected option, with 19% (*n*=23), was that the practitioner would provide treatment if the patient presented with a negative COVID-19 test. Around 17% (*n*=20) of practitioners would proceed with treatment without using any protective measures, and 14% (*n*=17) would proceed with treatment using protective measures. The least number of practitioners, 5% (*n*=6), selected that they were unsure of what they would do.

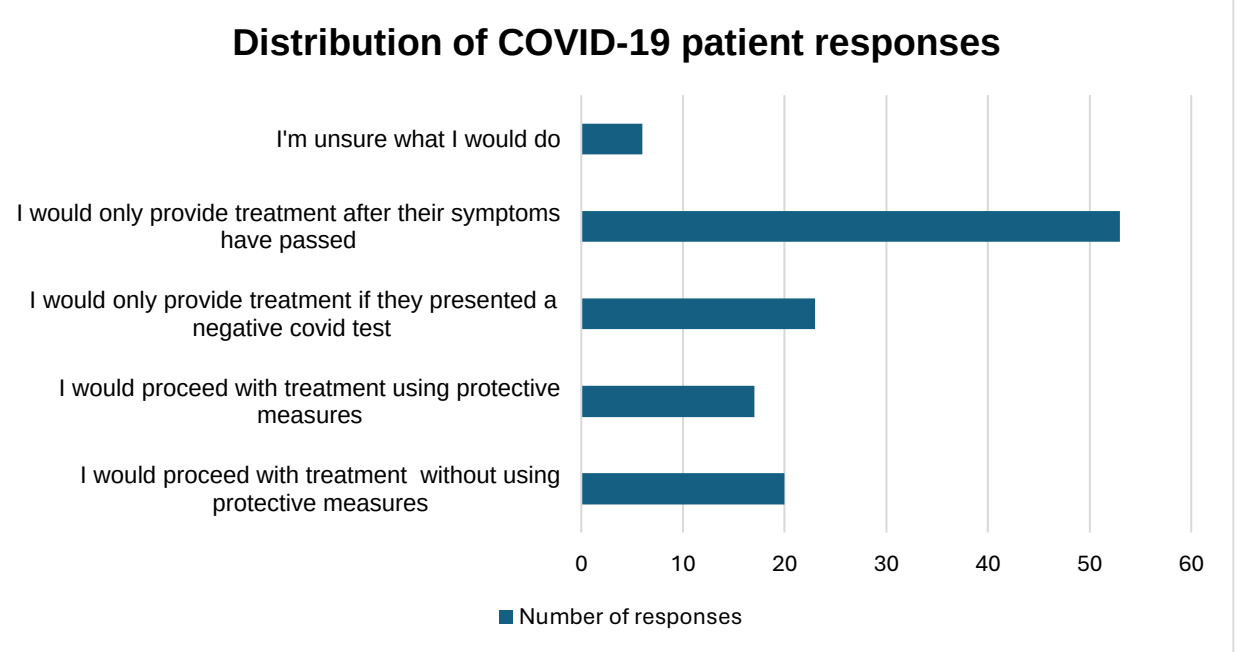

Figure 4.5: The distribution of protocols that would be followed when a COVID-19 patient presented at the practice (n=119)

4.5.7 The Impact of COVID-19 Hygiene Protocols on Practitioners Practice Hygiene Behaviours

The majority of participants (78.15%; *n*=93) felt that the COVID-19 hygiene protocols made them more aware of practice hygiene behaviours and explained their response using the statements in Table 4.5.

Table 4.5: Explanation as to why the practitioners felt that COVID-19 protocols made them more aware about hygiene behaviours (*n*=119)

PPE	"I wear clean gloves for every patient now." "To disinfect even more than before, still wearing a mask while treating patients." "We have implemented certain behaviours after COVID-19 and still continue with these." "I make use of a mask when a patient looks ill and I sanitise more frequently." "Symptomatic patients will prompt immediate use of PPE as a healthcare worker. I shall also urge my colleagues in the same room/vicinity to wear PPE." "More disinfecting of equipment and the space. More conscious of transmission between myself and patients."
Sanitisation	"Sanitising not only your room but the whole practice." "Table sanitising head piece etc., done after COVID-19 but never done before." "Reception area, toilet handles etc., places more exposed to bacteria are now sanitised after each patient rather than two times a day." "Clean equipment regularly and wash hands regularly." "Would clean equipment and hands more regularly." "Cleaned equipment and hands more regularly." "I've realised how little we sanitised before COVID-19 and have implemented more cleaning procedures." "Clean equipment and hands regularly." "i sanitise the reception more often now." "Ensuring more regular general cleaning between patients." "It has highlighted the need to instil hygiene protocols not just within the treatment room, but all areas patients frequent during their appointment." "Pre COVID-19 I just used to take hygiene standards for granted. My practice is always clean." "Cleaning of surface areas and maintaining cleanliness after each patient." "I've always maintained a hygienic practice but COVID-19 made me more focused on areas that were neglected. "I'm a little better with sanitising my practice these days." "Frequently washing hands/sanitising is helpful in preventing common colds and flu as well, not only COVID-19" "Hygiene is simple if consistent with sanitisation!" "I sanitise my chiropractic bed between patients, and our cleaner uses stronger disinfectants on common surfaces than before COVID-19." "Hand sanitising and breathing space." "Sanitisation is much more important to me between patients." "Especially with keeping the bed clean." "Direct touch proved to be a high risk for transmission of COVID-19 and other infections. I henceforth would more frequently use sanitising procedures." "More frequent disinfecting of hands and work surfaces." "Sanitising is important to ensure a clean and safe environment for you and your patient." "More hygienic practices like sanitizing hands has been developed." "I am more aware of cleaning." "More cognisant of sanitizing hands and staying home if unwell." "Made me more aware of disinfecting contact and treatment areas to prevent the spread of disease." "Sanitise more often and keep wearing protective gear." "COVID-19 has definitely made sanitizing our hands more of a habit than before."

Table 4.5 continued

Cautious of infection	"While COVD-19 is diminished it is still a present risk." "Showed the risk involved/how easy contamination happens." "It has made me more cautious when coming into close contact with patients with flu-like or other possibly contagious symptoms." "Definitely more aware of symptoms and transmission and hygiene protocols." "I'm more careful with patients who are ill." "Made me more aware of the droplet and aerosol spread of virus." "I was already aware, I just started doing it more frequently." "The high risk of contamination." "Infection control." "I avoid unnecessary contact with patients, whereas before COVID-19 I didn't even think of it. I'm just more aware." "It made me aware of how vulnerable patients are by lying on the same bed as a previous patient and breathing droplets onto the headpiece." "Yes, exercise more care regarding safety procedures." "More conscious about multiple people needing to lie with their face in the same head rest… especially when patients have colds etc…" "Yes, I take more care to disinfect. "I do not treat patients with Covid symptoms." "Yes, you can get sick and need to wash hands and equipment." "Infection control awareness was heightened." "Yes, we realised how easily germs spread and how long they can last." "The easy rate of infectious disease became a concern." "Better hand cleaning procedure. "Leave the alcohol to absorb on the bed, instead of drying it myself. "Clean consultation desk more often." "Hygiene is important." "We moved from cloth towels to disposable paper towels." "Overall hygiene needs to be maintained regarding to all aspects to reduce risk of any infection." "The safety of me and my patients are highly important and we should everything to prevent another outbreak."
Education	"It reminded me of how easily bacteria and virus can spread." "Studies done in the transmission of infections were highlighted. "These studies make one so aware of how easily infectious agents can be spread." "I have been made more aware of germ and droplet transmission during the pandemic, especially within a healthcare environment." "COVID-19 is an ever evolving disease. "We as practitioners need to be aware of new variants and always stay informed." "Yes, the infectiousness of the COVID-19 virus increased my awareness of how my practice could be a contact point for transmission." "We suddenly realised that we do not clean enough and that it leads to sickness." "How easily germs are spread." "More aware of symptoms. "Hand sanitizer always available in rooms. "..ask more in history". "It's good to consider the impact we all have on one another even when the aim is to give and receive medical assistance." "I am more aware of general sanitising routines to protect patient and myself from all transmittable illnesses." "For me personally they have made me aware of all the ways to prevent the spread of any diseases" "I think it made one think of a few more hygiene related factors but I have always been somewhat of a cleaning fanatic so not much to change protocol wise." "Reminded me of the importance of hygiene behaviours where necessary." "More aware of germs, more sanitation. I use a face mask sometimes, when treating people's mouths and faces." "More aware to prevent the dangers." "More aware of the importance of correct hygiene protocols to ensure a sterile and safe practice environment." "It makes one more aware of the dangers of not maintaining proper surface hygiene." "Yes. I am a lot more aware of hygiene and patient protocol when they arrive with flu symptoms at my practice." "We weren't as aware as before." "Much more aware of hygiene, and less judgmental about hygiene practices of patients." "It's important." "The importance, frequency and to protect my health as well as the patients." "Easy spreading of viruses."
No change	"Not much has changed for me, I was always careful to clean equipment." "I always practice awareness of hygiene protocols."

The participants who felt that the pandemic did not influence their hygiene behaviours (21.9%; *n*=26) gave the reasons as reported in Table 4.6 to support their choice of answer.

Table 4.6: Explanation as to why the practitioners felt that COVID-19 protocols did not make them change their hygiene behaviours (*n*=119)

PPE	"Less PPE, means greater chance of infection spread COVID-19 or other dx)"
Sanitisation	"We may have sanitised a little more during COVID-19. "But our hygiene practices pre COVID-19 were of a very high standard. "So not much really changed."
Cautious of infection	"I would only provide treatment after their symptoms have passed." "I would only provide treatment if they presented a negative COVID-19 test."
Education	"The germ theory is wrong."
No change	"I've always had good hygiene standards." "I have always been strict on hygiene measures prior to COVID-19 and still am." "Always applied general hygiene rules." "After COVID-19 we pretty much went back to pre COVID-19 measures." "I just continued with it the way I always did." "Always applied rules" "I was aware of hygiene behaviours pre COVID-19, chose which ones to use during COVID-19. Post-COVID-19 we decided what is best for overall health, including realising that too many hygiene behaviours can diminish one's own immune functions." "The standard hygiene protocols for COVID-19 are the same protocols I have used in practice prior to COVID-19." "We've always used proper hygiene." "I have always disinfected arm rests, face pieces, and changed towels and gowns for each patient. "Patients were required to wear a mask if they had a sore throat or upper respiratory tract infection, or preferably, reschedule their appointments if ill pre COVID-19. "Have also washed hands between each patient. "I also have always kept the window open for air circulation and that's why I use a gas heater in winter. "What I have implemented post-COVID-19 is wearing an N-95 mask when doing a cervical adjustment, and not telling the patient to breath in and out when adjusting, and just to breath normally from their nose." "It wasn't very prevalent in my areas." "Hygiene has always been a priority, just not as strict as COVID-19 regulations." "Same as before COVID-19." "I practiced them before." "Similar level of sanitation pre and post." "I have always followed standard practice hygiene behaviours pre COVID-19." "I have always been focused on having a clean and sterile environment."

4.6 THE COVID-19 IMPACT ANALYSIS OF CHIROPRACTORS IN SOUTH AFRICA

The third section of the survey focused on the impact that COVID-19 had, or may have had, on the way chiropractors practiced and the hygiene protocols that may have been implemented.

4.6.1 Likelihood of Contracting COVID-19 While Practicing If the Necessary Protocols Are Not Being Adhered

Figure 4.6 shows that 30% (*n*=36) of chiropractors believed that they were likely to contract COVID-19 if they did not adhere to hygiene practices.

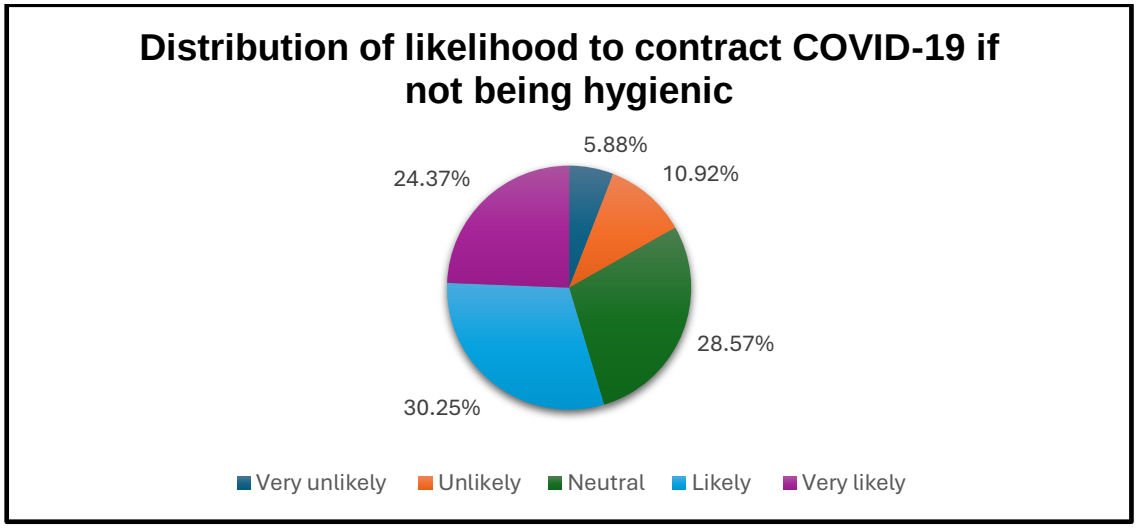

Figure 4.6: The distribution of likelihood to contract COVID-19 if hygiene protocols are not being adhered to (n=119)

4.6.2 Seriousness of Contracting COVID-19 Amongst Chiropractors and Patients

Figure 4.7 shows that the majority of the participants selected neutral when answering this question (30.25%; *n*=36) and that more participants felt that it was not likely (38.7%, *n*=46) that the consequences would be serious.

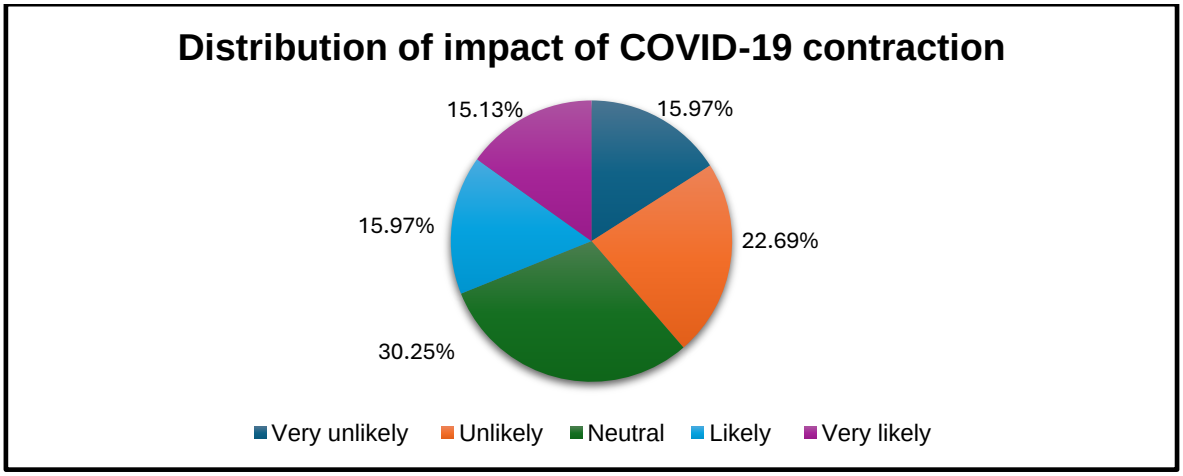

Figure 4.7: The distribution of seriousness of contracting COVID-19 amongst chiropractors and/or patients (n=119)

4.6.3 Barriers to Implementing Hygiene Practices During COVID-19

Figure 4.8 shows that the participants felt that the most common barrier was the patient's reluctance to adhere to hygiene practices during chiropractic care (45.38; *n*=54), followed by 41.18% (*n*=49) of participants who felt that none of the mentioned factors were barriers. Lack of time also seemed to be a common barrier for 27.73% (*n*=33) of participants.

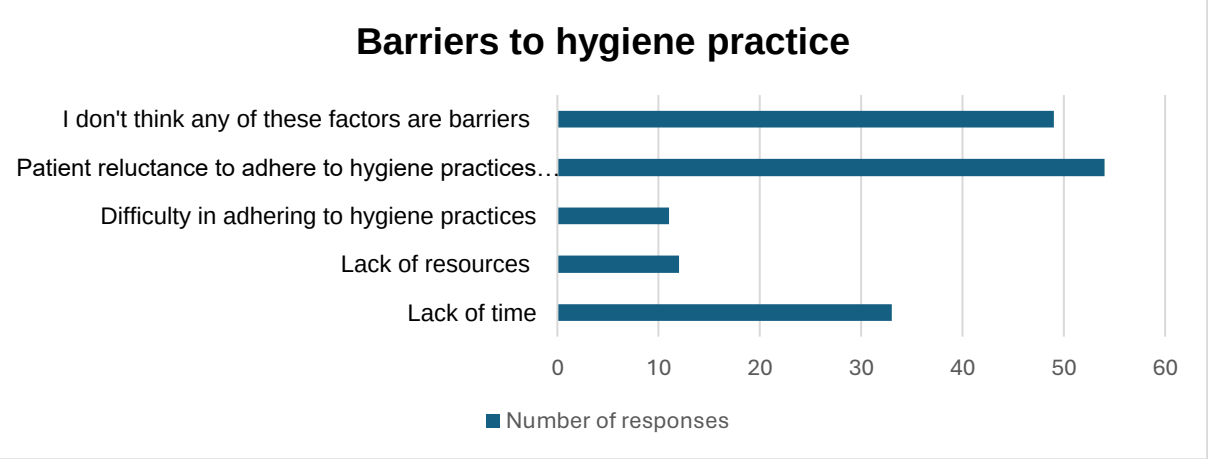

Figure 4.8: The distribution of barriers of hygiene practices (n=119)

4.6.4 Confidence in the Ability of Chiropractors to Implement Hygiene Practices During Chiropractic Care

Figures 4.9 shows that 43.70% (*n*=52) of chiropractors felt very confident in their ability to implement hygiene practices during their treatment.

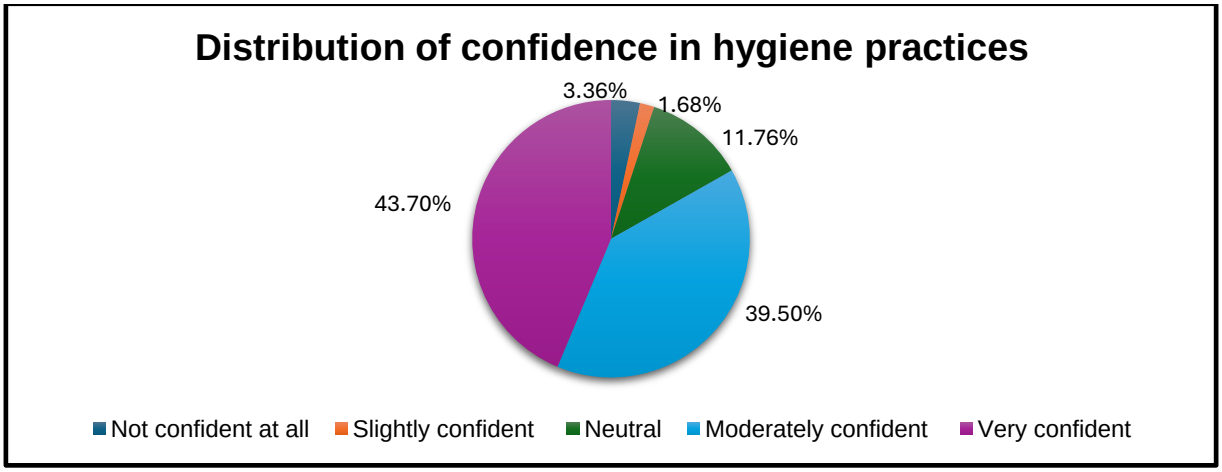

Figure 4.9: The distribution of confidence in hygiene practices (n=119)

4.6.5 Importance in Practicing Good Hygiene During Chiropractic Treatment Pre and During COVID-19

Figure 4.10 shows that the majority of the participants felt that good hygiene was important, irrespective of if it was during or pre the pandemic (82.4%; *n*=98).

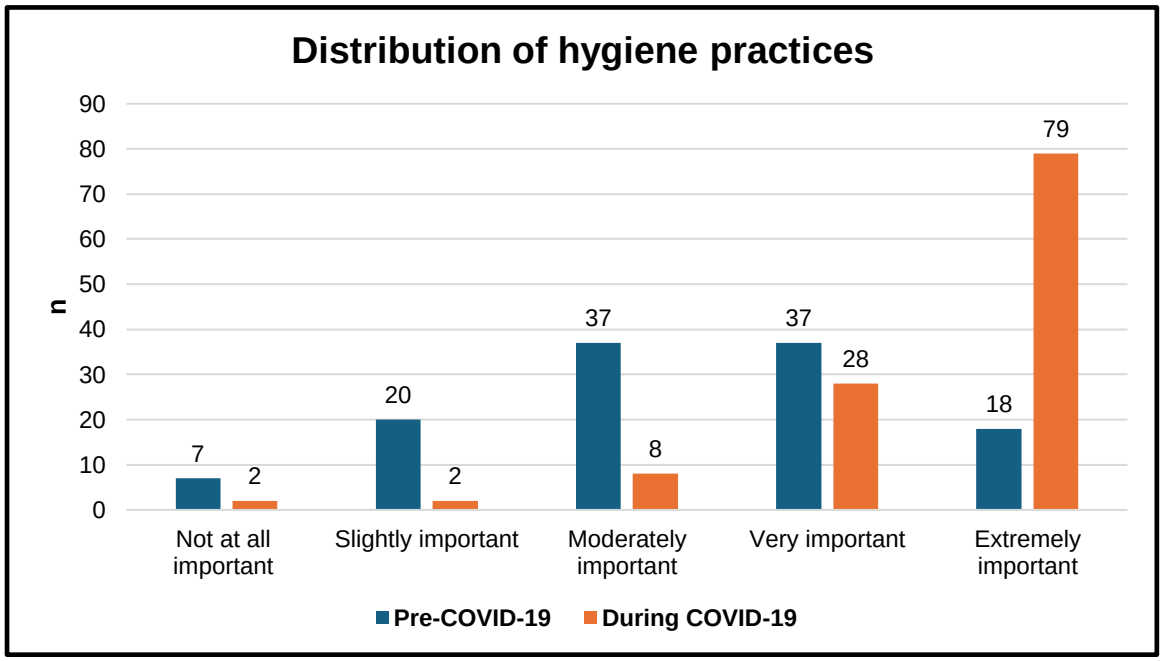

Figure 4.10: The distribution of confidence in hygiene practices pre COVID-19 and during COVID-19 (n=119)

4.6.6 Importance in Educating Patients About Good Hygiene to Reduce Risk of COVID-19 Transmission

Figure 4.11 shows that the majority of participants felt it was important to educate patients on COVID-19 to reduce the transmission (84.9%; *n*=101).

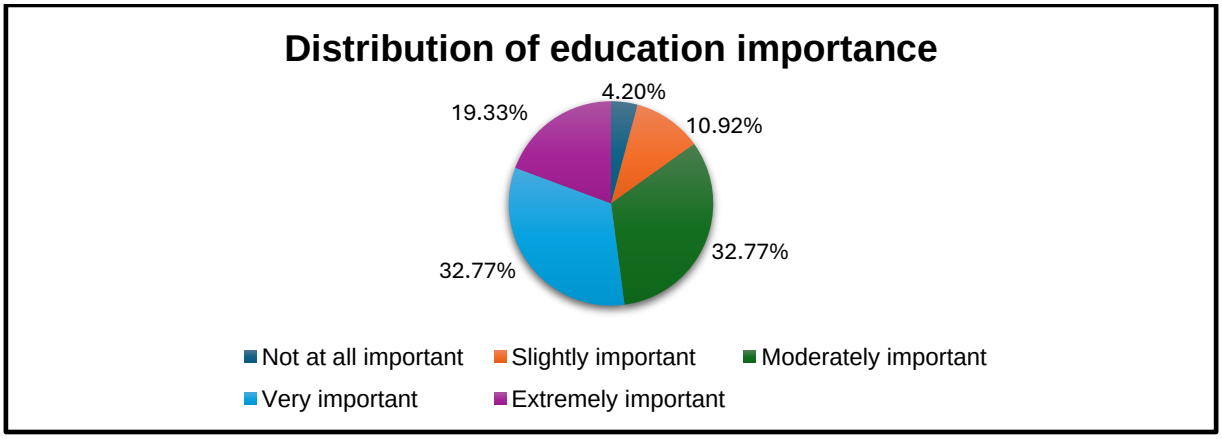

Figure 4.11: The distribution of importance in educating patients on COVID-19 to reduce the transmission (n=119)

4.6.7 Continuation of Good Hygiene Practices Post COVID-19

Figures 4.12 shows that 49.58% (*n*=59) of participants agreed to continue with good hygiene practices post COVID-19, while 25.21% (*n*=30) strongly agreed.

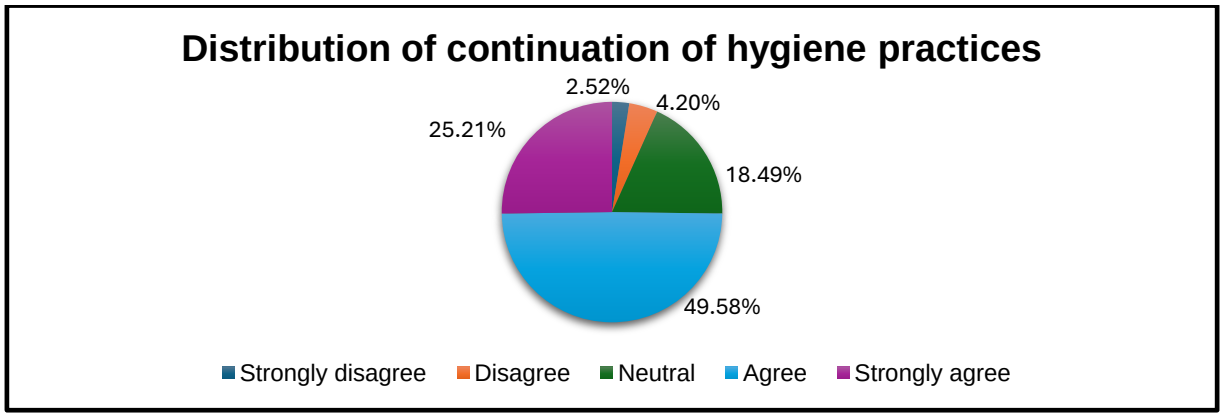

Figure 4.12: The distribution of continuation of hygiene practices post COVID-19 in chiropractic practices (n=119)

4.7 CONCLUSION

This chapter comprised an overview of the data that were collected from the chiropractors who partook in the study. The data contain the demographics, COVID-19 practice analysis, COVID-19 impact analysis, and cross-impact analysis of hygiene practices pre, during and post COVID-19 in South Africa.

CHAPTER FIVE

DISCUSSION

5.1 INTRODUCTION

This chapter consists of the discussion of the results in relation to the current literature. This chapter examines the findings from Chapter Four and compares them to similar research on the spread of hand and equipment disinfection in a healthcare context, prior to and following the COVID-19 pandemic.

This study aimed to assess the hygiene practices of chiropractors in South Africa, before, during and after the COVID-19 pandemic. The current investigation employed an online questionnaire as a means of gathering data. An email with a survey link from QuestionPro® was sent to chiropractors who are officially registered with the AHPCSA. A trend was depicted amongst the frequency of hand, equipment, and frequent contact areas disinfection, pre, during and post COVID-19. Around 54% of chiropractors believed there was a possibility of contracting COVID-19 if hygiene protocols were not followed.

Mlambo (2018) found a growing trend in South African citizens who moved from a rural setting to an urban setting. Similarly, results of this study showed that most chiropractors are working in an urban setting. This also correlates to a study done in Canada, which found that most chiropractors practiced in a major city (Southerst *et al.* 2022). Some reasons for this, may be the better financial opportunities in a city, as opposed to a rural setting, and cities are often more populated. Chiropractors also *only* provide care in a private setting; as most citizens living in a rural setting cannot afford medical aid, or to pay for such healthcare. Thus, chiropractors in South Africa, are often found in areas where the average household incomes are higher.

KwaZulu-Natal and Gauteng proved to be the most chiropractic saturated provinces in South Africa. This may be attributed to the fact that the only chiropractic institutes in South Africa, namely, DUT and the University of Johannesburg are situated in these two provinces. This can also be seen on the CASA (2024) website, when searching for a chiropractor in each area.

In a study conducted by Johnson and Green (2013), it came to light that the proportion of female chiropractors was quite small. The study also highlighted the need for the number of chiropractors to quadruple in order to achieve a gender ratio that aligns with the proportion of female patients. The results of this study have demonstrated an uneven distribution among the sex of chiropractors, with a slightly higher female percentage due to

it being female dominated in South Africa (CASA 2024). Contrary to this, a study conducted in Canada, found a higher saturation of male chiropractors (Southerst *et al.* 2022). Suen *et al.* (2019) cited that women are more likely than men to follow hygiene practices and have more awareness about hand hygiene. This could be linked to societal standards for cleanliness and personal hygiene, as well as the role of woman as the primary caregivers. The survey may, therefore, have been more appealing to women, and explain why a higher response rate from women exists.

Most of the chiropractors were categorised in the thirties age-group, followed by those in their forties (Table 4.1) These findings are similar to the study conducted in Southerst *et al.* 2022, which found that most chiropractors were between the ages of 31 and 50 years, with an average age of 44.7 years. In another study, conducted in Africa, it was found that 85% of the chiropractic participants were between the ages of 25 to 50 years (Southerst *et al.* 2022; Melka *et al.* 2021).

Melka *et al.* (2021) found that only 38% of chiropractors are practicing in a multidisciplinary setting, which is somewhat similar to the findings of this study, which found that 29% of chiropractors are working in a multidisciplinary setting. Similarly, 42% of chiropractors indicated to be practicing in an interdisciplinary setting in Canada, while 51% indicated practicing in an interdisciplinary setting in Africa (Southerst *et al.* 2022; Melka *et al.* 2021). A possible reason for this could be based on the principle of the biopsychosocial model and the acknowledgement of this model in the chiropractic profession (Hartvigsen and French 2020). The biopsychosocial model works on providing holistic care, which would require inter-referrals between professions to achieve the best outcome and approach to patient care, especially, for patients suffering from chronic pain (Vranceanu *et al.* 2022). Another possibility may be that chiropractors do not train with traditional healthcare providers, nor do they have access to hospitals. Therefore, most chiropractors open their own businesses (Ismail *et al.* 2021).

Melka *et al.* (2021) also found a similar finding to this study where 92% of the chiropractors in Africa practiced a diversified technique. This finding is similar to a study done in South Africa, where two thirds of the participants practiced a diversified technique (Ismail *et al.* 2023).

This study found the practitioners to be the most present in multidisciplinary practices are physiotherapists. Toloui-Wallace *et al.* (2022) suggested that physiotherapists, chiropractors, and osteopaths working together in a practice, allowed for a meaningful form of contact. This collaboration also allowed for a reduction in intergroup tension between the professions.

The participants have been in practice for an average of 13.1 years. This finding is very similar to a study by Southerst *et al.* (2022), which found that their participants had been in practice for an average of 17.5 years.

Almost one third of chiropractors returned to their practice during level 4 lockdown, while one quarter of chiropractors returned in level 5 lockdown. This was an unexpected result, due to the law stating that although chiropractors are considered primary-contact health practitioners, only those healthcare practitioners that were required in hospitals and as frontline staff were allowed to work during level 5 lockdown (Landman, Sewpersadh and Peterson 2022). No chiropractors should, therefore, have been working during level 5 lockdown, contrary to what the results are showing.

The analysis of chiropractors' COVID-19 practices in South Africa, identified a pattern of heightened frequency in disinfecting hands, equipment and locations of frequent contact before, during and after the COVID-19 period. This rise was anticipated as a result of safety precautions implemented for practitioners. Nevertheless, a marginal escalation in surface disinfection during the COVID-19 pandemic exists, in comparison to the disinfection of hands and equipment.

The respondents reported that official safety practices were implemented during the COVID-19 pandemic to mitigate transmission rates, including the introduction of protective screens, social distancing measures and mandatory face mask usage. Hand sanitiser emerged as an essential component of preventive measures during the COVID-19 pandemic, with a remarkable availability rate of 99.16% during the pandemic, and a usage rate of 94.12% after the pandemic. Nevertheless, a significant proportion of consumption and availability persisted even after the COVID-19 pandemic.

Handshaking was also seen, with numerous practitioners consenting to shake hands with their patients, before and during the COVID-19 pandemic. The prevailing choice of PPE among chiropractors, was a cloth or conventional surgical mask since it was advised. Approximately 80% of chiropractors reported an enhanced awareness of performing hygienic behaviours as a result of the COVID-19 pandemic, which may account for the observed rise in disinfection rates following the pandemic. Nevertheless, some chiropractors noted that patients exhibited hesitancy in complying with cleanliness protocols during chiropractic treatment. Despite successfully following cleanliness standards, most chiropractors believed that the likelihood of developing COVID-19 was low. During the initial stages of lockdown, mixed chiropractors resumed their profession earlier than straight chiropractors. The latter group held the belief that spinal subluxation could effectively treat illnesses.

5.3 THE COVID-19 PRACTICE ANALYSIS OF CHIROPRACTORS IN SOUTH AFRICA (PRE, DURING AND AFTER COVID-19)

A trend was depicted amongst the frequency of hand, equipment, and frequent contact areas disinfection, pre, during and post COVID-19. The frequency of disinfection mostly went from low percentages pre COVID-19 to an extremely high percentage during COVID-19, and then returned to a lower percentage post COVID-19. The rise in disinfection rates during COVID-19 was expected, due to the safety protocols issued to practitioners (AHPCSA Executive Committee 2020).

The guidelines enforced regular hand, equipment and contact area disinfection. However, although the disinfection rates increased exponentially, only a slight increase of disinfection of frequent contact areas was apparent. This could be due to the guidelines only enforcing surfaces to be disinfected at the beginning and at the end of the day, implying that the need to disinfect hands and equipment would have been more than for surfaces. This reasoning can explain why the results display a reduced rate for surface disinfection during COVID-19, compared to hand and equipment disinfection. Although the percentages post COVID-19 returned to lower amounts, it remained higher than the values pre COVID-19. This could be due to practitioners having more awareness of scientific evidence of pathogen transmission, and the role that disinfection plays in reducing spread, which were identified as barriers in physician hygiene behaviours (Miller *et al.* 2020).

Another explanation could be that post COVID-19, practitioners were mentally fatigued and a major relaxation on the promotion and enforcement of hygiene practices was evident due to people being vaccinated as well as mask mandates changing during the post-COVID-19 era. Without the constant reminder, forgetfulness is also considered a perceived barrier to adherence. During the pandemic heightened emphasis by the media created anxiety and fear. If a person believes they are more likely to get the virus because of poor hygiene practices, they may be motivated to take steps to improve it. Post pandemic, patient demands and workloads also returned to normal. External factors such as time constraints and workload pressures may have also impacted the practitioner's ability to adhere to practice-related hygiene behaviours (Miller *et al.* 2020).

A similar trend of frequency was seen in the use of protective screens, social distancing and wearing of a face mask. These protocols were not common guidelines in South Africa prior to COVID-19, but became official safety protocols during the COVID-19 pandemic, to reduce transmission rates. The results of the study that showed an increase in the use and

frequency of use of these devices during COVID-19 (AHPCSA Executive Committee 2020). Available hand sanitiser also became a vital part of practices during the COVID-19 pandemic, specifically alcohol-based sanitisers containing 70% ethyl or isopropyl. Alcohol damages the cell membrane of the virus, which will inactivate the virus and prevent transmission (Prajapati *et al.* 2022).

This study showed a 99.16% availability of alcohol during the COVID-19 pandemic and a 94.12% usage thereof. Although this was an expected outcome, as a result of the safety protocols that were implemented, a substantial percentage of usage and availability after the COVID-19 pandemic was noticeable. This finding was contrary to the predictable trend seen in other safety hygiene protocols perhaps due to chiropractic practices purchasing substantial amounts of alcohol/sanitizer stocks during COVID-19 and now they needed to be used up. There could have also been a preference change form hand washing to alcohol/sanitizer due to it being more convenient. A study conducted in Korea found similar results with an increased frequency of use, duration of use, and amount of sanitiser used, post COVID-19. The study also mentioned the potential risks of excessive disinfection use and the lack of public health guidelines thereof, which was not explored in this study (Choi *et al.* 2021). Perhaps this should be investigated further in South Africa.

Another contradictory trend was that of hand shaking. Many practitioners agreed to shaking their patients' hands before the pandemic, and then most stopped during the COVID-19 pandemic. The percentage rose again after the COVID-19 pandemic, but slightly less than the percentage prior to the COVID-19 outbreak. Hand shaking during the COVID-19 pandemic was prohibited, yet 21.01% of chiropractors still performed this action. Jain *et al.* (2020) described that a large amount of healthcare practitioners found it challenging to completely stop handshaking, especially as this had become a social habit. Makoul, Zick and Green (2007) found that patients desire a degree of formality from their physicians in the form of a handshake, and practitioners have, for many years, been encouraged to shake hands with patients, while remaining sensitive to non-verbal cues that might indicate whether patients are open to this behaviour.

The most used PPE among chiropractors was a cloth/standard surgical mask. Park (2020) outlined the importance of selecting a PPE suited to the different modes of transmission, and because COVID-19 is spread mostly through air droplets, surgical masks with eye protection, gloves, and gowns were recommended during the COVID-19 pandemic. The mode of transmission also explains why most chiropractors would only provide COVID-19 treatment after a patient's symptoms have passed, since it is spread through droplet spray which would be exacerbated with coughing and sneezing symptoms.

Almost 80% of chiropractors felt that COVID-19 made them more aware of practicing hygiene behaviours. Perhaps this explains why the increase of disinfection rates post COVID-19, compared to pre COVID-19. This study was limited in that it did not investigate why the remaining 20% of chiropractors did not feel that it made them more aware of practising sound hygiene behaviours. A reason for this could be because a small proportion of healthcare workers had misconceptions around the COVID-19. It could be that these chiropractors felt that they were already aware of hygiene behaviours pre COVID-19, and were perhaps already practicing hygiene behaviours, or perhaps some practitioners felt that their knowledge of hygiene behaviours had not changed, and they were reluctant to adhere to it.

5.4 THE COVID-19 IMPACT ANALYSIS OF CHIROPRACTORS IN SOUTH AFRICA

Around 54% of chiropractors believed there was a possibility of contracting COVID-19 if hygiene protocols were not followed. This can be seen in the high usage of disinfection rates during COVID-19, to reduce transmission. Another explanation could be that there was a 27.74% increase in chiropractors' belief of the importance of practicing good hygiene behaviour post COVID-19.

Many chiropractors felt confident in their ability to implement hygiene practices but felt that patients were reluctant to adhere to hygiene practices during chiropractic care. The maintenance of good hygiene practices is the most effective way to prevent the spread of communicable diseases, however it seemed that patients hindered the chiropractor's ability to do so (Altun, Cinar and Dede 2013). Although chiropractors proved successful in implementing hygiene practices, the majority felt that the seriousness of contracting COVID-19 would be unlikely.

Three quarters of the chiropractors agreed to continue with hygiene practices post COVID-19, while 65,54% agreed to the importance of educating their patients about good hygiene, to reduce the risk of COVID-19 transmission. Although the results of this study show improved hygiene post COVID-19, when compared to pre, it does not show such as high of a percentage. This indicates a lack of compliance amongst chiropractor's post COVID-19.

5.5 CROSS-IMPACT ANALYSIS

An interesting result was that of mixed chiropractors returning to practice in the early stages of lockdown, compared to the straight chiropractors. Straight chiropractors believe that a spinal subluxation will cure sickness within the body (Ernst 2008). If straight chiropractors

believe this, then they should have returned to practice within the fourth or fifth stage of lockdown, yet most only returned in level 3. Many of the straight chiropractors may have been elderly which would explain the reluctance to return to work during the pandemic.

5.6 CONCLUSION

Chapter Five included the discussion of the results. The following chapter will discuss the conclusion, limitations and recommendations of the study.

CHAPTER SIX

CONCLUSION, LIMITATIONS AND RECOMMENDATIONS

6.1 INTRODUCTION

This chapter will present the conclusion of the research; highlighting the limitations of the investigation and providing recommendations for future research.

6.2 CONCLUSION

The study of chiropractors' COVID-19 practices in South Africa revealed a rise in disinfection of hands, equipment, and frequent contact locations. Safety precautions, such as protective screens and face masks, were implemented to mitigate transmission rates. Hand sanitizer was essential, with a high availability rate. Handshaking was also observed. Approximately 80% of chiropractors reported increased awareness of hygiene practices. However, some patients exhibited hesitancy to follow cleanliness protocols. Mixed chiropractors resumed their profession earlier than straight chiropractors, believing spinal subluxation could treat illnesses.

6.3 LIMITATIONS

The limitations of the study include:

1. The time delay between the end of the COVID-19 pandemic and the administration of the survey, may have influenced the participants answer due to a lack of memory recall.
2. The low response rate to the study means that the results cannot be applied to the whole chiropractic population in South Africa.
3. The response rate to the survey was very low and may therefore not represent the broader chiropractic profession in South Africa.
4. Despite mechanisms to prevent multiple responses respondents could have used a different device or browser to complete more than one survey.
5. Question 17 in the survey asked about barriers but did not include “other” as an option. Future surveys should add this option.
6. The responded were required to rely on memory recall, thus there could be bias in there responses as a result of this.
7. Vaccination of patients were not looked at during this study.

6.4 RECOMMENDATIONS

The following recommendations are made for future research:

1. Comparative studies should be conducted between chiropractors and other members of the population, such as physiotherapists, medical students and homoeopaths.
2. A study comparing these findings with hygiene behaviours of chiropractors, to determine if chiropractors maintain these behaviours, and factors that may influence hygiene behaviours.
3. Professional associations and chiropractic educational institutions should provide learning, to ensure chiropractors maintain good hygiene behaviours.
4. Question 17 in the survey should have an “other” option included for future studies.
5. Future studies should consider asking questions surrounding patients that are vaccinated.

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APPENDICES

APPENDIX A: GATEKEEPER PERMISSION LETTER FROM AHPCSA

17 October 2023
Private bag X28
Lynnwood Ridge
0040

Request for Permission to Conduct Research

Dear Registrar

My name is Jan-Frederik Enslin, a Masters in Health Science in Chiropractic student at the Durban University of Technology. The research I wish to conduct for my Masters Dissertation involves 'Practice-related hygiene behaviours utilised by Chiropractors pre, during and post the COVID-19 pandemic in South Africa.'

I am hereby seeking your consent to distribute a questionnaire via an email link to all registered chiropractors within South Africa.

I have provided you with a copy of my proposal which includes copies of the data collection tools and consent and/ or assent forms to be used in the research process, as well as a copy of the approval letter which I received from the DUT-Institutional Research Ethics Committee (DUT-IREC).

If you require any further information, please do not hesitate to contact me on 0832928830 or by email 21850623@dut4life.ac.za or janenslin93@gmail.com. Thank you for your time and consideration in this matter.

Yours sincerely,

Jan-Frederik Enslin

Durban University of Technology

APPENDIX B: AHPCSA INVITATION WITH LIVE LINK

FROM THE DESK OF THE REGISTRAR

DR LOUIS MULLINDER

RESEARCH SURVEY PARTICIPATION REQUEST

Dear Registered Chiropractor

FOR YOUR CONSIDERATION PLEASE: You are invited to participate in a study entitled:

"Practice-related hygiene behaviours utilised by Chiropractors pre, during and post the COVID-19 pandemic in South Africa"

PURPOSE OF STUDY: Mr Jan-Frederik Enslin, a registered student of Chiropractic is completing this study, for which approval has been given by the DUT-Institutional Research Ethics Committee, in partial fulfilment for his Master's Degree in Chiropractic at the DUT. Your participation will be of significant assistance to the AHPCSA in the sphere of bioethics and jurisprudence.

REQUEST: For this reason, please answer the questions truthfully, according to what you are doing, not according to what you think the Regulations allow - your answers are fully anonymous Further information pertinent to the study is to be found below.

CONTINUING PROFESSIONAL DEVELOPMENT (CPD): Should you choose to participate in this study and once you have answered all questions, you will be awarded one (1) Continuing Education Unit for CPD purposes. In order to receive the CPD certificate you will be redirected to another independent link at the end of the survey and you will be required to include your personal information at this point. Note that this personal information will not be linked in any way to your answers in

the survey. **Kindly keep this CPD certificate on record in the event that your name is drawn in a random software CPD audit - do not forward this CPD certificate to Council House, thank you.**

HOW TO PARTICIPATE: Simply click on the following link and in doing so, you consent to participate in this survey:

https://dut.questionpro.com/t/AY6cCZ0lsu

Thank you for your participation.

For further enquiries please contact Mr Enslin at 0832928830 or email him at Jan-Frederik Enslin janenslin93@gmail.com /21850623@dut4life.ac.za. You can alternatively contact his supervisor at sureshk@dut.ac.za.

DURBAN UNIVERSITY OF TECHNOLOGY

DEPARTMENT OF CHIROPRACTIC

11 December 2023

Good day,

My name is Jan-Frederik Enslin; I would like to invite you to participate in my research study entitled “Practice-related hygiene behaviours utilised by Chiropractors pre, during and post the COVID-19 pandemic in South Africa”

Before you decide on whether to participate, I would like to explain to you why the research is being done and what it will involve for you. The study is part of a research project being completed as a requirement for an MHSc Degree in Chiropractic through the Durban University of Technology.

THE PURPOSE OF THIS STUDY is to identify the impact of the pandemic on the Chiropractors within South Africa and to see what changes developed. The study will look at the hygiene practices utilised by chiropractors pre, during and post the COVID-19-pandemic within South Africa and how they changed over the pandemic.

I would like to invite you to participate in my research questionnaire as this will provide valuable information towards my research.

DO I HAVE TO TAKE PART? No, you don't have to. It is up to you to decide to participate in the study.

WHAT EXACTLY WILL I BE EXPECTED TO DO IF I AGREE TO PARTICIPATE? Should you decide to partake in this study you need to read and agree to the consent form which will be attached on this email. You will then be expected to complete an online survey that should take no longer than 15 minutes.

WHAT WILL HAPPEN IF I WANT TO WITHDRAW FROM THE STUDY? If you decide to participate, you are free to withdraw your consent at any time without giving a reason and without any consequences. However, due to the anonymity of the data, once you have clicked submit, the data will not be recoverable.

IF I CHOOSE TO PARTICIPATE, WILL THERE BE ANY EXPENSES FOR ME, OR PAYMENT DUE TO ME: You will not bear any personal costs or be financially compensated for taking part in this study.

RISKS INVOLVED IN PARTICIPATION: There are no associated risks involved with this study. No personal details will be asked before submitting the survey therefore the answers cannot be traced back to you.

BENEFITS INVOLVED IN PARTICIPATION: You will receive one Continuing Education Unit (CEU) for completion of the survey, given you include your personal details in the independent link.

WILL MY PARTICIPATION IN THIS STUDY BE ANONYMOUS? Yes. All information obtained during the course of this study will be kept strictly confidential. Recorded data used for the statistical analysis by STATKON will not include any information that identifies you as a participant in this study. Your personal information will however be needed to issue you with one ethics CEU point. Your personal information will be requested on an independent page and therefore cannot be linked to the answers you have provided in your survey.

WHAT WILL HAPPEN TO THE RESULTS OF THE RESEARCH STUDY? The results will be written into a research report that will be assessed. In some cases, results may also be published in a scientific journal. In either case, you will not be identifiable in any documents, reports or publications. You will be given access to the study results if you would like to see them, by contacting me.

WHO IS ORGANISING AND FUNDING THE STUDY? The study is being organised by me, under the guidance of my research supervisor at the Department of Chiropractic in the Durban University of Technology. The study will be funded by the Supervisor linked bursary provided by Durban University of Technology.

WHO HAS REVIEWED AND APPROVED THIS STUDY? Before this study was allowed to start, it was reviewed in order to protect your interests. This review was done first by the Department of Chiropractic, and then secondly by the Faculty of Health Sciences Research Ethics Committee at the Durban University of Technology. In both cases, the study was approved.

WHAT IF THERE IS A PROBLEM? If you have any concerns or complaints about this research study, its procedures or risks and benefits, you should ask me. You may contact me at any time if you feel you have any concerns about being a part of this study. My contact details are:

Jan-Frederik Enslin

Mobile: 0832928830

Email: janenslin93@gmail.com

You may also contact my research supervisor:

If you feel that any questions or complaints regarding your participation in this study have not been dealt with adequately, you may contact the Chairperson of the Faculty of Health Sciences Research Ethics Committee at the Durban University of Technology:

Prof. J K Adam

031 373 3093

adamjk@dut.ac.za

FURTHER INFORMATION AND CONTACT DETAILS: Should you wish to have more specific information about this research project information, have any questions, concerns or complaints about this research study, its procedures, risks and benefits, you may communicate with me using any of the contact details given above.

Researcher:

Jan-Frederik Enslin

APPENDIX C: SAMPLE SIZE CALCULATIONS FROM STATISTICIAN

Hello Jan,

Thank you for the call on the weekend. As discussed, please find the write up below of the different methods for calculating sample size.

The determination of sample size can be approached statistically in multiple ways. However, in the context of this research, the following methods are discussed:

Demographic spread:

One method is the demographic spread, which aims to extract sufficient information from the data to draw conclusions about different demographic areas. The research includes four demographic classes: gender, ethnicity, year of study, and urban/rural classification, with two, six, five, and two options for each category, respectively. In addition, there is a continuous variable in the form of age. Without accounting for age buckets, 120 participants would be required.

Considering the margin for error in selection and the representativeness of the entire population of an estimated 700+ individuals, this approach seems to produce a representative proportion of the population for the study.

To further confirm that this sample is representative, during the actual data analysis, statistical methods such as interpolation, cross-correlation of variables, and various extraction techniques will be used to extract enough information on each demographic variable.

An alternative approach in the form of Cochran's Formula, a commonly used approach in the biostatistics field, can also be used to calculate an ideal sample size.

Cochran's Formula Approach:

This is calculated based on the desired level of precision, desired confidence level, and the estimated proportion of the attribute present in the population.

The formula is: Necessary sample size = [(z-score)^2 x p x (1-p)] / (margin of error) ^2, where p represents the estimated proportion of the population with the attribute in question, which in this case is the impact of COVID-19 on hygiene behaviour (pre, post and during).

A reasonable estimate for p is 30%, given the severity of the pandemic and related studies. Using a confidence level of 90% and a margin for error of 6% (given the nature of the study), the sample size calculated using Cochran's formula is 158.

Given the margin for error in selection and the representativeness of the entire population of an estimated 700+ individuals, this approach to determining the sample size would be impractical and unfeasible and as such would lead to far too many individuals being required for the study.

Thus, the modified Cochran's Formula is discussed below as an alternative.

Modified Cochran's Formula:

The modified Cochran's Formula is adapted to allow for smaller sample sizes, with the formula necessary sample size = n = n(0)/ [1 + (n(0) -1)/N], where N is the population size and n(0) is the value from Cochran's formula.

Using this approach, the required sample size is 129 individuals (rounded).

Considering the difficulty of data collection and other complexities, due to the fact that chiropractors are relatively busy given the nature of their profession, a 20% margin should be allowed to determine the minimum required sample. Therefore, the minimum sample required to make this research sample representative of the whole population is +-103 individuals.

Although the aim should be a sample of 129, if around 100 responses are collected, it is this statistician's opinion that the results should be representative of the population and will be sufficient for the purposes of this study.

Let me know if any further clarifications are required on the above or if anything else is required.

Kind Regards

Zalin Strydom

APPENDIX D: CONSENT FORM FOR MAIN STUDY

Full Title of the Study: Practice-related hygiene behaviours utilised by Chiropractors pre, during and post the COVID-19 pandemic in South Africa.
Names of Researcher/s: Jan-Frederik Enslin, BHSc Chiropractic
Statement of Agreement to Participate in the Research Study:

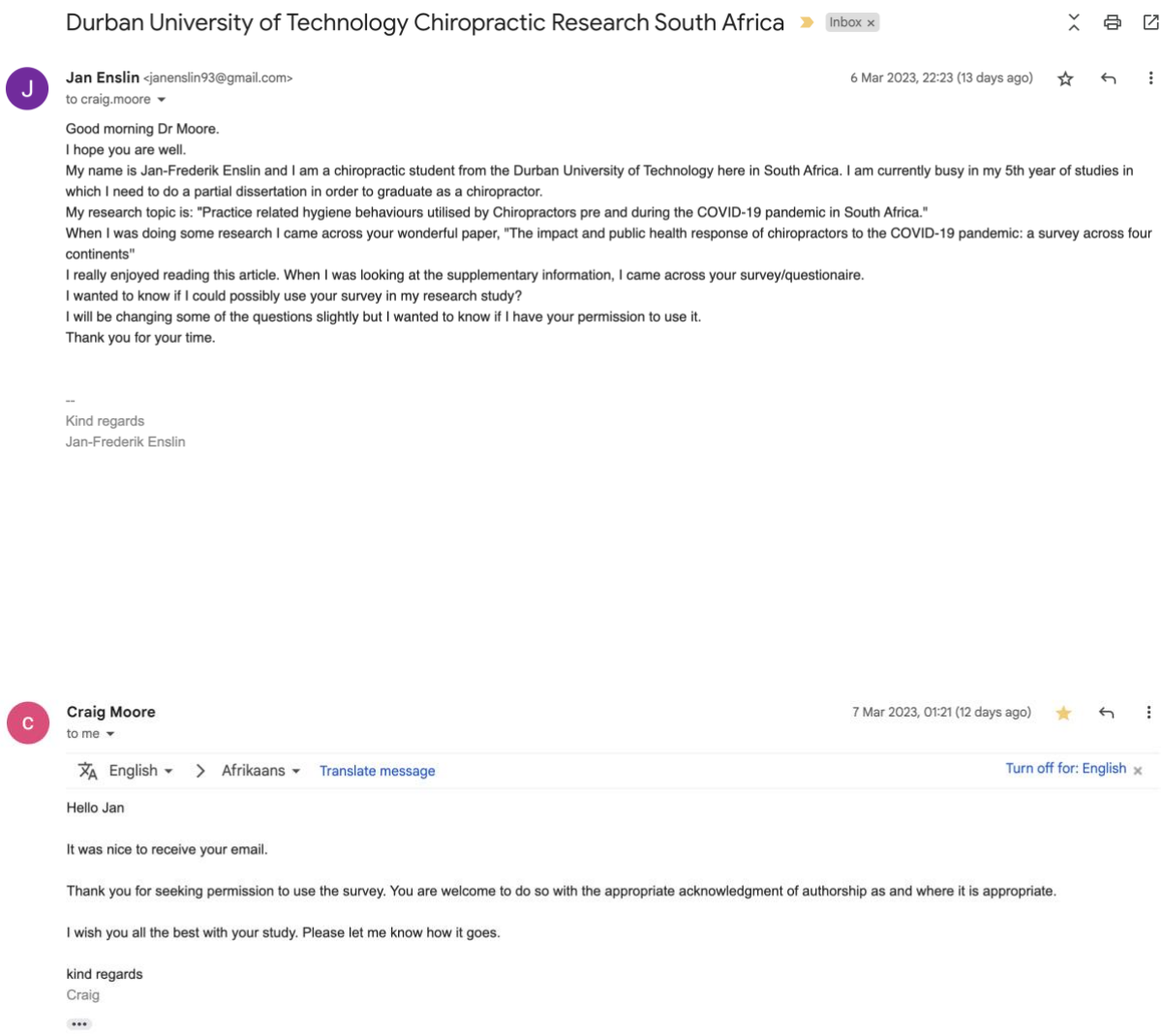
- I hereby confirm that I have been informed by the researcher, Mr Jan-Frederik Enslin about the nature, conduct, benefits, and risks of this study - Research Ethics Clearance Number: IREC185/23.
- I have also received, read, and understood the above written information (Participant Letter of Information) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymous processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in study.
- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

_____	_____	_____	_____
Full Name of Participant	Date	Time	Signature
Thumbprint			

I, Jan-Frederik Enslin herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

Jan-Frederik Enslin	_____	_____
Full name of Researcher	Date	Signature
_____	_____	_____
Full name of Witness (if applicable)	Date	Signature
_____	_____	_____
Full name of Witness (if applicable)	Date	Signature

APPENDIX E: PERMISSION TO USE QUESTIONNAIRE



Durban University of Technology Chiropractic Research South Africa Inbox ×

Jan Enslin <janenslin93@gmail.com> 6 Mar 2023, 22:23 (13 days ago)
to craig.moore

Good morning Dr Moore.
I hope you are well.
My name is Jan-Frederik Enslin and I am a chiropractic student from the Durban University of Technology here in South Africa. I am currently busy in my 5th year of studies in which I need to do a partial dissertation in order to graduate as a chiropractor.
My research topic is: "Practice related hygiene behaviours utilised by Chiropractors pre and during the COVID-19 pandemic in South Africa."
When I was doing some research I came across your wonderful paper, "The impact and public health response of chiropractors to the COVID-19 pandemic: a survey across four continents"
I really enjoyed reading this article. When I was looking at the supplementary information, I came across your survey/questionaire.
I wanted to know if I could possibly use your survey in my research study?
I will be changing some of the questions slightly but I wanted to know if I have your permission to use it.
Thank you for your time.

--
Kind regards
Jan-Frederik Enslin

Craig Moore 7 Mar 2023, 01:21 (12 days ago)
to me

English > Afrikaans Translate message Turn off for: English

Hello Jan

It was nice to receive your email.

Thank you for seeking permission to use the survey. You are welcome to do so with the appropriate acknowledgment of authorship as and where it is appropriate.

I wish you all the best with your study. Please let me know how it goes.

kind regards
Craig

APPENDIX F: QUESTIONNAIRE

Welcome to my research. I am a 5th year student at DUT doing research for my master's degree in Chiropractic. I would like to invite you to participate in my research questionnaire as this will provide valuable information towards my research.
I give consent to this questionnaire and for any of my answers to be used for research purposes.
I am a registered chiropractor with the AHPCSA and have been practicing before, during and after the COVID-19 pandemic in South Africa.

A tick box [ ] I agree
Section A: Demographic and practice background

1) What is your age?

2) What is your sex?
(a) Male
(b) Female
(c) Other
(d) Prefer not to say

3) What is your marital status?
(a) Single
(b) Married
(c) Divorced
(d) Widowed

4) In which province do you reside? (Select one)
(a) Eastern Cape
(b) Free State
(c) Gauteng
(d) KwaZulu-Natal
(e) Limpopo
(f) Mpumalanga
(g) Northern Cape
(h) North West
(i) Western Cape
(j) Other (If selected, please specify)

5) How many years have you been in practice as a chiropractor? (Enter whole number)

6) Which of the following best describes the ***practice location*** where you primarily worked as a chiropractor during the COVID-19 pandemic? (Select one)
(a) Rural/remote region
(b) Town or smaller regional city
(c) Major city (Urban/metropolitan/suburban)

7) At what level of lockdown did you start treating patients during the pandemic?

(a) Level 5
(b) Level 4
(c) Level 3
(d) Level 2
(e) Level 1

8) Indicate the type of practice that you worked in as a chiropractor during the COVID-19 pandemic (Select all that apply).

(a) Sole practitioner only
(b) Multidisciplinary practice (only if selected with the following practitioners)
    - Please specify

9) Which of the following statements would ***most closely*** describe the care you provided as a chiropractor during the COVID-19 pandemic?

a. Straight chiropractors
   Care based upon the detection and correction of chiropractic subluxations.
b. Mixed/diversified chiropractors
   Care based on the management of non-surgical spine and/or musculoskeletal conditions.

10) Which of the following statements applied to your home environment ***during*** the COVID-19 outbreak? (Select all that apply)

(a) Living alone
(b) Living with a partner and/or other adults ***under*** the age of 65 years
(c) Living with partner and/or other adults ***over*** the age of 65 years
(d) Living with children under the age of 18 years.
(e) Living with a higher personal risk of COVID-19 because of an existing chronic health condition
(f) Living with someone else with a higher risk of COVID-19 because of an existing chronic health condition
(g) Living with someone with a disability
(h) None of the above

Section B: Impacts of COVID-19 on practice-life pre, during and post the pandemic

11) Which of the following practices were utilised within your chiropractic practice pre, during and post the COVID-19 pandemic? (Select all that apply).

	Pre COVID-19	**During COVID-19**	**Post COVID-19**
(a) On average, how many times a day did you disinfect your hands?	- Always after each patient - Often - several times throughout the day - Seldom - Never	- Always after each patient - Often - several times throughout the day - Seldom - Never	- Always after each patient - Often - several times throughout the day - Seldom - Never
(b) Did you have hand sanitizer available for your patients?	Yes/No	Yes/No	Yes/No
(c) On average, how many times a day did you disinfect your equipment?	- Always after each patient - Often - several times throughout the day - Seldom - Never	- Always after each patient - Often - several times throughout the day - Seldom - Never	- Always after each patient - Often - several times throughout the day - Seldom - Never
(d) On average, how many times a day did you do disinfect frequent contact areas? (e.g. reception area)	- Always after each patient - Often - several times throughout the day - Seldom - Never	- Always after each patient - Often - several times throughout the day - Seldom - Never	- Always after each patient - Often - several times throughout the day - Seldom - Never
(e) Was a protective screen added at the reception desk?	Yes/No	Yes/No	Yes/No
(f) Was social distancing implemented in the reception and treatment areas, with regards to patient seating?	Yes/No	Yes/No	Yes/No
(g) Do you shake the patient's hands?	Yes/No	Yes/No	Yes/No
(h) Do you wear a face mask during consultations?	Yes/No	Yes/No	Yes/No
(i) Do the other staff in the practice wear a face mask?	Yes/No	Yes/No	Yes/No
(j) The hand sanitizer used in my practice has a minimum of 70% ethyl or isopropyl alcohol solution?	Yes/No	Yes/No	Yes/No
(k) Do you practice social distancing with colleagues in your workspace?	Yes/No	Yes/No	Yes/No

12) What personal protective equipment (PPE) did you as a ***chiropractor use DURING & AFTER the*** COVID-19 outbreak?

	(a) DURING	**(b) AFTER**
Cloth/standard surgical mask		
N95 respirator/mask		
Face and/or eye shielding		
Disposable gloves		
Protective garments/clothing		
None of the above		

13) What care would you recommend to a patient who presents with COVID-19 symptoms? (Select one)

(a) I would proceed with treatment without using protective measures.

(b) I would proceed with treatment using protective measures.

(c) I would only provide treatment if they presented a negative COVID-19 test.

(d) I would only provide treatment after their symptoms have passed.

(e) I'm unsure what I would do.

14) Have the COVID-19 hygiene protocols made you more aware about practice hygiene behaviours? Yes/No.

Please explain your answer? _____

Section C: Changes in practice-related hygiene behaviours using the health belief model:

15) How likely do you think you are to contract COVID-19 while practicing, if you do not take necessary hygiene precautions?
    - Very unlikely
    - Unlikely
    - Neutral
    - Likely
    - Very likely

16) How serious do you think the consequences of contracting COVID-19 are for you and your patients?
    - Not severe
    - Somewhat severe
    - Neutral
    - Severe
    - Very severe

17) In your opinion, which of the following factors are barriers to implementing hygiene practices during chiropractic care?
    - Lack of time
    - Lack of resources (e.g., PPE, disinfectants)
    - Difficulty in adhering to hygiene practices
    - Patient reluctance to adhere to hygiene practices during chiropractic care
    - I don’t think any of these factors are barriers

18) How confident are you in your ability to implement hygiene practices during chiropractic care?
    - Not confident at all
    - Slightly confident
    - Neutral
    - Moderately confident
    - Very confident

19) Before & during the COVID-19 pandemic, I believed that practicing good hygiene in my chiropractic practice was:

	(a) BEFORE	**(b) DURING**
Not important		
Somewhat important		
Moderately important		
Very important		
Extremely important		

20) I believe that educating my patients about the importance of good hygiene practices in reducing the risk of contracting or transmitting COVID-19?
   (a) Not important
   (b) Somewhat important
   (c) Moderately important
   (d) Very important
   (e) Extremely important

21) I intend to continue implementing good hygiene practices in my chiropractic practice after the COVID-19 pandemic has subsided?
   (a) Strongly disagree
   (b) Somewhat disagree
   (c) Neutral
   (d) Somewhat agree
   (e) Strongly agree

Thank you for taking the time to complete this questionnaire.

APPENDIX G: LETTER OF INFORMATION FOR FOCUS GROUP

LETTER OF INFORMATION: FOCUS GROUP

Title of the Research Study: Practice-related hygiene behaviours utilised by Chiropractors pre, during and post the COVID-19 pandemic in South Africa.

Principal Investigator/s/researcher: Jan-Frederik Enslin, BHSc Chiropractic

Co-Investigator/s/supervisor/s: Dr Krishna SBN (PhD: Biochemistry), Collaborator: Dr Laura O'Connor (M.Tech: Chiropractic)

Brief Introduction and Purpose of the Study: Since the COVID-19 pandemic, there has been a major disruption in our daily lives. This is the first pandemic experienced by this generation During the level 5 lockdown period, most chiropractic practices were closed and unable to function properly. Chiropractors were also challenged with adjusting their practice-related hygiene behaviours in order to prevent the spread of the virus. It was discovered that the pandemic had caused a great impact on chiropractors within South Africa as they could not practice like before. New protocols were put in place by the AHPCSA. These included new hygiene practices, behaviours and rules on social distancing and running a practice. The purpose of this study is to identify the impact of the pandemic on the Chiropractors within South Africa and to see what changes developed. The study will look at the hygiene practices utilised by chiropractors pre, during and post the COVID-pandemic within South Africa and how they changed over the pandemic.

Good day and thank you for taking part in my research. I am a 5th year student at DUT doing research for my bachelor's degree in chiropractic. I would like to invite you to participate in my research questionnaire as this will provide valuable information towards my research.

What is Research: Research is the systematic investigation and study of a subject or topic in order to develop or expand knowledge. It involves gathering information, reviewing existing literature, formulating hypotheses or research questions, collecting and analysing data, and drawing conclusions based on the findings. Research can be conducted in various

fields such as science, social sciences, humanities, or business, and it plays a critical role in advancing knowledge, solving problems, and informing decision-making.

Outline of the Procedures: Registered Chiropractors with the AHPCSA, such as yourself and your fellow colleagues, will be asked to participate. After reading the information letter and signing the informed consent form, you will be sent an online questionnaire to complete that would take about 10 minutes and can be done in your own time. The completed questionnaires will be collected, and data will be drawn from it.

Risks or Discomforts to the Participant: There are no risks or discomforts to you if you are involved in this study.

Explain to the participant the reasons he/she may be withdraw from the Study: A participant may at any time choose not to complete the questionnaire and then be withdrawn from the study.

Benefits: This study will demonstrate a better understanding of how you and your fellow chiropractor's had changed their practice-related hygiene behaviours pre, during and post the COVID-19 pandemic and how it evolved since the start of the pandemic.

Remuneration: There will be no remuneration if you are involved in this study.

Costs of the Study: There will be no cost if you are involved in this study.

Confidentiality: All answers are confidential and will not be linked to your participation. The informed consent and questionnaires will be coded to ensure that no questionnaire can be linked to you. The questionnaire will be analysed by a statistician and all information will only be used for research purposes. After a period of 5 years the data collected will be destroyed.

Results: The results will be written up in a partial dissertation and be published in a journal.

Research-related Injury: There are no risk of research-related injuries in this study.

Storage of all electronic and hard copies including tape recordings The informed consent and questionnaires will be coded to ensure that no questionnaire can be linked to you. The questionnaire will be analysed by a statistician and all information will only be used for research purposes. After a period of 5 years the data collected will be destroyed.

Persons to contact in the Event of Any Problems or Queries Please contact the researcher (Jan-Frederik Enslin 0832928830), my supervisors (Dr ¯Krishna SBN - sureshk@dut.ac.za or 0313736015 or Dr Laura O'Connor - lauraw@dut.ac.za) or the Institutional Research Ethics Administrator on 031 373 2375. Complaints can be reported to the Research and postgraduate support: Director - researchdirector@dut.ac.za

APPENDIX H: CONFIDENTIALITY STATEMENT AND CODE OF CONDUCT

IMPORTANT NOTICE: This form is to be read and filled in by every member participating in the focus group, before the meeting convenes.

CONFIDENTIALITY STATEMENT AND CODE OF CONDUCT: FOCUS GROUP

1. All information contained in the research documents and any information discussed during the focus group meeting must be kept private and confidential. This is especially binding to any information that may identify any of the participants in the expert group.

2. None of the information shall be communicated to any other individual or organisation outside of this specific focus group as to the decisions of this expert group.

3. The information from this focus group will be made public in terms of a dissertation/thesis and/or journal publication, which will in no way identify any of the participants involved in this expert group.

4. The returned questionnaires will be coded and kept anonymous in the research process.

5. All data generated from this expert group will be kept for five years in a secure location at Durban University of Technology and thereafter will be destroyed. Once this form has been read and agreed to, please fill in the appropriate information below and sign to acknowledge agreement. Please print in block letters:

FOCUS GROUP MEMBER: _____ SIGNATURE: _____

WITNESS NAME: _____ SIGNATURE: _____

RESEARCHER'S NAME: _____ SIGNATURE: _____

SUPERVISOR'S NAME: _____ SIGNATURE: _____

APPENDIX I: CONSENT FORM FOR THE FOCUS GROUP

CONSENT

Statement of Agreement to Participate in the Focus Group Study:

- I hereby confirm that I have been informed by the researcher, Jan-Frederik Enslin, about the nature, conduct, benefits and risks of this study - Research Ethics Clearance Number: IREC185/23,
- I have also received, read and understood the above written information (Participant Letter of Information) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerized system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

_____	____-	_____	_____
Full Name of Participant	**Date**	**Time**	**Signature/Right Thumbprint**

I, Jan-Frederik Enslin herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

Jan-Frederik Enslin	_____	_____
Full Name of Researcher	**Date**	**Signature**
_____	_____	_____
Full Name of Witness (If applicable)	**Date**	**Signature**
_____	_____	_____
Full Name of Legal Guardian (If applicable)	**Date**	**Signature**

APPENDIX J: LETTER OF INFORMATION FOR THE PILOT STUDY

LETTER OF INFORMATION: PILOT STUDY

Title of the Research Study: Practice-related hygiene behaviours utilised by Chiropractors pre, during and post the COVID-19 pandemic in South Africa.

Principal Investigator/s/researcher: Jan-Frederik Enslin, BHSc Chiropractic

Co-Investigator/s/supervisor/s: Dr Krishna SBN (PhD: Biochemistry), Collaborator: Dr Laura O'Connor (M.Tech: Chiropractic)

Brief Introduction and Purpose of the Study: Since the COVID-19 pandemic, there has been a major disruption in our daily lives. This is the first pandemic experienced by this generation During the level 5 lockdown period, most chiropractic practices were closed and unable to function properly. Chiropractors were also challenged with adjusting their practice-related hygiene behaviours in order to prevent the spread of the virus. It was discovered that the pandemic had caused a great impact on Chiropractors within South Africa as they could not practice like before. New protocols were put in place by the AHPCSA. These included new hygiene practices, behaviours and rules on social distancing and running a practice. The purpose of this study is to identify the impact of the pandemic on the Chiropractors within South Africa and to see what changes developed. The study will look at the hygiene practices utilised by chiropractors pre, during and post the COVID-19-pandemic within South Africa and how they changed over the pandemic.

Good day and thank you for taking part in my research. I am a 5th year student at DUT doing research for my bachelor's degree in chiropractic. I would like to invite you to participate in my research questionnaire as this will provide valuable information towards my research.

What is Research: Research is the systematic investigation and study of a subject or topic in order to develop or expand knowledge. It involves gathering information, reviewing existing literature, formulating hypotheses or research questions, collecting and analysing data, and drawing conclusions based on the findings. Research can be conducted in various fields such as science, social sciences, humanities, or business, and it plays a critical role in advancing knowledge, solving problems, and informing decision-making.

Outline of the Procedures: Registered Chiropractors with the AHPCSA, such as yourself and your fellow colleagues, will be asked to participate. After reading the information letter and signing the informed consent form, you will be sent an online questionnaire to complete that would take about 10 minutes and can be done in your own time. The completed questionnaires will be collected, and data will be drawn from it.

Risks or Discomforts to the Participant: There are no risks or discomforts to you if you are involved in this study.

Explain to the participant the reasons he/she may be withdraw from the Study: A participant may at any time choose not to complete the questionnaire and then be withdrawn from the study.

Benefits: This study will demonstrate a better understanding of how you and your fellow chiropractor's had changed their practice-related hygiene behaviours pre, during and post the COVID-19 pandemic and how it evolved since the start of the pandemic.

Remuneration: There will be no remuneration if you are involved in this study.

Costs of the Study: There will be no cost if you are involved in this study.

Confidentiality: All answers are confidential and will not be linked to your participation. The informed consent and questionnaires will be coded to ensure that no questionnaire can be linked to you. The questionnaire will be analysed by a statistician and all information will only be used for research purposes. After a period of 5 years the data collected will be destroyed.

Results: The results will be written up in a partial dissertation and be published in a journal.

Research-related Injury: There are no risk of research-related injuries in this study.

Storage of all electronic and hard copies including tape recordings The informed consent and questionnaires will be coded to ensure that no questionnaire can be linked to you. The questionnaire will be analysed by a statistician and all information will only be used for research purposes. After a period of 5 years the data collected will be destroyed.

Persons to contact in the Event of Any Problems or Queries Please contact the researcher (Jan-Frederik Enslin 0832928830), my supervisors (Dr ¯Krishna SBN - sureshk@dut.ac.za or 0313736015 or Dr Laura O'Connor - lauraw@dut.ac.za) or the Institutional Research Ethics Administrator on 031 373 2375. Complaints can be reported to the Research and postgraduate support: Director - researchdirector@dut.ac.za

APPENDIX K: CONSENT FORM FOR THE PILOT STUDY

CONSENT

Statement of Agreement to Participate in the Pilot Study:

- I hereby confirm that I have been informed by the researcher, Jan-Frederik Enslin, about the nature, conduct, benefits and risks of this study - Research Ethics Clearance Number: IREC185/23,
- I have also received, read and understood the above written information (Participant Letter of Information) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerized system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

_____	____-	_____	_____
Full Name of Participant	**Date**	**Time**	**Signature/Right Thumbprint**

I, Jan-Frederik Enslin herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

Jan-Frederik Enslin	_____	_____
Full Name of Researcher	**Date**	**Signature**
_____	_____	_____
Full Name of Witness (If applicable)	**Date**	**Signature**
_____	_____	_____
Full Name of Legal Guardian (If applicable)	**Date**	**Signature**

APPENDIX L: PRESURVEY NOTIFICATION

Dear valued Chiropractor

Over the past three years, chiropractors had to adapt to the global pandemic by changing their hygiene practices to keep their patients safe during treatment. Chiropractors had to quickly familiarize themselves with these changes and adapt in such a short time. For many, this period impacted their ways of cleaning and sanitizing beds, social distancing and follow new health related protocols and procedures.

In order to gain further insight into this effect, I would like to invite you to participate in a survey entitled: **"Practice-related hygiene behaviours utilised by Chiropractors pre, during and post the COVID-19 pandemic in South Africa"** which forms part of my master's degree at the Durban University of Technology. Your participation will help ensure that the survey will provide up to date information about effects of practice-related hygiene behaviours of chiropractors within South Africa pre, during and post the COVID-19 pandemic.

Should you agree to participate, you will find the link to the survey at the bottom of this email notification containing clear instructions. Your participation in this survey is important and will be greatly appreciated.

Kind regards

Jan-Frederik Enslin

APPENDIX M: CONSENT FORM FOR MAIN STUDY

Full Title of the Study: Practice-related hygiene behaviours utilised by Chiropractors pre, during and post the COVID-19 pandemic in South Africa.
Names of Researcher/s: Jan-Frederik Enslin, BHSc Chiropractic
Statement of Agreement to Participate in the Research Study:

- I hereby confirm that I have been informed by the researcher, Mr Jan-Frederik Enslin about the nature, conduct, benefits, and risks of this study - Research Ethics Clearance Number: IREC185/23
- I have also received, read, and understood the above written information (Participant Letter of Information) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymous processed into a study report
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in study.
- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

_____	____-	_____	_____
Full Name of Participant	**Date**	**Time**	**Signature/Right Thumbprint**

I, Jan-Frederik Enslin herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

Jan-Frederik Enslin	_____	_____
Full Name of Researcher	**Date**	**Signature**
_____	_____	_____
Full Name of Witness (If applicable)	**Date**	**Signature**
_____	_____	_____
Full Name of Legal Guardian (If applicable	**Date**	**Signature**

APPENDIX N: IREC ETHICS CLEARANCE LETTER

Institutional Research Ethics Committee
Research and Postgraduate Support Directorate
2nd Floor, Berwyn Court
Gate 1, Steve Biko Campus
Durban University of Technology

P O Box 1334, Durban, South Africa, 4001

Tel: 031 373 2375
Email: lavishad@dut.ac.za
http://www.dut.ac.za/research/institutional_research_ethics

www.dut.ac.za

4 December 2023

Mr J-F Enslin
Unit 601
Epernay Complex
190 Botanical Gardens Road
Musgrave

Dear Mr Enslin

Practice-related hygiene behaviours utilised by Chiropractors pre, during and post the COVID-19 pandemic in South Africa
Ethics Clearance Number: IREC 185/23

The DUT-Institutional Research Ethics Committee acknowledges receipt of your notification regarding the piloting of your data collection tool.

Kindly ensure that participants used for the pilot study are not part of the main study.

In addition, the DUT-IREC acknowledges receipt of your gatekeeper permission letters.

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

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

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

It is compulsory for a student or researcher to apply for recertification on an annual basis. The failure to do so will result in withdrawal of ethics clearance. It is the responsibility of the researcher and the supervisor to apply for recertification.

Please note that you are required to submit a Notification of Completion of Study form together with an abstract to the DUT-IREC office on completion of your study.

Yours Sincerely

_____
Prof J K Adam
Chairperson: DUT-IREC

APPENDIX O: PROFESSIONAL LETTER FROM EDITOR

Helen Bond
IMPELA EDITING SERVICES
impelaediting@gmail.com
079 395 5873

19 May 2024

CERTIFICATE

Jan-Frederik Enslin

Dear Jan

Thank you for using Impela Editing Services to edit your Master's thesis entitled "*Practice-related hygiene behaviours utilised by Chiropractors pre, during and post the COVID-19 pandemic in South Africa*".

I have proofread for errors of grammar, punctuation, spelling, syntax and typing mistakes. I have formatted your work and checked the references (this means checking the formatting) according to the DUT's version of Harvard referencing style.

PLEASE NOTE: Impela Editing accepts no fault if an author does not accept the corrections suggested or makes changes to a document after a certificate has been issued. A client may choose to accept none, some, or all of the editor's editorial changes and/or suggestions.

I wish you the very best in your submission.

Kind regards

Helen Bond (Bachelor of Arts, HDE)

APPENDIX P: TURNITIN REPORT

J. Enslin (21850623) Turnitin.docx

ORIGINALITY REPORT

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PRIMARY SOURCES

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