LEVELS OF DISABILITY AND RISK OF CHRONIFICATION OF NECK PAIN AMONG PATIENTS ATTENDING NAKURU LEVEL 5 HOSPITAL

IRENE KEMUNTO MAKENDO

MASTER OF SCIENCE

(Physiotherapy)

JOMO KENYATTA UNIVERSITY

OF

AGRICULTURE AND TECHNOLOGY

2024

Levels of Disability and Risk of Chronification of Neck Pain among Patients Attending Nakuru Level 5 Hospital

Irene Kemunto Makendo

A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Science in Physiotherapy (Orthopedics) of the Jomo Kenyatta University of Agriculture and Technology

2024

DECLARATION

This thesis is my original work and has not been presented for a degree in any other university

Signature……..Date……..……

Irene Kemunto Makendo

This is thesis has been submitted for examination with our approval as the University Supervisors

Signature……..Date……..……

Dr. Nassib Tawa, PhD

JKUAT, Kenya

Signature……..……..Date……..……

Prof. Benita Olivier, PhD

Witwatersrand University, South Africa

Signature……..Date……..……

Prof. Gideon Kikuvi, PhD

JKUAT, Kenya

DEDICATION

This thesis is dedicated to my dear father, Mr. Benson Makendo, who has been my number one supporter and has always taught me that no goal is too big. He continuously encouraged me to set new goals and smash them. Dad, your investment in me can never be repaid, and I am extremely grateful. I also dedicate this work to my beloved mother, who, for months past, has provided unwavering encouragement.

To my children, Rio, Shantel, and Jamal, who have been affected in every possible way by this quest, I extend my gratitude. My siblings, Job, Betty, Sarah, Esborne, and Anne, have never left my side and are truly special. Thank you. My love for all of you can never be quantified. God bless you.

ACKNOWLEDGEMENT

This journey has been incredible, and there are several people I would like to thank because I couldn't have done this without them. First and foremost, I offer praises and thanks to God for providing continued strength and good health throughout my research process. I would like to express my deep and sincere gratitude to my research supervisors, Dr. Nassib Tawa, Prof. Benita Olivier, and Prof. Gideon Kikuvi for allowing me to conduct research and providing invaluable guidance throughout this endeavour. I cannot forget Dr. Joseph Matheri and Dr. Wallace Karuguti for their positive comments. I also extend my thanks to my research assistants for their significant contributions. Finally, I express my heartfelt gratitude to my family for their constant inspiration.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ACRONYMS AND ABBREVIATIONS

BMI	Body Mass Index
CDC	Center for Disease Control
CI	Confidence Interval
CNP	Chronic Neck Patients
CT	Computerized Tomography
IASP	International Association for the Study of Pain
LBP	Low Back Pain
MRI	Magnetic Resonance Imaging
NDI	Neck Disability Index
NF	Neuropathic Feature
NP	Neck Pain
NP+NRI	Neck Pain with the Presence of Nerve Root Involvement
OMPSQ	Orebro Musculoskeletal Pain Screening Questionnaire
QTFCS	Quebec Task Force Classification System
RCTs	Randomized Controlled Studies
SPSS	Statistical Package for the Social Scientists
WAD	Whiplash-Associated Disorders
YLDs	Years Lost to Disability

DEFINITION OF OPERATIONAL TERMS

Allodynia A condition where non-painful stimuli, such as touch or pressure, evoke pain sensations in individuals (He & Kim, 2023).

Central Sensitization A neurophysiological process where the central nervous system (CNS) intensifies nociceptive sensory stimuli, resulting in heightened and prolonged pain sensations (Williams, 2018)

Chronic inflammation is characterized by persistent inflammatory processes extending beyond their normal physiological role, leading to tissue damage and potentially contributing to a range of health conditions (Nasef, Mehta, & Ferguson, 2017).

Chronification Process by which an acute condition transforms into a persistent or long-lasting state, often characterized by ongoing symptoms and potential complications (Morlion *et al*., 2018).

Coping mechanisms Adaptive thoughts and behaviours individuals employ to manage both internal and external stressful situations, enabling them to effectively navigate and respond to challenges or difficult circumstances (Algorani & Gupta, 2023).

Neuroplasticity Encompasses the nervous system's capacity to reorganize its structure, function, and connections in response to both intrinsic and extrinsic stimuli, forming new neural connections notably in learning, experience, or injury contexts (Cramer *et al.,* 2011).

Whiplash-associated disorders A range of symptoms and conditions, resulting from sudden acceleration-deceleration forces on the neck, often experienced after a motor vehicle collision or similar trauma (Bussieres *et al.,* 2016).

ABSTRACT

Neck pain is a major health concern that is often underestimated, despite being a leading cause of disability. In Kenya, the levels of disability and the risk of chronification of neck pain are not well understood, leading to a generalized approach in its clinical management, which may hinder effective treatment outcomes. This study aimed to evaluate the Levels of Disability and Risk of Chronification of Neck Pain Among Patients Attending Nakuru Level 5 Hospital. This analytical cross-sectional study, conducted in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines, involved 124 eligible participants. The Kruskal-Wallis test was used to analyze functional aspects across socio-demographic variables, while Spearman's Rho test and ordinal logistic regression assessed the relationships and their strength between variables. Results were interpreted at a significance level of 0.05 with a 95% confidence interval (CI). The majority of participants were females (64.5%), with 54.0% aged 36 and above. Utilizing the Orebro Musculoskeletal Pain Screening Questionnaire, findings revealed that 58.9% were at moderate risk of chronification, 32.3% were at high risk, and 8.9% were at low risk. Assessment of neck disability, using the Neck Disability Index, the results showed that 50% had moderate disability, 41.9% severe disability, 6.5% mild disability, and 2.4% complete disability. The findings revealed a predominant moderate to high-risk profile for neck pain chronification, indicating a vulnerability to developing chronic neck pain. The study demonstrated moderate to severe disability levels of neck pain among participants. A moderate inverse relationship was observed between the risk of chronification and the degree of neck pain-related disability. Additionally, the study identified a higher prevalence of neck pain in females compared to males, with increased pain intensity and chronicity predominantly affecting individuals aged 36 and above. The results have implications on the importance of early screening and timely pain management in preventing the progression of acute neck pain to chronic conditions. Clinicians should focus on strategies that prioritize pain reduction and functional improvement to minimize long-term disability. Additionally, raising public awareness about the significance of early detection and proactive management can greatly reduce the future burden of chronic neck pain.

CHAPTER ONE

INTRODUCTION

1.1 Introduction to the Chapter

The chapter commences by providing a clear definition of neck pain, its causes, clinical features, and risk factors. It then goes on to discuss the diagnostic classification and differentials for patients with neck pain and explores the prevalence, impact, and factors associated with the onset of chronic cervical pain. Finally, the chapter concludes by defining the study's main aim, objectives, problem statement, justification, and conceptual framework.

1.2 Background Information

Neck pain is a diverse concept defined differently by various authors. As a reference, Hoy *et al.* (2014) characterized neck pain as activity-limiting pain located in the cervical region with radiating or non-radiating symptoms into one or both upper limbs, head or trunk and can last for at least a day. This definition is in line with the 2010 Global Burden of Health study on neck pain.

Efforts to establish the prevalence of neck pain in the overall population have encountered challenges due to wide inconsistency in defining the condition. Variability and heterogeneity in the definitions of neck pain have obstructed accurate frequency assessments (Dennison & Leal, 2015). Despite this non-uniformity, epidemiological studies have consistently revealed a high prevalence of neck pain, surpassing 30%, with a point prevalence of 4.9% (males 4.5%, females 5.8%). The lifetime prevalence ranges from 22% to 70%, and it tends to be more prevalent in women than men, peaking around the age of 45. Moreover, urban areas exhibit higher prevalence compared to rural areas, and developed countries experience a higher burden of neck pain compared to underdeveloped countries (Blanpied *et al.*, 2017;Cohen, 2015).

Prolonged disability resulting from neck pain is a pervasive challenge that significantly hampers individuals' ability to engage in daily activities, diminishes

functional capacity, and gives rise to prevalent issues such as depression and anxiety, thereby exerting a substantial negative impact on overall well-being (Vassilaki & Hurwitz, 2014). Alarmingly, research consistently indicates that a significant portion, ranging from 50% to 84%, of individuals suffering from neck pain continue to endure discomfort for 1 to 5 years (Domingues *et al.*, 2018). This enduring pain-induced disability contributes to a cascade of detrimental consequences across psychological, physical, and economic domains, affecting both the affected individuals and society at large (Kelly, Ritchie, & Sterling, 2017; Henschke, Kamper, & Maher, 2015).

According to de Melo Castro Deligne *et al.,* (2021), the economic impact of neck pain is substantial, encompassing treatment costs, reduced productivity, work absenteeism, and social security expenses. In the United States, neck pain led to 16 million medical consultations in 2010. By 2016, the costs associated with diagnosing and treating neck and lower back pain had surged to an estimated $134 billion. In 2012 alone, neck pain caused 25.5 million job absences, with affected individuals missing an average of 11.4 days of work. In Europe, about 60% of workers reported musculoskeletal pain symptoms in 2015, with neck and upper limb pain accounting for 41% of these complaints. In Brazil, neck pain was responsible for 7.2% of disability pensions awarded to workers with musculoskeletal conditions.

Safiri *et al.,* (2020) provide a detailed analysis in the Global Burden of Disease Study (GBD) 2017, examining the global prevalence, incidence, and burden of neck pain across 195 countries from 1990 to 2017. In 2017, the global age-standardized point prevalence of neck pain was 3,551.1 per 100,000 population, with an annual incidence rate of 806.6 per 100,000, and 352.0 years lived with disability (YLD) per 100,000. These metrics showed little variation over the study period, indicating a consistent global burden. The prevalence of neck pain was generally higher in females compared to males, although the difference was not statistically significant. Age-related prevalence peaked between 70 and 74 years before declining in older age groups. Scandinavian countries—Norway, Finland, and Denmark—recorded the highest prevalence rates in 2017. Significant increases in prevalence were also noted in the United Kingdom, Sweden, and Kuwait from 1990 to 2017. The study

identified a positive correlation between the sociodemographic index (SDI) and the burden of neck pain, suggesting that regions with higher SDI experience a greater impact from the condition.

Ayhualem *et al.,* (2021) examined the burden of neck pain and associated factors among smartphone users at the University of Gondar, Ethiopia. With the rapid global expansion of mobile technology, Ethiopia reached 66.2 million mobile subscribers by 2018. Musculoskeletal complaints linked to smartphone use are common, with prevalence rates spanning from 8.2% to 89.9% across various body parts. Among these, neck pain is particularly prevalent, ranging from 17.3% to 67.8%.

In the broader context, a study from 2010 on the Global Burden of Health reported 291 documented cases of musculoskeletal disorders. Within this spectrum, cervical pain emerged as the fourth highest cause of disability, measured by the number of years lost to disability (YLDs) (Verwoerd, Wittink, Maissan, de Raaij, & Smeets, 2019). Remarkably, it stands as the second most prevalent reason for medical consultation worldwide, surpassed only by back pain and 21st in terms of overall burden (de Melo Castro Deligne *et al.,* 2021; Hoy *et al.,* 2014). Alarmingly, over 30% of patients with acute neck pain endure prolonged symptoms lasting more than six months (Qu *et al.,* 2020). The repercussions of neck pain extend beyond individual health, leading to elevated treatment costs, compensation claims, lost wages, and increased work absenteeism. These challenges significantly impact workforce productivity, contribute to heightened employee turnover, and pose a threat to the economic stability of households and communities. Ultimately, disabilities related to neck issues impose a substantial economic burden, influencing the productivity of both individuals and communities (Blanpied *et al.,* 2017).

Neck pain can stem from various structures within the neck, including ligaments, muscles, intervertebral discs, zygapophysial joints, and nerves. In addition to these anatomical factors, inappropriate sleeping positions can also contribute to the development of cervical pain. Notably, certain lifestyle and occupational factors significantly elevate the risk of experiencing neck pain.

Engagement in contact sports like football, rugby, and wrestling, as well as involvement in motor vehicle accidents, constitutes distinctive risk factors for the development of neck pain (Cohen, 2015).

Furthermore, individuals with a history of neck pain are predisposed to its recurrence. Cohen emphasizes that certain professions, such as manual laborers, office and computer technicians, and healthcare workers, exhibit a higher incidence of developing neck pain due to the nature of their work. The demands and postural requirements of these professions can contribute to musculoskeletal strain and, consequently, an increased likelihood of neck pain. Understanding these multifaceted risk factors is essential for both preventive measures and targeted interventions in managing and mitigating the impact of neck pain in different populations.

Neck pain, a multifaceted condition, presents a challenge with numerous contributing factors that remain incompletely understood. Its origins are complex, involving a combination of various risk factors, making it elusive to pinpoint a singular cause. While numerous studies propose a pathological basis for neck pain, addressing and remedying the underlying cause poses persistent challenges (Siahaan, 2022).

Controversy arises in the literature, with some studies implicating poor posture and work habits in the development of neck pain, while others dispute these claims, asserting that the true causes of cervical pain remain enigmatic. Researchers recognize that known factors leading to neck pain are limited to serious yet rare conditions like heart disease and cancer. Moreover, emerging studies highlight the potential role of psychosocial factors in neck pain development, with a noteworthy connection observed in individuals with a history of neck or lower back pain (Kazeminasab *et al.,*2022). The complex web of factors influencing neck pain encompasses an individual's body composition, measured by BMI, posture, previous neck pain history, age, exercise routines, repetitive movements, ergonomic considerations, social dynamics, job satisfaction, and psychological aspects such as depression and high stress levels (Vitor *et al.,* 2017). Navigating the management of neck pain proves challenging for healthcare professionals due to conflicting

information regarding treatment success and prognostic outcomes (Kelly *et al.*, 2017).

Clinical manifestations of neck pain often manifest as a persistent, dull ache that intensifies with neck movement. This discomfort can be further delineated into distinct categories, providing insight into the specific characteristics of the pain. Sub-occipital pain, localized between C2 and the superior nuchal line, stands out as a focal point and is notably recognized as the origin of cervico-genic headache. Additionally, neck pain can be distinguished between lower and upper cervical spinal regions, each presenting distinct symptomatic patterns (Childress & Stuek, 2020). Pain emanating from the upper cervical divisions may radiate to the head, contributing to a broader spectrum of discomfort. On the other hand, lower cervical divisions typically manifest with referred pain to the front part of the chest wall, scapular region, upper extremity, and shoulder. This nuanced categorization, as proposed by Siahaan (2022) aids in the clinical understanding and management of neck pain, allowing for a more targeted and comprehensive approach to address the diverse symptomatic presentations associated with this prevalent condition.

According to Cohen (2015), the classification of neck pain has been a subject of extensive research. Various methods have emerged, aiming to categorize patients based on their presenting symptoms. This categorization seeks to group individuals with neck pain into distinct classes, considering their clinical manifestations and treatment objectives. The overarching goal is to tailor management strategies to each patient, optimizing outcomes. The absence of a robust classification system may lead to the assumption that all neck pain cases respond uniformly to treatment, potentially hindering patient recovery.

To confirm objective findings in patients presenting with neck pain, a thorough physical assessment is essential, encompassing screening and a strategic plan for further investigation. Plain radiographs serve as a valuable diagnostic tool for identifying structural abnormalities contributing to neck pain. When soft tissue abnormalities are suspected, or red flags necessitate investigation into serious neurological deficits, MRI emerges as a sensitive test (Cohen, 2015). Additionally,

electro-diagnostic testing proves beneficial in diagnosing unclear symptoms and ruling out peripheral neuropathy.

In cases of acute neck pain, conservative treatments often yield positive outcomes regardless of the pain's origin. A study involving 206 patients with acute cervical pain demonstrated the efficacy of physical treatment, coupled with home exercises and the use of a cervical collar, in alleviating symptoms over 6 weeks (Cohen, 2015). The effectiveness of epidural corticosteroid injections for patients with radiculopathy remains a topic of debate, but spinal manipulation has shown promise in the treatment of cervical pain. Surgery is typically recommended for chronic cases of neck pain.

Clinical features predictive of chronicity in patients with neck pain span diverse domains, classified into physical, psychosocial, work environment, and individual factors (Kim, Wiest, Clark, Cook, & Horn, 2018). While many individuals experiencing acute neck pain recover, a subset may endure disability and pain persisting six months later, emphasizing the need for a nuanced approach (Verwoerd, Wittink, Maissan, de Raaij, & Smeets, 2019). Prognosis assessment, particularly regarding psychosocial and maladaptive illness behaviour, plays a pivotal role in understanding and addressing chronicity. Psychosocial well-being emerges as a crucial determinant in the onset of neck pain-related disability, with studies consistently highlighting its significance. Certain physical factors also contribute to the development of chronic cervical pain, including prolonged neck flexion, extended periods of sitting, poor neck muscle endurance, altered cervical movement, and suboptimal posture (Shahidi, Curran-Everett, & Maluf, 2015). Notably, individuals with a medical history of neck pain, a trauma history, females, older adults, and those with concurrent low back pain exhibit a higher likelihood of poor treatment outcomes. These factors contribute to the transition from acute neck pain to chronic conditions, warranting tailored interventions and preventive strategies (Hruschak & Cochran, 2018).

1.3 Statement of the Problem

Neck pain remains a significant and often underestimated musculoskeletal challenge, with its prevalence ranging from 16.7% to 75.1% globally (Vitor *et al.*, 2017). Despite its substantial impact on disability and daily functioning, the traditional approach to managing neck pain—treating all patients as a homogeneous group—has led to suboptimal recovery and prolonged treatment durations. This one-size-fits-all strategy has been found to aggravate conditions rather than providing effective, individualized care.

In Kenya, the risk of developing chronic neck pain is not well understood due to the lack of specific data and research. This knowledge gap hampers the ability of physiotherapists to tailor interventions to the individual needs of patients, potentially compromising treatment outcomes. Without detailed insights into the prevalence and nature of neck pain within the Kenyan context, there is a risk that treatment approaches will remain generalized, failing to address the specific factors contributing to the condition.

The Global Burden of Disease Study in 2010 identified cervical pain as the fourth leading cause of disability among 291 musculoskeletal disorders, as measured by years lived with disability (YLDs). Neck pain is the second most common reason for seeking medical consultation worldwide, following only back pain (Blanpied *et al.*, 2017). Alarmingly, over 30% of patients with acute neck pain experience symptoms that persist for more than six months (Cohen, 2015).

The economic burden of neck disorders is significant, encompassing high treatment costs, compensation claims, lost wages, and work absenteeism. These factors contribute to decreased workforce productivity, increased employee turnover, and adverse economic impacts on households and communities (Blanpied *et al.,* 2017).

1.4 Study Aim

To determine the levels of disability and risk of chronification of neck pain among patients attending Nakuru Level 5 Hospital.

1.4.1 Specific Objectives

1. To determine the risk of chronicity of neck pain among patients attending the physiotherapy and general outpatient clinics at Nakuru Level 5 Hospital with neck pain.
2. To determine the levels of disability among patients with neck pain attending the physiotherapy and general outpatient clinics at Nakuru Level 5 Hospital.
3. To determine the relationship between social-demographics characteristics and risk of chronification in patients with neck pain attending the physiotherapy and general outpatient clinics at Nakuru Level 5 Hospital.
4. To determine the relationship between sociodemographic characteristics and levels of disability in patients with neck pain attending the physiotherapy and general outpatient clinics at Nakuru Level 5 Hospital.

1.4.2 Research Questions

1. What is the risk of chronification of neck pain among patients attending the physiotherapy and general outpatient clinics at Nakuru Level 5 Hospital?
2. What are the levels of disability among patients with neck pain attending the physiotherapy and general outpatient clinics at Nakuru Level 5 Hospital?
3. What is the association between sociodemographic characteristics and the risk of chronification among patients with neck pain attending the physiotherapy and general outpatient clinics at Nakuru Level 5 Hospital?
4. What is the association between sociodemographic characteristics and level of disability among patients with neck pain attending the physiotherapy and general outpatient clinics at Nakuru Level 5 Hospital?

1.5 Significance of the Study

This study aims to enhance the understanding of neck pain, a crucial aspect of effective patient management. By identifying individuals at risk of developing chronic neck pain, healthcare providers can intervene early and prevent potential long-term complications. With over 50% of patients with neck pain being referred to physiotherapists, the need to develop improved treatment strategies becomes

paramount. The insights derived from this study will inform such strategies, contributing to better patient outcomes. The findings hold the potential to significantly enhance patient care by guiding healthcare providers towards more targeted and effective interventions for those experiencing neck pain.

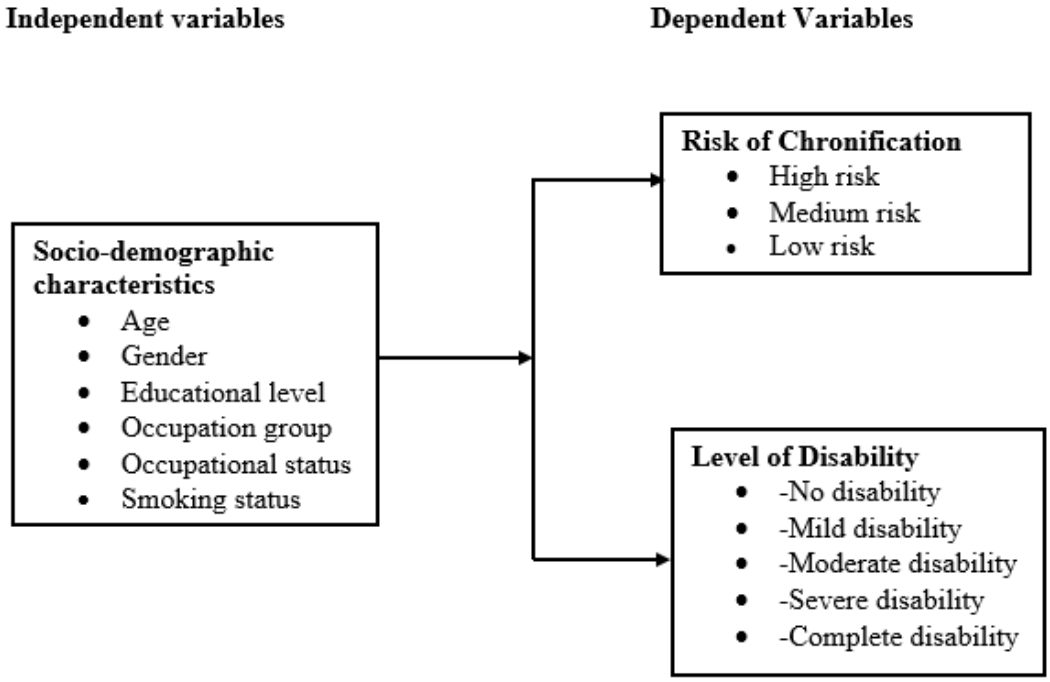

Figure 1.1: Study Conceptual Framework

1.5 Summary of the Chapter

Neck pain emerges as a prevalent musculoskeletal condition within the general population. However, the dissatisfaction with treatment outcomes can be attributed to the conventional practice of treating patients as a homogeneous group. This standardized approach has resulted in diverse patient experiences, ranging from incapacitating neck pain to prolonged treatments and, in certain instances, misdiagnoses and long-term disability. In response to this challenge, this study aims to forecast the risk of chronicity and evaluate the degree of disability among individuals with neck pain. The goal is to move beyond the one-size-fits-all paradigm, enabling a more personalized and effective approach to the management of neck pain.

CHAPTER TWO

LITERATURE REVIEW

2.1 Pathophysiology of Pain Chronification

As per the definition provided by the International Association for the Study of Pain (IASP), chronic pain is characterized as pain that persists beyond the typical time required for tissue healing, commonly acknowledged as three months in the absence of other factors (Mills, Nicolson, & Smith, 2019). The transition from acute pain to persistent pain is termed as pain chronification, a process marked by an imbalance between pain inhibition and pain amplification *(*Morlion *et al.*, 2018).

Prolonged exposure to a painful stimulus, often stemming from a noxious event, triggers the abnormal firing of pain signals, leading to an intensified response in the higher centers of the brain, a phenomenon referred to as central sensitization (Isa & Chetty,2022; Morlion *et al.,* 2018). This heightened sensitivity arises from changes in the sensory response to normally benign stimuli. As a result, individuals with chronic neck pain may display heightened atypical sickness behaviors and more pronounced emotional responses.

2.2 Factors Associated with the Chronification of Neck Pain

Neck pain is a multifaceted condition influenced by a variety of factors, making its progression to chronicity difficult to predict. Identifying risk factors associated with the chronicity of neck pain is essential for understanding its prognosis, chronicity, and recovery trajectory. As highlighted by Kazeminasab *et al.* (2022), recognizing these risk factors is crucial for managing neck pain effectively. Researchers such as Kaur Ajit Singh (2018) have categorized these risk factors into three primary domains: individual, physical, and psychological. In a study by Shahidi, Curran-Everett, & Maluf (2015), modifiable risk factors for first-onset chronic neck pain were investigated among 171 new office workers in high-risk positions. The study assessed risk factors across psychosocial, physical, and neurophysiological domains during the first three months of employment. Participants completed monthly surveys

over a year to monitor the development of chronic neck pain, defined as a Neck Disability Index score of ≥5 points sustained for at least three months.

The analysis, using backward logistic and multivariate regression, identified three significant predictors of chronic neck pain: depressed mood (odds ratio [OR] = 3.36, p = .03), cervical extensor endurance (OR = .92, p = .001), and diffuse noxious inhibitory control (OR = .90, p = .02). The study revealed that mood impairments and inadequate pain modulation were associated with a higher risk of developing chronic neck pain, especially under conditions of muscle fatigue.

Despite the acknowledged significance of psychological factors in neck pain, research on this relationship remains limited and not fully comprehended. Psychological factors such as depression, anxiety, and psychological stress are recognized as crucial contributors that not only impact pain perception but also play a role in the development of chronicity in neck pain. Depression, in particular, stands out as one of the strongest predictors for the chronicity of neck pain. Research conducted by Shahidi *et al.*, (2015) indicates a noteworthy correlation between the chronicity of existing pain, pain severity, and depression. This correlation suggests an increase in the risk of new-onset occurrences. Recognizing the pivotal role of depression in identifying populations at risk for early diagnosis of neck pain becomes important. Even low levels of depression have been found to significantly contribute to the onset and development of pain chronicity. In addition to depression, anxiety also plays a pivotal role in the chronification of neck pain. Individuals experiencing persistent pain often battle with anxiety and worry as they seek to make sense of their symptoms (Elbinoune *et al.,* 2016). The complex relationship between anxiety, stress, pain, and disability further underscores the psychological factors influencing the progression of neck pain. A study on adolescents demonstrated a strong correlation between neck pain and elevated levels of stress and anxiety, highlighting the significant role of psychological well-being in the manifestation of symptoms (Kazeminasab *et al.*, 2022).

Elbinoune *et al,*. (2016) investigated the prevalence of anxiety and depression in 80 patients with chronic neck pain (duration >3 months). Excluding those with existing

psychological issues or on psychotropic medication, the study found that 68.4% had anxiety and 55.7% had depression. Significant predictors of anxiety included disability, while cervico-brachial neuralgia was linked to depression. Additionally, a lower education level was associated with higher anxiety and depression. Kim *et al*. (2018) conducted a systematic review to identify risk factors for a first episode of neck pain, analyzing 10 studies out of 878. The review found a global incidence rate of 16.2% for neck pain. Key psycho-social risk factors included depressed mood, high role conflict, and perceived muscular tension. While no major physical risk factors were identified, awkward postures at work were frequently reported. Protective factors were supportive leadership, a positive social climate, regular physical activity, and strong cervical extensor muscles.

Physical risk variables encompass a range of factors influencing the development and chronification of neck pain (Shahidi *et al.,* 2015). These include physical activity levels, cervical active range of motion, forward head position, cervical endurance, cervical strength, scapular muscle length, and work-related physical straining. Notably, high levels of physical activity and increased job responsibilities have been associated with the onset of neck pain. Neck pain exhibits a complex interplay between workplace risk factors and individual characteristics (Ehsani *et al.*,2017). Various individual factors have been identified as contributors to the development of neck pain, including gender, age, job satisfaction, length of employment, and overall health status. Nonetheless, studies have consistently demonstrated that women are at a higher risk of developing neck pain compared to men. This discrepancy has been attributed to differences in physiological pain perception mechanisms and variations in the musculoskeletal system between the two sexes (Ehsani *et al.,* 2017). Additionally, workers aged 40 and above, particularly those with lengthy employment histories, face an elevated risk of developing neck pain. This heightened risk is attributed to degenerative changes in the cervical spine joints that occur over time due to wear and tear associated with prolonged employment. Additionally, adopting a sedentary lifestyle, lacking engagement in physical activities, and prolonged periods of sitting without breaks in the workplace are identified as significant contributors to the occurrence of neck pain (Ehsani *et al.,* 2017).

In a cross-sectional study, Nejati, Lotfian, Moezy, & Nejati (2015) investigated the relationship between forward head posture (FHP) and neck pain among Iranian office workers. The research examined how work-related factors, particularly posture, contribute to neck pain, focusing on the impact of cervical and thoracic spine positions in both forward-looking and working postures. The study involved 101 participants, including 46 without neck pain and 55 with neck pain. Posture was assessed using photographic methods to measure high thoracic (HT) and craniovertebral (CV) angles. The findings revealed a significant association between poor posture and neck pain in the working position, with higher HT and CV angles correlating with the presence of neck pain ($p < 0.05$). In contrast, no significant differences in posture were found between the groups in the forward-looking position ($p > 0.05$).

According to Kim *et al.*(2018), only a limited number of systematic reviews have successfully pinpointed the essential factors contributing to the development of neck pain. In comparison with other systematic reviews, gender, age, and smoking were deemed to have the least impact on the degree of risk. It's noteworthy that the majority of the identified risk factors were considered to be modifiable, offering potential avenues for targeted interventions and preventive strategies. Interestingly, Kim *et al.* (2018) findings contradicted some prior studies by revealing no significant relationship between age and female gender as risk factors for developing neck pain. This discrepancy highlights the complexity of the factors influencing neck pain and underscores the need for continued research to better understand the meaning of interplay between demographic variables and the development of chronic neck pain.

Furthermore, neck pain has been associated with various sociodemographic factors, as explored by Cresswell *et al.,* (2020). In their investigation into the relationship between education levels and neck pain, participants with secondary education displayed higher levels of fear avoidance, a factor linked to neck pain, compared to those with tertiary education. This study indicated that lower education levels were associated with fear avoidance, while higher pain intensity correlated with increased pain catastrophizing and fear avoidance. Similarly, Genebra, Maciel, Bento, Simeão, & Vitta (2017) found that individuals with lower education levels were more likely

to experience neck pain. This association was attributed to the fact that this demographic often engages in occupations with a heightened risk of musculoskeletal injury, a significant contributor to neck pain. These findings highlight the complex interaction between psychological and sociodemographic factors in shaping the experience and chronicity of neck pain.

Age and gender are key determinants of neck pain prevalence, as highlighted by Kazeminasab *et al.* (2022). Their literature review demonstrated that neck pain tends to peak in middle age before gradually declining in later years. Notably, the highest prevalence was observed in women aged 50 to 54 and men aged 45 to 49. Consequently Alshami, (2015) conducted a retrospective study which examined the prevalence of spinal disorders and their relationship with age and gender among patients referred to physical therapy. Data from electronic referrals to the Physical Therapy department were analyzed over a 3-year period (2011-2013). The study found that 28.1% of the referred patients had spinal disorders, with lumbar and cervical spine issues being the most common. Neck pain was particularly prevalent in individuals under 30 years old, while cervical spondylosis was more common in those over 30. Gender differences were also observed, with women more frequently experiencing low back pain and spondylosis.

Palacios-Ceña *et al.,* (2021) investigated the prevalence of chronic neck pain (CNP), chronic low back pain (CLBP), and migraine headache (MH) among 22,511 Spanish adults using data from the 2017 Spanish National Health Survey. The study found that females reported higher rates of CNP, CLBP, and MH compared to males ($P < 0.001$). Anxiety, depression, and poor self-rated health were key factors associated with all three conditions. CNP and CLBP were linked to older age and activity limitations, while comorbid respiratory diseases were notably associated with CNP and MH. These results provide valuable insights for managing these conditions in the general population. Xavier *et al.,* (2021), further supported the gender-based differences in neck pain prevalence, revealing that women not only had a higher prevalence of self-reported neck pain but also a higher risk of experiencing this symptom compared to men. This aligns with broader research trends indicating an increased prevalence of pain, including neck pain, among females. However, Xavier

et al., (2021) further highlighted that gender differences were not observed in the mobility of the upper spine and neck pain-related disability, emphasizing the complexity of gender dynamics in neck pain experiences. Consistent with these findings, Zheng *et al.,*(2022) investigated the prevalence rates of neck pain among college male and female students, revealing that female students had a higher prevalence compared to their male counterparts. The identification of gender-specific patterns in neck pain prevalence emphasizes the need for gender-sensitive approaches.

The professional context significantly influences the prevalence of neck pain within the population. An examination of the correlation between work-related physical factors and neck pain reveals that certain occupational aspects are closely associated with the onset of neck pain. Jobs that necessitate prolonged periods of holding the neck in a forward posture, extensive computer working hours, exposure to temperature fluctuations, extended periods of sitting, repetitive movements per minute, and prolonged static positions are identified as risk factors for neck pain Chen, O'Leary, & Johnston, (2018).

While the relationship between neck pain and race remains an area with limited research, certain existing studies suggest a potential positive correlation between the two. In a comprehensive study conducted by Wright, Shi, Busby-Whitehead, Jordan, & Nelson, (2015), non-institutionalized individuals, including both White and African-American men and women aged 45, were investigated. The results of this study indicated a higher frequency of neck symptoms and pain among White women, indicating a predisposition to chronic pain in this demographic. Interestingly, shoulder symptoms and pain exhibited a more uniform distribution across gender and race subgroups.

To mitigate the incidence of neck pain, it is crucial to integrate protective mechanisms, including taking breaks during working hours and maintaining an active lifestyle through regular exercise, as emphasized by Ehsani *et al.*, (2017). Individuals engaging in physical activity at least three times a week are 1.5 times less likely to experience episodes of neck pain compared to those who do not exercise regularly. While the biological aspects of neck pain are significant, a review by Kazeminasab *et al.,* (2022) suggests that many risk factors for the chronification of

neck pain are psychological, highlighting the importance of understanding and addressing psychological elements.

Various researchers have conducted studies examining the risk factors associated with the chronification of neck pain. In a cross-sectional study conducted by Hashemi *et al.* (2016), a noteworthy correlation was observed between anxiety, depression, and the development of chronic pain. The study revealed that the severity of pain was significantly higher in individuals with chronic pain compared to those experiencing sub-acute pain. An interesting finding from the study was the employment status's impact on chronic pain, indicating that employed individuals demonstrated a lower frequency of chronic pain compared to their non-employed counterparts. This insight suggests a potential association between occupational factors and the risk of neck pain chronification.

In addition, Kim *et al.* (2018) in their systematic review of longitudinal and observational studies, further elucidated the risk factors associated with chronic neck pain, categorizing them into three main dimensions: physical, psychological, and individual factors. The study conducted a nuanced analysis by classifying these factors into different risk levels based on the strength of odds or risk ratios: minor risk factor (1.0-1.5), moderate risk factor (1.5-2.0), and major risk factor (2.0+).

Within the physical factors, as reported by five studies, certain aspects such as the space environment and maintaining sustained and awkward positions were classified as moderate risk factors. This underlines the importance of occupational and environmental considerations in understanding the development of chronic neck pain. On the individual level, three studies highlighted significant factors. Among them, one study identified moderate risk factors associated with family size and marital status, emphasizing the influence of personal and relational aspects on the manifestation of chronic neck pain. Remarkably, the sole demographic and individual factor established as a major risk contributor to neck pain was a high body mass index (BMI). This finding underscores the significance of addressing lifestyle and health-related factors in mitigating the risk of chronic neck pain (Kim *et al.* 2018)

Furthermore, seven studies focused on identifying psychological risk factors associated with chronic neck pain. Among these factors, perceived work demands and inadequate recognition at the workplace exhibited varying levels of significance but were consistently classified as statistically significant contributors. Notably, major risk factors identified within the psychological dimension included a history of low back pain, a past occurrence of neck pain, and a presence of depression.

Various studies have explored the link between work-related factors and the chronification of neck pain. Notably, some literature has highlighted low job satisfaction and the quality of the workspace environment as potential risk factors for the development of chronic neck pain. However, findings by Shahidi, Curran-everett & Maluf, (2015), diverge from this perspective, suggesting that work-related psychological issues may not necessarily be associated with the chronicity of cervical pain.

Ehsani *et al.,* (2017) investigated the prevalence, risk factors, and consequences of neck pain (NP) among 220 office employees in Semnan, Iran, during 2014-2015. The study revealed high prevalence rates of NP: 38.1% immediate, 39.7% in the past month, 41.1% in the past six months, 45.8% in the past year, and 62.1% lifetime. NP was significantly associated with age, gender, health status, job satisfaction, and length of employment. Key contributing factors included prolonged computer use, static postures, and extended sitting. Medication and physiotherapy were reported as the most effective treatments (60.2%). Consequently Shahidi *et al.,* (2015), reported that chronic pain prevalence tends to increase with age while showing a decrease with higher levels of education. Furthermore, retired or unemployed individuals were found to have a higher incidence of chronic neck pain compared to their employed counterparts. These insights underscore the multifaceted nature of the relationship between socioeconomic factors and the persistence of neck pain.

Additionally, Ernst *et al.,* (2018), shed light on the psychological factors influencing pain chronicity, revealing associations between a lack of social support, depression, and anxiety, regardless of the specific body site affected. This underscores the interconnectedness of mental health factors with the chronicity of pain experiences.

On the physical front, poor cervical extensor muscle endurance and a reduction in physical activities were identified as significant risk factors for the chronification of neck pain (Ernst et *al.*,2018). Numerous cross-sectional studies have linked neck pain chronicity to several factors. One such factor is psychological factors. Shahidi *et al. (*2015), conducted a survey to identify modifiable risk factors for developing first-onset CNP among healthy individuals. The authors established that depressed mood was one of the strongest predictors of chronic interfering neck pain. The study's outcome is consistent with several other cross-sectional researches that have found a correlation between the severity and chronicity of existing pain and depressed mode.

Furthermore, individuals experiencing migraines have been observed to be at an increased risk of developing chronic neck pain, as highlighted by research. In a study conducted by Carvalho *et al.,* (2014), the presence of migraines emerged as a crucial risk factor for the development of neck pain, suggesting that cervical dysfunction may influence the natural progression of migraines, thereby elevating the risk of chronification. Notably, patients with chronic migraines exhibited higher scores on the Neck Disability Index, indicating more substantial levels of mild and severe disabilities. The study also identified specific characteristics in patients with migraines that contribute to the increased likelihood of neck pain chronification. These characteristics include neck stiffness, impairments in neuromuscular functions of the neck, restricted cervical range of motion, trigger points in the cervical musculature, and forward head posture factors that collectively heighten the chances of developing chronic neck pain (Carvalho *et al.*,2014).

2.4 Level of Disability among Patients with Neck Pain

The impact of neck pain on an individual's level of disability can vary significantly, influenced by various factors and the overall health status of the patient. Fejer & Hartvigsen, (2018) examined the relationship between neck pain (NP) intensity, duration, and disability. Using an 11-box numerical rating scale for pain intensity, the Standardized Nordic Questionnaire for pain duration, and the Copenhagen Neck Functional Disability Scale for disability, they found moderate correlations between pain intensity and disability but weak correlations between pain duration and

disability. Building on this understanding, a more recent study by Yabe *et al.*, (2022) delved into the connection between pain intensity and disability levels, particularly in patients exhibiting neuropathic features (NF). The findings of the study demonstrated that patients with neuropathic features displayed higher pain intensity and increased levels of disability compared to those without NF. The study suggested that clinical symptoms in the neuropathic feature group were more pronounced, significantly influencing the overall pain levels experienced by these individuals. The results strongly indicated that the presence of neuropathic features in the group contributed to the development of more severe pain intensity when compared to the non-neuropathic feature group. This underscores the importance of considering specific factors, such as the nature of injuries and the presence of neuropathic features, in understanding the complex relationship between neck pain, disability, and its varying degrees of intensity

Alalawi *et al.*, (2022) examined whether baseline pain extent, based on electronic pain drawings, could predict pain and disability outcomes after 1 and 2 years in individuals with chronic Whiplash-Associated Disorders (WAD). Among 205 participants, data on neck pain intensity, disability (via the Neck Disability Index), psychological factors, and work ability were collected. The initial findings showed a significant association between pain extent and disability at 1 year ($p=0.006$) and 2 years ($p=0.029$). However, after adjusting for perceived disability, psychological health, and work ability, the association was no longer significant at either 1 year ($p=0.56$) or 2 years ($p=0.401$), suggesting that pain extent's impact on disability is influenced by these additional factors.

Furthermore, the researchers discovered that individuals enduring chronic WAD not only faced pervasive pain but also reported elevated levels of depression. This underscores the multifaceted impact of chronic WAD on patients, affecting both physical and psychological well-being (Alalawi *et al.*, 2022). In a separate study examining psychological factors in cohorts beyond those with WAD, the researchers established a significant correlation. They found that the presence of psychological issues, such as stress and depression, in patients experiencing neck pain was

intricately linked to the development of more chronic and widespread pain, ultimately culminating in debilitating discomfort.

Beltran-Alacreu *et al.*, (2018) conducted a descriptive cross-sectional study to assess differences in kinesiophobia, active cervical range of movement (CROM), and pressure pain threshold (PPT) among patients with non-specific chronic neck pain, categorized by disability levels (mild, moderate, severe), and compared these with asymptomatic individuals. The study involved 128 participants—96 with chronic neck pain and 32 asymptomatic controls. The Neck Disability Index (NDI) was used for classification, while the Tampa Scale of Kinesiophobia (TSK-11), Visual Analogue Scale (VAS), PPT, and CROM were employed for outcome measurements. Key findings included significant differences in pain intensity (VAS) between the mild and severe disability groups, and the moderate and severe groups ($P < 0.01$), but not between the mild and moderate groups ($P > 0.05$). Kinesiophobia levels were similar across different disability levels ($P > 0.05$). The study concluded that pain intensity and chronicity increase with higher disability levels, but kinesiophobia does not significantly vary with disability severity.

On another study, Ye *et al.* (2017) using cross-sectional observational study utilized the Northwick Park Neck Pain Questionnaire and the Oswestry Low Back Pain Disability Index, alongside self-reported demographic data to determine level of disability and risk factors for neck pain. Key findings revealed that having the computer monitor positioned to the side (rather than directly in front) was significantly associated with higher levels of NP (ORs of 2.6 and 2.9 for medium- and high-level pain) and LBP (OR of 3.2 for high-level pain in females). Other significant factors included office temperature (OR 5.4 for high vs. low LBP) and work duration (≥5 years) with medium-level NP in female workers (OR 2.7).

2.5 Summary of the Reviewed Literature

This chapter critically examined existing literature derived from a global perspective, with a primary focus on investigating the potential for chronification and the varying levels of disability observed within distinct subgroups of individuals suffering from neck pain. The majority of these studies comprised systematic reviews, longitudinal

studies, and cross-sectional analyses. Notably, a significant portion of this research was conducted in developed countries, with limited exceptions found in the sub-Saharan African region. It's noteworthy to mention that no such study has been conducted in Kenya. This study significantly contributes to the broader understanding of neck pain management by synthesizing knowledge on the risk of chronification and the extent of disability among diverse subsets of neck pain patients. The comprehensive review of existing literature serves as a valuable resource for clinicians, offering insights that can guide them in tailoring appropriate treatments for specific patient groups.

By unravelling the degrees of chronification and disability levels, clinicians can make informed decisions, thereby enhancing the effectiveness of interventions. In light of the geographical gap identified, it becomes imperative to conduct this study in the Kenyan context. By doing so, the researcher aimed to explore whether the patterns and findings observed in other research studies are replicated within the unique socio-cultural and healthcare landscape of Kenya. This localized investigation holds the potential to provide context-specific insights, facilitating more targeted and culturally relevant approaches to the management of neck pain in the Kenyan population.

CHAPTER THREE

MATERIALS AND METHODS

3.1 Introduction

This methodology chapter explains the design of the study and approach, location, setting, target population, sampling methods and sample size determination. The chapter further describes the different principles which were used to include or exclude subjects for the study, tools that were used to collect data, procedures to be used for data collection, analytical methods and the study's ethical considerations.

3.2 Study Design

This study utilized analytical cross-sectional research design, a type of observational research design that involves the collection of data from a population, or a representative subset, at a single point in time (Puspa Zuleika & Legiran, 2022). Unlike descriptive cross-sectional studies, which focus on describing the prevalence of a particular condition or characteristic in a population, analytical cross-sectional studies go a step further by exploring associations and relationships between variables.

3.3 Study Location and Setting

Data was collected from the general and physiotherapy outpatient clinics at Nakuru Level 5 Hospital in Nakuru County. Nakuru County is located in what was formerly termed as Rift Valley Province of Kenya. It is approximately 160 kilometers from the capital of Kenya, Nairobi City. Nakuru County is mostly an agricultural county with various tourist attractions such as lakes and craters. Nakuru County borders six counties Kericho, Narok, Kajiado, Baringo, Nyandarua and Bomet. It covers an area of 7496.5 square kilometers.

According to the 2019 National Census, the County had a population of 2,203,325 people. It is a cosmopolitan county with its people originating from different tribes in Kenya. The majority of the population are Christians with small numbers of Muslims

and Hindus. Nakuru Level 5 Hospital was started as a military hospital in 1906 and was gazetted as a public hospital in 1956. Currently, it is ranked as a Level 5 hospital and it is the fourth largest government referral hospital in Kenya. The hospital serves a primary catchment population of about 2.1 million in Nakuru County and a secondary catchment population of seven surrounding counties. The bed occupancy at any particular time is 720. The hospital has 16 general wards, 9 operating theaters, a labour ward and newborn unit, an intensive care unit and high dependent unit, General and Physiotherapy Outpatient clinics, Renal Unit, Laboratories, Eye Unit, Dental Unit and Radiology Department with MRI and CT scan.

3.4 Study Population and Sampling Technique

Census sampling, also known as a complete enumeration or census method, was used in this study, whereby data was collected from every individual who presented with neck pain attending Physiotherapy and the general outpatient clinics at Nakuru Level 5 Hospital. According to the Hospital's medical records department, an average of 60 patients with neck pain visit the Hospital every month. These were estimated to be approximately 180 patients in three months. To permit suitable persons to be included in the sample, all patients who presented with neck pain were recruited into the study.

3.5 Sample Size Determination and Sampling Procedure

One of the most important tasks in the research process is determining an appropriate sample size that accurately represents the population being studied. This is crucial to ensure that the findings from the sample can be generalized to the larger population with a certain level of random error (Adam, 2020). Therefore, Cochran (1977) formula for large populations (> 10,000) was utilized in this study.

$$n = \frac{Z^2 PQ}{e^2}$$

Where:

n is the required sample size.

Z is the z-score corresponding to the desired level of confidence for example 1.96 for 95% confidence.

p is the expected prevalence or proportion of an attribute/disease in the population (in this case, 30% proportion of patients with neck pain (Cohen, 2015; Blanpied *et al.*, 2017) so *p*=0.3).

q is the complementary probability of *p*, so 1−0.3= 0.7*q*=1−*p*=1−0.3=0.7.

e is the desired level of precision.

$\mathbf{n} = \frac{1.96^2 \times 0.3(0.7)}{0.005^2}$= 322 minimum sample size

Neck pain patients at Nakuru Level 5 Hospital are 180

Adjusted sample size finite population formula

$$n_f = \frac{n}{1 + (\frac{n-1}{N})}$$

$$n_f = \frac{322}{1 + (\frac{322-1}{180})}$$

Minimum sample size = 116 participants

This study conducted a census of 136 patients who were enrolled at the study site in order to meet the minimum sample size.

3.6 Participants' Selection Criteria

3.6.1 Inclusion Criteria

The researcher only included neck pain patients who meet the following criteria;

- All participants who had experienced pain in the neck region.

- Presence of pain in the cervical area referred to the shoulder, occiput and upper extremities.
- All participants who had consented to participate in the study.

3.6.2 Exclusion Criteria

For purposes of this study, the researcher excluded patients who had pain in the neck presenting with the following characteristics;

- Symptoms that pointed towards risk of specific disorders that will simulate cervical pain for example, insidious progression of a condition, loss of sensation in more than one dermatome or weakness in movement comprising more than one myotome.
- Clinical features indicative of cerebrovascular insufficiency for example drop attacks, dizziness, transient ischemic attack and cerebrovascular accident
- Those with medical conditions like fracture, instability, and acquired postural deformities including scoliosis, and kyphosis.
- History of clinical features of malignancy.
- Signs and symptoms of mental instability

3.7 Data Collection Tools

The social demographic tool *(Appedix v)* was used to determine the participant's social demographics. The *Orebro Musculoskeletal Pain Screening Questionnaire (OMPSQ) (Appendix vi)* a self-administered tool was used to predict the risk of chronic pain development in patients presenting with neck pain. The questionnaire consists of 25 items grouped into 5 categories, each assessing key risk factors for prolonged disability and delayed recovery. The total possible score is 210 points, with higher scores indicating a greater risk of chronicity. A score above 130 is considered a strong indicator of high risk for chronic pain (Langenfeld *et al.,* 2018). The risk categories based on the OMPSQ score are:

Low Risk: Scores below 105 indicate low risk of chronicity and a reduced likelihood of chronic pain.

Moderate Risk: Scores between 105 and 130 reflect moderate risk of chronicity, suggesting a moderate risk of prolonged recovery.

High Risk: Scores above 130 signify a high level of chronicity, indicating a significant risk of developing chronic pain and extended disability.

The questionnaire acted as a checklist and the patients were required to match their symptoms against the list.

The Neck Disability Index (NDI) *(Appendix vii)* is an outcome measurement tool designed to assess the level of disability in patients experiencing neck pain was used in this study. NDI has demonstrated strong reliability in previous studies, particularly in its "test-retest" reliability. The NDI consists of 10 items that evaluate functional activities, including reading, sleeping, personal care, lifting, recreation, work, and driving. Each item offers six response options, scored from 0 to 5, where 0 represents no disability and 5 represents complete disability, with a maximum possible score of 50.

The final NDI score is expressed as a percentage, with higher percentages reflecting greater levels of pain and disability (Kaur, 2018). The score categories are as follows:

0-4: No disability
5-14: Mild disability
15-24: Moderate disability
25-34: Severe disability
35 and above: Complete disability

This tool has been proven reliable, with intraclass correlation coefficients ranging from 0.50 to 0.98, and is considered a valid instrument for self-assessing disability in patients with chronic neck pain (Muñoz-García *et al.*, 2016).

3.8 Procedure for Data Collection

The process for collecting data took place at the physiotherapy and general outpatient clinics. The researcher identified subjects with neck pain who met the inclusion criteria using the census sampling method. Eligibility was checked before enrollment with the help of a research assistant, The participants were then issued with a participant information sheet. A study participant information sheet detailed the study's aim and objectives as well as the participants' expectations. A written consent form was presented to participants as verification of their willingness to participate in the study.

The information sheet also contained a letter of approval to carry out the research from the Jomo Kenyatta University and Nakuru County. The researcher then issued the participants with written consent for signing. After signing and returning the consent form the researcher administered the social demographic, the Orebro Musculoskeletal Pain Screening Questionnaire and the Neck Disability Index tools for self-completion by each respondent. All duly signed consent forms and the completed questionnaires were collected by the researcher for safekeeping.

3.9 Data Handling and Management

The researcher assigned an identification number to each of the completed questionnaires and secured them in a safe place upon the conclusion of the data collection process. The pre-determined study variables were then extracted into a Microsoft Excel spreadsheet. Data extraction consisted of variables like gender, age, marital status, occupation, level of education, area/location of neck pain, intensity, and duration since onset. Cleaning of the data was then done by cross-examination of the items on the study questionnaires against each variable. Social scientists (SPSS) software was used for data processing and statistical analysis.

3.10 Data Analysis

The researcher accurately coded diverse study variables using cleaned data. Subsequently, a Kolmogorov-Smirnov Normality test was employed to assess data distribution, revealing substantial deviations from normality in socio-demographic

characteristics. Given the non-normal distributions across variables, the decision was made to employ non-parametric statistical tests for subsequent analyses. Data underwent comprehensive analysis using the Statistical Package for the Social Sciences (SPSS), enabling both descriptive and inferential statistics, with the presentation of frequencies and percentages for data description. In the interpretation of results, a significance level of 0.05 and a 95% confidence interval (CI) were applied. The Kruskal-Wallis test analyzed functional aspects across socio-demographic variables. Spearman's Rho test and ordinal logistic regression explored the relationship and strength of relationships between the variables respectively.

3.11 Ethical Considerations

The researcher adhered to ethical considerations by securing approvals from the Jomo Kenyatta University of Agriculture and Technology Research Ethics Committee, The National Commission for Science, Technology, and Innovation, and the Medical Superintendent of Nakuru Level 5 Hospital. Before questionnaire administration, informed written consent was obtained from all participants, with additional consent sought from guardians/parents for those below 18 years. Participants were informed of the voluntary nature of their involvement, emphasizing their right to withdraw at any point without repercussion. Assurances were provided regarding the exclusive use of participants' information for the specified research purpose. To uphold confidentiality, participants were not required to disclose their identities in the questionnaires. Instead, each participant was assigned a unique study number accessible only to the researcher, ensuring the anonymity and privacy of collected data. These ethical measures collectively safeguarded the rights and well-being of the research participants.

CHAPTER FOUR

RESULTS

4.1 Introduction

This chapter comprises the presentation of the study findings and it consists of participants' recruitment and response rate, socio-demographic characteristics of study participants, socio-demographic factors associated with chronification of neck pain among study participants, risk of chronification and level of disability of neck pain among study participants.

4.1 Participants' Recruitment and Response Rate

The study enrolled a total of 136 participants. Ten participants were excluded from the study in the initial stage because they presented with symptoms that were considered red flags (insidious progression of the condition, loss of sensation in more than one dermatome, and history of cancer). Two of the 126 remaining participants were further removed because they declined to give consent. The enrolment process is elaborated in Figure 4.1.

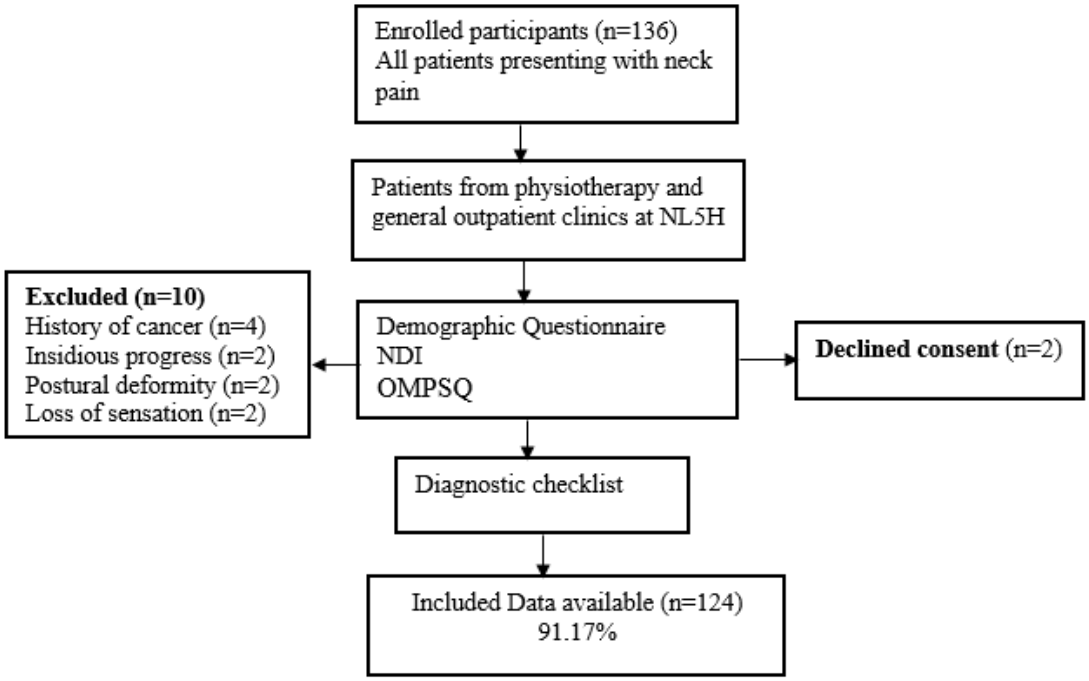

Figure 4.1: Flow Chart Illustrating Participants' Inclusion

4.3 Normality Test Results for Social-Demographic Characteristics

A series of Kolmogorov-Smirnov tests were conducted to assess the normality of distributions for various variables within the study. The sample of 124 participants was analyzed across multiple parameters, including age, gender, marital status, educational level, occupational group, occupational status, and smoking history. First, it was hypothesized that the respondents' socio-demographic traits were normally distributed.

The Kolmogorov-Smirnov tests revealed significant departures from normality for all examined variables ($p < .001$). Specifically, age distribution ($W = .328$, $p < .001$), gender ($W = .415$, $p < .001$), marital status ($W = .036$, $p < .001$), educational level ($W = .026$, $p < .001$), occupational group ($W = .225$, $p < .001$), occupational status ($W = .303$, $p < .001$), and smoking history ($W = .454$, $p < .001$) all exhibited statistically significant deviations from a normal distribution.

The obtained p-values, all below the conventional threshold of .05, indicate a lack of normality in the distributions of the examined variables indicating that the above null

hypothesis was rejected. These results suggest non-normal distributions across the demographic and categorical parameters investigated in the study. The deviation from normality in these variables may imply that assumptions relying on normal distribution, such as parametric statistical tests, may not be appropriate for analysis. Alternative non-parametric approaches in interpreting statistical findings was warranted when examining these variables. Table 4.1 presents results on the participants' socio-demographic characteristics.

Table 4.1: Kolmogorov-Smirnov test for Social-Demographic Characteristics

variable	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Age (yrs)	0.328	124	0.000	0.758	124	0.000
Gender	0.415	124	0.000	0.605	124	0.000
Marital status	0.306	124	0.000	0.813	124	0.000
Educational level	0.206	124	0.000	0.875	124	0.000
Occupational group	0.225	124	0.000	0.794	124	0.000
Occupational status	0.303	124	0.000	0.782	124	0.000
Smoking history	0.454	124	0.000	0.572	124	0.000

4.4 Social-Demographic Characteristics of Study Participants

The study comprised 124 participants, exhibiting diverse demographic characteristics across various parameters. Participants were distributed across different age groups, with the majority (54.0%) falling in the category of 36 years and above. Subsequently, those between 26-35 years accounted for 21.8%, while 18-25 years and those below 18 years constituted 18.5% and 5.6%, respectively. Gender distribution skewed towards females, constituting 64.5% of the participants, while males represented 35.5% of the cohort. More than half of the study participants (55.6%) were married while 25% were single, (13.7%) were separated or divorced and (5.6%) were widowed.

Participants exhibited diverse educational levels, with a notable proportion having completed college-level education (33.1%). This was followed closely by individuals with a secondary-level education (27.4%), primary-level education (20.2%), and

university-level education (19.4%). The participants were categorized into three distinct occupational groups: Office work (33.9%), non-office work (33.9%), and unskilled labour (32.3%). Participants exhibited diverse occupational statuses, with the majority being employed (50.0%). Subsequently, the distribution included unemployed individuals (24.2%), casual labourers (19.4%), and a smaller category labelled as 'Others' (6.5%). In terms of smoking, 75% of the individuals had never smoked, 19.4% had previously smoked, and 5.6% were actively smoking. The results of sociodemographic characteristics are presented in Table 4.2

Table 4.2: Socio-Demographic Characteristics of Study Participants

Parameters		**Frequency**	**Percentage**
Age	below 18 years	7	5.6
	18-25 years	23	18.5
	26-35 years	27	21.8
	36 years and above	67	54.0
Gender	Male	44	35.5
	Female	80	64.5
Marital status	Single	31	25.0
	Married	69	55.6
	Divorced/separated	17	13.7
	Widowed	7	5.6
Educational level	Primary level	25	20.2
	Secondary level	34	27.4
	College level	41	33.1
	University level	24	19.4
Occupational group	Office work	42	33.9
	Non-office work	42	33.9
	unskilled	40	32.3
Occupational status	Employed	62	50.0
	Unemployed	30	24.2
	casual labourer	24	19.4
	Others	8	6.5
Smoking	Never	93	75.0
	previously	24	19.4
	Currently	7	5.6
Total number of participants		**124**	**100.0**

4.5 Risk of Chronification among Study Participants

The risk of chronification of neck pain among research participants was determined using a self-administered Orebro Musculoskeletal Pain Questionnaire (OMPQ). According to the Orebro-score groupings, the majority of the patients (58.9%) were

moderate risk, followed by high risk (32.3%) and low risk (8.9%). These results are summarized in Table 4.3.

Table 4.3: Risk of Chronification of Neck Pain

Risk of chronification	Frequency	Per cent
Low risk	11	8.9
Moderate risk	73	58.9
High risk	40	32.3
Total	124	100.0

4.6 Level of Disability among Study Participants

The level of disability among the study participants was determined using a neck disability index (NDI). A moderate disability was discovered in approximately (50%) of the study participants, whereas a severe disability was detected in 41.9%, a mild disability (6.5%), and a complete disability (2.4%). These results are summarized in table 4.4.

Table 4.4: Neck Disability Index

Level of neck disability	Frequency	Percentage
Mild disability	8	6.5
Moderate disability	61	49.2
Severe disability	52	41.9
Complete disability	3	2.4
Total	124	100.0

4.7 Analysis of Functional Aspects by Age

The findings revealed notable trends within different functional domains across age groups. Notably, pain intensity displayed a consistent escalation with advancing age, ranging from an average of 55.9 among individuals below 18 years to 66.49 among those aged 37 years and above, resulting in an overall mean score of 59.61 (SD = 9.144). Conversely, personal care of the patient exhibited its highest mean score among the 19-25 years group (69.76) and gradually decreased in older age brackets, averaging 64.17 (SD = 4.873).

Furthermore, analyses of physical abilities, including the ability to lift things and work without pain, indicated fluctuations across age groups. The older age group (37 years and above) demonstrated relatively higher mean scores in these aspects, with means of 61.60 and 63.97, respectively. In addition to mean scores, standard deviations varied across functional aspects and age groups, suggesting differences in the variability of reported scores within each aspect. These findings highlight nuanced variations in functional capabilities across age categories and emphasize the significance of considering age-related differences when addressing individual needs across diverse functional domains. These results are presented in table 4.5.

Table 4.5: Functional Aspects by Age

Functional Aspect	Age					
	Below 18 years	**19-25 years**	**26-35 years**	**36 years and above**	**Total**	**Mean**
Intensity of Pain	55.9	56.2	59.85	66.49	238.44	59.61
Personal Care	69.36	69.76	55.41	62.15	256.67	64.17
Lifting	63.50	62.20	55.31	65.40	246.41	61.60
Working	63.36	65.46	67.81	59.25	255.88	63.97
Headaches	60.36	64.91	59.48	63.11	247.86	61.97
Concentration	56.64	60.70	71.65	60.04	249.03	62.26
Sleeping	73.21	59.52	61.31	62.88	256.93	64.23
Driving	83.71	66.43	65.94	57.54	273.64	68.41
Reading	65.64	67.15	52.87	64.46	250.12	62.53
Recreation	53.21	54.89	56.04	68.69	232.83	58.21
Mean	64.49	62.722	60.57	63.00	250.78	
STDEV	9.144	4.873	6.150	3.426		

4.8 Analysis of Functional Aspects by Gender

The comparison reveals some variations in mean scores across functional aspects between males and females. Notably, males generally exhibit slightly higher mean scores in most functional domains compared to females. For instance, in aspects like personal care of the patient, ability to lift things, and sleeping without pain, males show consistently higher mean scores, indicating potential perceived strengths in these functionalities.

Conversely, females tend to have marginally higher mean scores in aspects such as experiencing headaches and engaging in recreational activities without pain. This

suggests potential differences in experiences or capabilities favoring females in these specific domains.

The total mean scores for males and females stand at 63.63 and 61.88, respectively, with a standard deviation of 2.97 for males and 1.63 for females, signifying a relatively higher variability in scores among males across these functional aspects**.** These results are presented Table 4.6.

Table 4.6: Functional Aspects by Gender

	Gender			
Functional Aspect	**Male**	**Female**	**Total**	**Mean**
Intensity of Pain	65.93	60.61	126.54	63.27
Personal Care	66.95	60.05	127.00	63.50
Lifting	66.80	60.14	126.93	63.47
Working	63.59	61.90	125.49	62.75
Headaches	59.10	64.37	123.47	61.74
Concentration	64.72	61.28	126.00	63.00
Sleeping	65.67	60.76	126.43	63.21
Driving	61.82	62.88	124.69	62.35
Reading	62.99	62.23	125.22	62.61
Recreation	58.77	64.55	123.32	61.66
Mean	63.63	61.88		
STDEV	2.972	1.635		

4.9 Analysis of Functional Aspects by Marital Status

The analysis reveals varying mean scores across functional aspects concerning different marital statuses. Participants in different marital categories displayed distinct mean scores in various functional domains. For instance, those who were widowed reported the lowest mean scores across multiple aspects, indicating potential challenges in certain functionalities such as personal care of the patient and sleeping without pain.

Conversely, individuals categorized as divorced/separated reported higher mean scores in aspects like headaches and reading without pain, indicating potential areas of concern or discomfort within these domains compared to other marital categories. Moreover, the standard deviation values demonstrate variability in scores across

marital statuses. Widowed participants exhibited the highest standard deviation (9.37), signifying a broader range of scores or higher variability within this group across different functional aspects compared to other marital statuses. The results are presented in table 4.7.

Table 4.7: Functional Aspects by Marital Status

	Marital status					
Functional Aspect	**Single**	**Married**	**Divorced/ Separated**	**Widowed**	**Total**	**Mean**
Intensity of Pain	67.11	58.40	71.65	60.29	124	64.36
Personal Care	67.48	60.68	65.00	52.29	124	61.36
Lifting	67.98	60.65	57.85	67.71	124	63.55
Working	70.29	57.27	63.03	78.29	124	67.22
Headaches	64.00	59.56	76.38	51.14	124	62.77
Concentration	64.11	60.25	65.62	70.00	124	64.99
Sleeping	69.19	60.93	60.03	54.36	124	61.13
Driving	61.81	62.57	59.00	73.43	124	64.20
Reading	75.13	54.75	72.21	59.36	124	65.36
Recreation	67.45	59.78	62.09	68.36	124	64.42
Mean	67.46	59.48	65.29	63.52		
STDEV	3.732	2.199	6.230	9.370		

4.10 Analysis of Functional Aspects by Educational Level

The mean scores across the functional aspects varied across educational levels, shedding light on differential experiences. Notably, individuals reported relatively consistent challenges in the intensity of pain (M = 60.71, SD = 6.970) and lifting (M = 60.91, SD = 6.970) across all educational stages. Conversely, recreation (M = 63.63, SD = 4.880) and reading (M = 63.74, SD = 7.308) appeared less affected across these educational tiers.

Specifically, recreation and reading seem to exhibit a relatively lower impact, suggesting that these activities might be less influenced by the educational level of the individuals. Conversely, aspects such as intensity of pain and lifting showcase a more consistent challenge irrespective of educational attainment, indicating a broader impact on functional capabilities. Furthermore, while there are nuanced differences

across educational stages, no stark variations were observed in the overall mean scores. This implies that functional aspects are affected to a certain degree regardless of the level of education, albeit with varying intensities across different activities**.** The results are presented in Table 4.8.

Table 4.8: Functional Aspects by Educational Level

	Educational level					
Functional Aspect	**Primary**	**Secondary**	**College**	**University**	**Total**	**Mean**
Intensity of Pain	51.20	67.34	70.45	53.83	124	60.71
Personal Care	67.76	58.69	62.77	61.96	124	62.79
Lifting	61.10	70.74	66.72	45.08	124	60.91
Working	71.64	66.22	61.10	50.10	124	62.27
Headaches	64.98	59.82	61.46	65.48	124	62.94
Concentration	61.16	68.15	61.67	57.31	124	62.07
Sleeping	62.70	70.29	56.94	60.75	124	62.67
Driving	66.58	58.37	59.95	68.46	124	63.34
Reading	73.36	63.96	54.02	63.60	124	63.74
Recreation	74.48	61.04	56.27	62.73	124	63.63
Mean	65.50	64.46	61.14	58.93		
STDEV	6.970	4.740	4.880	7.308		

4.11 Analysis of Functional Aspects by Occupation

Findings revealed differential patterns in mean scores across various functional aspects among the occupational groups. Notably, concentration scores were notably higher among non-office workers (M = 77.89, SD = 2.780) compared to their office and unskilled counterparts. Conversely, consistent mean scores were observed in intensity of pain (M = 62.55, SD = 2.813), sleeping (M = 62.55, SD = 2.813), and reading (M = 62.55, SD = 2.546) across all three occupational categories.

Distinctive disparities were evident primarily in concentration, suggesting a significant impact influenced by the nature of the work environment. However, aspects related to pain, sleeping patterns, and reading activities exhibited remarkable consistency across the diverse occupational groups, indicating uniform experiences in these functional domains irrespective of job roles. The minimal variance in mean scores for most functional aspects implies a certain level of universality in experiences related to pain perception, sleep quality, and reading habits among

individuals regardless of their occupational categorization. This suggests that while specific functional aspects may be more susceptible to occupational influence, certain daily activities remain relatively unaffected by job roles. The results are presented in table 4.9.

Table 4.9: Functional Aspects by Occupational Group

	Occupational group				
Functional Aspects	**Office**	**Non-office**	**Unskilled**	**Total**	**Mean**
Intensity of Pain	57.89	64.23	65.53	124	62.55
Personal Care	57.50	66.02	64.05	124	62.52
Lifting	58.33	64.50	64.78	124	62.54
Working	57.77	61.61	68.40	124	62.59
Headaches	64.21	61.69	61.55	124	62.48
Concentration	56.27	67.26	64.04	124	77.89
Sleeping	60.75	61.15	65.75	124	62.55
Driving	61.80	67.39	58.10	124	62.43
Reading	54.64	67.30	65.71	124	62.55
Recreation	57.44	66.86	63.24	124	62.51
Mean	58.66	64.80	64.11		
STDEV	2.813	2.546	2.780		

4.12 Analysis of Functional Aspects by Occupational Status

The findings reveal varied patterns in mean scores across different functional aspects among the occupational categories. Notably, the ability to work without pain exhibited significant divergence (M = 76.21, SD = 6.743), with higher reported scores from the unemployed and casual laborers compared to the employed and others. Conversely, aspects such as concentration levels (M = 60.19, SD = 8.124) and engagement in recreational activities (M = 61.83, SD = 6.743) displayed more consistent mean scores across occupational groups.

While certain domains, such as physical lifting abilities and reading without pain, displayed moderate variations, other aspects like pain intensity, headaches, and sleeping without pain showcased relatively uniform experiences among participants across diverse occupational categories. This study highlights the substantial impact of occupational categories, particularly on the ability to work without pain, indicating distinct experiences based on employment status. Conversely, concentration levels

and participation in recreational activities appear less influenced by occupational diversity, reflecting a more uniform experience irrespective of job roles. The results are presented in table 4.10.

Table 4.10: Functional Aspects by Occupational Status

	Occupational group					
Functional aspects	**Employed**	**Unemployed**	**Casual labourers**	**Others**	**Total**	**Mean**
Intensity of Pain	61.77	64.52	67.19	46.56	124	60.01
Personal Care	65.19	62.83	52.96	69.06	124	62.51
Lifting	60.25	64.80	65.46	62.44	124	63.24
Working	56.02	67.70	73.69	59.63	124	76.21
Headaches	63.10	66.85	58.40	53.88	124	60.55
Concentration	59.21	69.08	69.17	43.31	124	60.19
Sleeping	64.55	65.38	54.19	60.75	124	61.22
Driving	59.48	72.95	59.29	56.38	124	62.02
Reading	61.79	62.13	63.38	66.75	124	63.51
Recreation	61.12	70.28	57.79	58.13	124	61.83
Mean	61.25	66.65	62.15	57.69		
STDEV	2.707	6.744	6.744	8.125		

4.13 Analysis of Functional Aspects by Smoking Status

The findings elucidate distinctive patterns in mean scores across the functional aspects among the different smoking statuses. Notably, concentration levels (M = 64.59, SD = 10.629) and driving without pain (M = 64.77, SD = 5.684) exhibited higher mean scores among current smokers compared to never-smokers and previous smokers. In contrast, sleeping without pain (M = 53.28, SD = 10.629) demonstrated significantly lower mean scores among current smokers, indicating a substantial impact on sleep quality for this group.

Moreover, while several domains such as pain intensity, personal care, and ability to work without pain displayed moderate variations, headaches and recreational activities showcased relatively similar mean scores across the smoking statuses. The study emphasizes the notable influence of smoking status on specific functional domains, particularly in concentration levels, driving comfort, and sleep quality.

Current smokers reported higher concentration levels and driving comfort but notably lower quality of sleep without pain compared to never-smokers and previous smokers. The results are presented in Table 4.11.

Table 4.11: Functional Aspects by smoking status

	Smoking status				
Functional Aspect	**Never**	**Previous**	**Current**	**Total**	**Mean**
Intensity of Pain	64.08	56.73	61.29	124	60.70
Personal Care	64.49	52.67	69.71	124	62.29
Lifting	63.49	58.85	61.79	124	61.17
Working	61.51	66.81	60.86	124	63.06
Headaches	63.33	59.92	60.36	124	61.20
Concentration	61.99	62.48	69.29	124	64.59
Sleeping	65.47	58.88	35.50	124	53.28
Driving	63.32	55.56	75.43	124	64.77
Reading	62.48	61.48	66.21	124	63.39
Recreation	59.95	72.35	62.57	124	64.96
Mean	63.01	60.57	62.30		
STDEV	1.589	5.685	10.630		

4.14 Relationship between Neck Disability and Risk of Chronification

The results revealed a statistically significant negative relationship between the level of disability and the risk of chronification of neck pain, with a correlation coefficient of r(124) = -.212 and a p-value of .018. This indicates a moderate and inverse relationship between the variables, implying that an escalation in disability is linked to a reduction in the likelihood of chronification for neck pain, and vice versa. The results are presented in Table 4.12.

Table 4.12: Correlation between Neck Disability and Risk of Chronification

		NDI	**OREBRO**
Spearman's rho	NDI	1	
	OREBRO	-.212*	1

Note *. Correlation is significant at the 0.05 level (2-tailed).

4.14 Association between the Risk of Chronification and Socio-Demographic Characteristics among Participants

Risk of Chronification

Low Risk vs. Moderate Risk: Individuals classified as having a moderate risk have significantly higher odds (odds ratio = 20.636, 95% CI [0.750, 20.636], p = 0.060) of the outcome compared to those classified as having a low risk, although the result is marginally non-significant.

Age

Older age: This category serves as the reference

For each one-unit increase in age, there is a non-significant increase in the odds of the outcome variable (odds ratio = 0.452, 95% CI [-0.022, 0.925], p = 0.062).

Gender

Female: This category serves as the reference

Male vs. Female: There is no significant difference in the odds of the outcome between males and females (odds ratio = 1.000, 95% CI [-∞, ∞], p = 0.893). (Female serves as the reference category)

Marital Status

Widowed: This category serves as the reference

There is no significant difference in the odds of the outcome variable between single individuals and others (odds ratio = 1.291, 95% CI [-1.610, 2.121], p = 0.788). (Others include married, divorced/separated, and widowed)

Occupation

Unskilled: This category serves as the reference

Individuals engaged in office work have significantly higher odds (odds ratio = 3.998, 95% CI [0.302, 2.470], p = 0.012) of the outcome compared to those in other occupations. (Others include non-office work and unskilled labor)

Employment Status

Others: This category serves as the reference

Employed, Unemployed, and Casual Labourer vs. Others: None of the employment statuses shows a significant effect on the odds of the outcome variable compared to the reference category (odds ratios range from 2.512 to 3.695, all p > 0.05). (Others include individuals in other employment statuses)

Smoking History

Currently smoking: This category serves as the reference

Never Smoked and Previously Smoked vs. Currently Smoking: There is no significant difference in the odds of the outcome between individuals who never smoked or previously smoked compared to those currently smoking (p > 0.05). Currently, smoking serves as the reference category. These results are presented are presented in Table 4.13.

Table 4.13: The Odds Ratio Tests between the Risk of Chronification and Socio-Demographic Characteristics among Participants

Variable	Category	Estimate	odds Ratio	Std. Error	Wald	df	Sig.	95% Confidence Interval	
								Lower Bound	Upper Bound
Risk of chronification	low risk	-0.626	0.535	1.587	0.155	1	0.693	-3.736	2.484
	Moderate risk	3.028	20.636	1.611	3.533	1	0.060	-0.129	6.185
Age	Ref: older age								
	Age	0.452	1.571	0.242	3.493	1	0.062	-0.022	0.925
Gender	Ref: Female								
	Male	-0.061	0.941	0.451	0.018	1	0.893	-0.945	0.823
Marital status	Ref: widowed								
	Single	0.256	1.291	0.952	0.072	1	0.788	-1.610	2.121
	Married	0.107	1.113	0.872	0.015	1	0.902	-1.601	1.816
	Divorced/separated	0.782	2.185	1.017	0.591	1	0.442	-1.212	2.775
Occupational group	Ref: unskilled								
	Office work	1.386	3.998	0.553	6.283	1	0.012	0.302	2.470
	Non-office work	-0.668	0.513	0.533	1.569	1	0.210	-1.713	0.377
Occupational status	Ref: Others								
	Employed	1.307	3.695	0.876	2.228	1	0.136	-0.409	3.023
	Unemployed	0.921	2.512	0.884	1.086	1	0.297	-0.811	2.653
	Casual labourer	1.018	2.768	0.930	1.198	1	0.274	-0.805	2.842
Smoking status	Ref:currently smoking								
	Never	-0.910	0.403	0.905	1.009	1	0.315	-2.684	0.865
	Previous	-1.001	0.367	1.016	0.971	1	0.324	-2.993	0.990

4.15 Association between Level of Disability and Socio-Demographic Characteristics among Participants

Level of Neck Disability

Mild Disability

The estimated coefficient for mild disability is -2.590 with a p-value of 0.086. Individuals with mild disabilities have significantly lower odds (odds ratio = 0.075, 95% CI [-5.546, 0.365]) of being in a higher category of the ordinal outcome variable compared to the reference category.

Moderate Disability

The estimated coefficient for moderate disability is 0.508 with a non-significant p-value of 0.730. There is no significant effect on the log odds of the outcome variable compared to the reference category (95% CI [-2.380, 3.396]).

Severe Disability

The estimated coefficient for severe disability is 4.191 with a p-value of 0.009. Individuals with severe disabilities have substantially higher odds (odds ratio = 66.101, 95% CI [1.063, 7.319]) of being in a higher category of the ordinal outcome variable compared to the reference category.

Age

Older age: This category serves as the reference

For each one-unit increase in age, the log odds of the outcome variable increase by 0.271, although this effect is not statistically significant (95% CI [-0.173, 0.714]).

Gender

Female: This category serves as the reference

The odds ratio (OR) for males compared to females is 1.048, with a 95% confidence interval (CI) ranging from -0.783 to 0.877. Since the CI contains the value 1, it indicates that the odds of the outcome variable for males are not significantly different from females. In other words, there is no statistically significant difference between males and females in terms of the log odds of the outcome variable.

Marital Status

Widowed: This category serves as the reference

Being married (-0.803) or divorced/separated (-0.189) compared to being single does not significantly affect the log odds of the outcome variable (95% CI [-2.403, 0.797] and [-2.038, 1.661], respectively.

Occupational Group

Unskilled: This category serves as the reference

In terms of occupation, when compared to the reference category of unskilled labour, neither office work (95% CI [-1.954, 0.105]) nor non-office work (95% CI [-1.342, 0.577]) shows a significant difference in log odds. Furthermore, since the confidence interval for unskilled labour is infinite (95% CI [-∞, ∞]), it suggests that unskilled labour is not significantly different from itself, which is expected as it serves as the reference category.

Employment Status

Others: This category serves as the reference

Regarding employment status, being employed (OR = 0.240), unemployed (OR = 0.759), or a casual labourer (OR = 0.091) compared to other employment categories

does not significantly influence the log odds of the outcome variable (95% CI [-1.345, 1.825], [-0.841, 2.358], and [-1.585, 1.767], respectively).

Smoking History

Currently smoking: This category serves as the reference

There is no significant difference in log odds between individuals who never smoked (-0.084), previously smoked (-0.391), or currently smoke compared to the reference category (95% CI [-1.714, 1.546], [-2.225, 1.444], and [-∞, ∞], respectively).

The analysis revealed several significant predictors of the ordinal outcome variable. Individuals with severe disabilities had significantly higher odds of being in a higher category compared to those with mild disabilities. Additionally, age, marital status, occupation, employment status, and smoking history did not significantly predict the outcome variable, as their confidence intervals included the null value. The results of the ordinal logistic regression analysis are presented in table 4.14.

Table 4.14: The Odds Ratio Tests between Level of Disability and Socio-Demographic Characteristics among Participants

Variable	Category	Estimate	Odd ratio	Std. Error	Wald	df	Sig.	95% Confidence Interval	
								Lower Bound	Upper Bound
Threshold	Mild disability	-2.590	0.750	1.508	2.952	1	0.086	-5.546	0.365
	Moderate disability	0.508	1.663	1.474	0.119	1	0.730	-2.380	3.396
	Severe disability	4.191	66.110	1.596	6.895	1	0.009	1.063	7.319
Age	Ref: older age								
	Age	0.271	1.311	0.226	1.432	1	0.231	-0.173	0.714
Gender	Ref: Female								
	Male	0.047	1.048	0.423	0.012	1	0.912	-0.783	0.877
Marital status	Ref: Widowed								
	Single	0.372	1.451	0.893	0.174	1	0.677	-1.378	2.123
	Married	-0.803	0.448	0.816	0.967	1	0.325	-2.403	0.797
	Divorced/separated	-0.189	0.828	0.944	0.040	1	0.841	-2.038	1.661
occupational group	Ref: Unskilled								
	Office work	-0.925	0.397	0.525	3.099	1	0.078	-1.954	0.105
	Non-office work	-0.382	0.682	0.490	0.610	1	0.435	-1.342	0.577
Occupational status	Ref: Others								
	Employed	0.240	1.271	0.809	0.088	1	0.766	-1.345	1.825
	Unemployed	0.759	2.135	0.816	0.864	1	0.353	-0.841	2.358
	Casual labourer	0.091	1.096	0.855	0.011	1	0.915	-1.585	1.767
Smoking history	Ref: currently smoking								
	Never smoked	-0.084	0.920	0.832	0.010	1	0.920	-1.714	1.546
	Previously smoked	-0.391	0.677	0.936	0.174	1	0.676	-2.225	1.444

4.16 Relationship between NDI Variables

The analysis revealed several associations among the assessed variables about patients' experiences with neck pain. Patients' Intensity of Pain demonstrated a statistically significant moderate positive correlation with their Ability to Work without Pain ($rs = 0.279$, $p = 0.002$) and Concentration Levels ($rs = 0.335$, $p < 0.001$). Additionally, it displayed weak positive correlations with several other factors, although not all reached statistical significance.

Patient's personal care exhibited a weak negative correlation with the Ability to Drive without Pain ($rs = -0.103$, $p = 0.253$) and presented weak positive correlations with other factors, none of which were statistically significant. Patients' Ability to Lift Things showed a moderate positive correlation with Ability to Work without Pain ($rs = 0.368$, $p < 0.001$) and a weak positive correlation with Concentration Levels ($rs = 0.147$, $p = 0.104$).

Moreover, Patients' Ability to Work without Pain demonstrated statistically significant moderate positive correlations with Concentration Levels ($rs = 0.449$, $p < 0.001$) and Sleeping without Pain ($rs = 0.228$, $p = 0.011$). Patients' Ability to Experience Headaches due to Neck Pain displayed moderate positive correlations with Concentration Levels ($rs = 0.229$, $p = 0.010$) and Ability to Sleep without Pain ($rs = 0.293$, $p = 0.001$). Concentration Levels, in turn, exhibited statistically significant moderate positive correlations with Ability to Work without Pain ($rs = 0.449$, $p < 0.001$), Ability to Sleep without Pain ($rs = 0.293$, $p = 0.001$), and Ability to Engage in Recreational Activities without Pain ($rs = 0.342$, $p < 0.001$).

Patients' Ability to Sleep without Pain also showed moderate positive correlations with Concentration Levels ($rs = 0.293$, $p = 0.001$) and Ability to Engage in Recreational Activities without Pain ($rs = 0.342$, $p < 0.001$). Additionally, Patients' Ability to Read without Pain demonstrated a moderate positive correlation with Ability to Engage in Recreational Activities without Pain ($rs = 0.325$, $p < 0.001$). Patients' Ability to Drive without Pain displayed weak correlations with some factors, none of which were statistically significant. The results are presented in Table 4.15.

Table 4.15: Correlation between NDI Variables

	1	2	3	4	5	6	7	8	9	10
Pain intensity (1)	1									
Personal care (2)	-0.171	1								
Lifting (3)	0.171	0.161	1							
Work (4)	.279**	-0.005	.368**	1						
Headache (5)	0.118	0.063	0.026	0.155	1					
Concentration (6)	.335**	0.007	0.147	.449**	.229*	1				
Sleeping (7)	0.128	.243**	0.176	.228*	0.119	.293**	1			
Driving (8)	0.070	-0.103	-0.115	0.090	-.328**	0.145	0.086	1		
Reading (9)	0.153	0.115	0.046	0.008	.256**	0.138	.239**	-0.065	1	
Recreation (10)	.197*	0.019	0.066	.241**	0.118	0.028	.342**	0.052	.325**	1

Note**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

4.17 Relationship between Orebro Variables

The examination of correlations using Spearman's rho revealed a web of connections among factors related to pain, work, physical activities, and psychological well-being (see Table 1). These correlations highlighted diverse strengths of relationships among the variables under consideration. Moderate positive associations emerged between the number of days missed at work due to pain and several factors. Notably, there were moderate positive correlations with the severity of pain (rho = .330, $p < .01$), pain episodes in the last three months (rho = .434, $p < .01$), and the level of anxiety (rho = .241, $p < .01$). Furthermore, a notably robust positive relationship was observed between the level of depression and the level of anxiety (rho = .600, $p < .01$).

Conversely, weaker negative associations were noted, such as the modest negative correlation between the nature of work and pain intensity (rho = -.236, $p < .01$). Additionally, a moderate negative relationship was apparent between the ability to decrease pain and pain intensity (rho = -.316, $p < .01$). The interrelation of physical activities with work-related factors revealed moderate positive correlations. For instance, physical activity, like walking for an hour, showed a moderate positive association with the ability to perform household chores (rho = .427, $p < .01$) and weekly shopping (rho = .255, $p < .01$). Examining work-related outcomes alongside psychological factors unveiled significant connections. Notably, a moderate negative

correlation was found between work satisfaction and both pain persistence (rho = -.345, $p < .01$) and resuming work (rho = -.345, $p < .01$).

The analysis also highlighted the substantial impact of sleeping patterns on pain-related factors. Strong negative correlations were observed between sleeping at night and days missed at work due to pain (rho = -.504, $p < .01$), pain persistence (rho = -.390, $p < .01$), and pain increase (rho = -.462, $p < .01$). Overall, these findings underscore the complex interplay among physical, psychological, and work-related factors in the context of pain management. The varying degrees of association emphasize the need for a comprehensive approach to pain treatment strategies and workplace interventions. The results are presented in Table 4.16.

Table 4.16: Relationship between Orebro Variable

	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	19	21	22	23	24	25
Pain area (5)	1																				
Missed days (6)	-0.012	1																			
Duration pain(7)	-0.059	.330	1																		
Nature of work(8)	0.149	-.236	-0.116	1																	
P.intensity (9)	0.123	.199	0.016	.236	1																
Severity (10)	0.073	.420	0.111	.302	.414	1															
Episodes (11)	-0.024	.434	.338**	0.007	.306	.457	1														
Decreasing pain (12)	0.043	-.212	-0.054	-0.157	-.316	-.213	-0.173	1													
Level of anxiety (13)	.241	0.139	-0.111	.408	.467	.362	.233	-0.109	1												
Level of depression (14)	0.114	0.012	-0.157	.344	.573	.343	.277	-0.102	.600	1											
Pain persistence (15)	0.090	0.099	0.106	.286	.240	0.160	.392	-.267	.518	.373	1										
Resuming work (16)	-0.049	-.252	-0.007	-0.089	-0.170	-0.049	-.231	0.163	-.404	-.247	-.541	1									
Work satisfaction (17)	-.186*	0.032	0.016	-.275**	-.486	-0.157	-.209	.204	-.491	-.345	-.530	.482	1								
Physical activity(18)	0.132	.250	0.155	.250	.428	.337	.235	-0.162	.593	.424	.394	-0.166	-.327	1							
Pain increase(19)	0.167	.253	0.120	0.133	.205*	0.161	0.119	0.063	.364**	.222*	.212*	-.205*	-.334	.394	1						
Normal work (20)	0.133	.248	.312	0.023	0.138	-0.083	.348	-.351	0.012	0.012	.301	-.270	-.224	0.163	0.128	1					
Light work (21)	-0.051	-0.064	-.190	0.122	-0.081	0.040	-.242	-0.024	0.057	-0.162	-.193	0.154	.226*	-0.071	-0.147	-.329	1				
Walking (22)	-0.081	-0.136	0.082	-0.011	-0.023	-0.087	-0.145	0.130	-0.131	-.203*	-.249	.255	0.125	-.216*	-.215*	-.268	.554	1			
Household chores (23)	-0.087	-0.146	0.073	0.010	-0.009	-0.113	-0.168	0.137	-0.149	-.219*	-.259**	.427**	0.174	-0.132	-0.003	-.337**	.413**	.752**	1		
Shopping (24)	-.200	-.324	0.092	-0.104	-.326**	-.388**	-.179*	0.060	-.367**	-.346**	-0.156	.255**	.305**	-.314**	-.248**	-0.107	.490**	.602**	.630**	1	
Sleeping (25)	-0.106	-.504	-.189*	0.100	-.256**	-.318**	-.294**	.180*	-.390**	-.197*	-.361**	.256**	.270**	-.462**	-0.100	-.281**	.353**	.288**	.325**	.483**	1

Note **. Correlation is significant at the 0.01 level (2-tailed).*. Correlation is significant at the 0.05 level (2-tailed).

CHAPTER FIVE

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This section comprises the discussion of the key study findings as per the study objectives provided in chapter four, conclusions drawn from the results, recommendations as well as suggestions for further studies.

5.2 Risk of Developing Chronic Neck Pain

The research utilized the Orebro Musculoskeletal Pain Screening Questionnaire (OMPQ) to evaluate neck pain's chronicity risk among participants. Analysis based on Orebro-score groupings revealed distinct risk profiles. In this study, a majority of the participants were categorized as moderate to high risk with scores of (58.9%) and (32.3%) respectively indicating a prevalent susceptibility to chronic neck pain. These findings align with those of Dorner *et al.,* (2018), who also reported a high prevalence and chronicity of severe pain. In their cross-sectional survey of 15,474 Austrians aged 15 and older, 38.6% reported experiencing severe pain within the past year, while 24.9% suffered from chronic pain. The study identified higher pain prevalence among older adults, individuals with lower education levels, the unemployed, retirees, those with anxiety or depression, and those lacking social support. Psychosocial factors like depression and anxiety were strongly linked to severe and chronic pain across multiple body sites. Socio-demographic factors, such as age, gender, education, and employment status, significantly impacted pain prevalence and chronicity, though the extent of their influence varied across different groups (Dorner *et al.*,2018).

The findings contrast with those of Heikkala *et al.,* (2023), who observed different patterns in their analysis. In their study, members of the Northern Finland Birth Cohort 1966 completed the ÖMPSQ-SF at age 46, with data linked to national registers on sick leave and disability pensions, indicators of work disability. The study assessed the relationship between ÖMPSQ-SF risk categories (low, medium,

high) and work disability over two years, using negative binomial and binary logistic regression models, adjusting for factors like sex, education, weight, and smoking. Out of 4,063 participants, 90% were categorized as low risk, 7% as medium risk, and 3% as high risk. Those in the high-risk group had 7.5 times more sick leave days (95% CI: 6.2–9.0) and were 16.1 times more likely to be granted a disability pension (95% CI: 7.1–36.8) compared to the low-risk group, even after accounting for baseline characteristics.

These differences could be attributed to the small sample size in this study. The majority of patients seeking physiotherapy for neck pain (NP) are in the chronic stage, indicating that they tend to overlook the initial onset of NP unless the pain becomes severe. Factors such as a lack of understanding about available therapeutic therapies, extended wait periods to see a clinician, and the exploration of other treatment choices all impact this behaviour. Expert opinion suggests, however, that if acute NP is not managed appropriately, it can continue and become chronic, emphasizing the significance of early referral to physiotherapy for optimal treatment (Praveen, Lim, & O'Brien, 2014).

Exposure to prolonged painful stimuli has been identified as a factor that can induce changes in brain chemistry, heightening an individual's vulnerability to the development of chronic pain. Remarkably, this increased sensitivity to pain can manifest within a few days of exposure and persist for up to a year, even after the initial pain has subsided (Mills *et al.,* 2019). The concept of neuroplasticity, reflecting the neural system's ability to adapt, offers insights into the process of neck pain transitioning into chronic pain. Neuroplastic alterations occurring in peripheral nerves, the spinal cord, and brain centres contribute to the emergence of chronic pain disorders.

One critical aspect of neuroplasticity is central sensitization, a transformative shift that results in heightened pain responses, commonly referred to as allodynia. While treatment strategies can help alleviate hypersensitivity, chronic inflammation may lead to structural abnormalities (Heikkala *et al.*, 2023). The progression of pain to a chronic state is a complex process influenced by an imbalance in both amplifying

and inhibiting pain signals, in conjunction with various genetic, environmental, and biopsychosocial factors. This intricate interplay contributes to a spectrum of sensations, ranging from mild discomfort to persistent chronic pain. Furthermore, structural changes, nerve sprouting, and cellular atrophy play pivotal roles in facilitating the transition from acute to chronic pain (Morlion *et al.*, 2018). Understanding these neuroplastic mechanisms provides valuable insights for tailoring interventions that not only target symptom relief but also address the underlying processes contributing to the persistence of pain.

5.3 Level of Disability of Neck Pain

In assessing the level of disability among the study participants, the Neck Disability Index (NDI) was utilized. The results disclosed varying degrees of disability within the sample, with approximately 50% experiencing moderate disability and 41.9% grappling with severe disability. This indicates that neck pain is a condition of moderate disablement, significantly impacting an individual's capacity to handle and engage in everyday activities such as self-care, work, recreation, and concentration.

The prevalence of moderate disability observed in the current study is consistent with findings from (Muñoz-García *et al.*, 2016). Their research indicated that patients with cervical pain experienced mild to moderate disability, with scores of 49% and 26.2%, respectively. In this study, *Muñoz-García et al.*, (2016) conducted a cross-sectional, single-blind analysis involving 44 participants: 22 with neck pain (NP), 20 with chronic cervical-facial pain (CCFP), and 22 asymptomatic controls. The mean age of participants was 26.22 ± 4.18 years, with demographic characteristics being similar across all groups ($P > 0.05$). The NP group included 50% females, the CCFP group had 75% females, and the control group had 54.5% females.

A study by Kuć and Żendzian-Piotrowska (2020) reported mild disability among otherwise healthy dentistry students. In their study, 112 students with a mean age of 22.88 years were assessed for cervical spine dysfunction using a questionnaire, body chart, Graded Chronic Pain Scale, Perceived Stress Scale, and Neck Disability Index. Results revealed that 22.32% of students experienced headaches 2–3 times a week,

and 45.53% had them 2–3 times a month. Concentration difficulties were reported by 42.85%, attention issues by 56.25%, and 25% had memory problems. Additionally, 9.82% of students suffered from depression, and 27.67% reported mood disorders. Cervical spine pain was noted in 47.32% of students, with 31.25% experiencing suboccipital discomfort. Moderate stress was reported by 58.03%, and mild cervical spine disorders were observed in 53.57% of the participants.

These findings are contrary to the findings of this study and could be accredited to the difference in methods of data collection and variances in defining a symptomatic case. Individuals who present with debilitating pain are likely to have limitations in performing most activities due to pain. An increase in pain can be interpreted as a loss in functional capacities and an increase in disability levels

5.4 Relationship between the Risk of Developing Chronicity and Level of Disability of Neck Pain

In examining the association between the degree of disability and the likelihood of neck pain transitioning into a chronic state, the results of this study revealed a statistically significant negative correlation, represented by $r(124) = -.212$, with a p-value of .018. This correlation suggests a moderate inverse relationship between the two variables. Specifically, as the level of disability increases, the risk of neck pain chronification tends to decrease. Conversely, as the risk of neck pain chronification rises, the level of disability tends to decrease.

In contrast to the findings of this study, Hansen *et al.,* (2019) found that pain extent was more strongly associated with disability, psychological factors, and neck muscle function in non-traumatic chronic neck pain than in traumatic cases. Their observational cross-sectional study involved 200 participants with chronic neck pain—120 with traumatic origins and 80 with non-traumatic origins. The study utilized measures including pain extent, Neck Disability Index (NDI), Beck Depression Inventory-II (BDI-II), Craniocervical Flexion Test (CCFT), Cervical Extension Test (CE), and Cervical Range of Motion (ROM). They observed significant positive correlations between pain extent and both NDI and BDI-II, suggesting that larger pain areas were associated with greater disability and

depression. Additionally, pain extent was linked to poorer cervical muscle function, as assessed by CCFT and CE, with these associations being weaker in patients with traumatic neck pain compared to those with non-traumatic pain.

It is worth noting that this discrepancy could be attributed to differences in the tools used for data collection. Additionally, the findings of this study differ from those of a study by Fejer and Hartvigsen (2018), which revealed a moderate but strongly linked correlation between disability and neck pain. However, it's noteworthy that a weaker correlation and almost no linked relationship were found between disability and neck pain duration in their study. Additionally, a study by Alalawi *et al*. (2022) the first to evaluate the predictive ability of pain extent in individuals with chronic whiplash-associated disorders (WAD), established that most of these patients exhibited widespread and higher pain levels significantly linked with high Neck Disability Index (NDI). Differences in study design, sample characteristics, and measurement tools may contribute to the disparities observed in these studies.

The inverse relationship found between the degree of disability and the likelihood of neck pain transitioning into a chronic state might seem counter intuitive at first glance. One potential explanation could revolve around the dynamics of healthcare-seeking behaviour. It's plausible that individuals experiencing more pronounced disability or severe symptoms might be more proactive in seeking immediate and comprehensive treatment. Consequently, their proactive approach to managing the condition could potentially lower the risk of the pain becoming chronic.

Conversely, individuals with less severe initial symptoms or lower levels of disability might delay seeking professional help or opt for less intensive treatments initially. This delay or less aggressive treatment approach could inadvertently contribute to an increased risk of the pain transitioning into a chronic state. Moreover, it's crucial to consider the complex nature of pain and disability. Factors beyond the scope of this study, such as individual pain tolerance, adaptive coping mechanisms, or variations in pain perception, could contribute to this inverse relationship (Meints & Edwards ,2017). These variables might interact in complex

ways that affect the progression of neck pain from acute to chronic stages, potentially influencing the observed correlation (Praveen *et al.,* 2014).

Further research that incorporates a more comprehensive array of variables and longitudinal studies tracking individuals from the onset of neck pain could provide deeper insights into the factors influencing this unexpected correlation. Understanding these nuances could refine strategies for early intervention and tailored treatments to mitigate the risk of chronic neck pain.

5.5 Demographic Characteristics Associated with Neck Pain Disability.

The findings of this study offer valuable insights into the association between neck pain disability and various socio-demographic characteristics among participants. Notably, individuals with severe disabilities exhibited substantially higher odds of being in a higher category of neck disability compared to those with mild disabilities, signifying the severity of disability as a significant predictor. Interestingly, age, gender, marital status, occupation, employment status, and smoking history did not emerge as significant predictors of the outcome variable. While age showed a slight increase in the log odds of the outcome variable, this effect was not statistically significant, suggesting that age may not play a substantial role in predicting neck pain disability levels within this sample. Similarly, gender, marital status, occupation, and employment status did not exhibit statistically significant effects on neck disability levels, as indicated by the confidence intervals encompassing the null value.

The non-significant association between these socio-demographic factors and neck pain disability levels might imply that other unexplored variables or factors beyond the scope of this study could better explain variations in neck pain disability. Moreover, the non-significant findings could also suggest the complexity of neck pain disability, which may be influenced by complicated factors beyond socio-demographic characteristics alone. Furthermore, the lack of significance in smoking history suggests that, within this sample, smoking status does not significantly influence neck pain disability levels. This finding contrasts with previous studies that have linked smoking to various health conditions and the relationship between

smoking and chronic pain seems to be influenced by the amount of tobacco smoked Mills *et al.*(2019), indicating potential differences in the study population or the need for further investigation into the specific relationship between smoking and neck pain disability.

Overall, while severe disability emerged as a significant predictor, the non-significant associations with socio-demographic factors highlight the nuanced nature of neck pain disability and the importance of considering a comprehensive range of factors in understanding and addressing its complexities. Future research could explore additional variables or employ different methodologies to further elucidate the determinants of neck pain disability and inform targeted interventions for individuals experiencing neck pain.

5.5 Demographic Characteristics Associated with Chronification Neck Pain

The analysis explored the association between neck pain disability and socio-demographic characteristics in relation to the risk of chronification. Interestingly, individuals classified as having a moderate risk exhibited higher odds of chronification compared to those with a low risk, albeit marginally non-significant. This suggests a potential trend towards increased risk of chronification among certain subsets of the population, warranting further investigation into contributing factors. Age, gender, marital status, occupation, employment status, and smoking history were examined as potential predictors of chronification risk. While age showed a slight non-significant increase in the odds of chronification, no significant differences were observed based on gender, marital status, employment status, or smoking history. However, individuals engaged in office work demonstrated significantly higher odds of chronification compared to those in other occupations, indicating a potential occupational influence on the risk of chronification.

In summary, the study established higher levels of pain and chronicity in individuals aged 36 years and above. This is in line with several other studies which found high levels of disability and chronicity in older individuals (Praveen *et al.*,2014;Ehsani *et al.*,2017 & Kazeminasab *et al.,* 2022). With increasing age, degenerative changes in the musculoskeletal system become more prevalent. Conditions such as

osteoarthritis, degenerative disc disease, or age-related wear and tear can contribute to heightened pain levels. These structural changes align with the increased pain reported in older individuals. Consequently, the accumulation of lifetime experiences, including occupational hazards, physical activities, injuries, and repetitive stress, can manifest in increased pain and chronicity as individuals age. Over time, these accumulated factors may exacerbate pain symptoms and contribute to a higher likelihood of chronicity.

This study found that compared to males, females were likely to be affected by neck pain. A higher proportion of neck NP in females is in agreement with the majority of previous studies (Vitor *et al.* 2017; Ye *et al.* 2017). However, contrary to most of the study findings Praveen *et al.* (2014) and Ogwumike *et al.* (2015) reported a higher prevalence of neck pain in males than in females. These differences could be attributed to workplace tasks whereby men are more likely to get involved in manual work (48%) as compared to (15%) of the females.

Research indicates that females often report higher levels of pain and seek healthcare services for pain more frequently than males. This inclination towards seeking medical attention might contribute to the higher representation of females in the study. Cultural and societal factors might also influence pain perception and reporting, potentially affecting the gender distribution in pain-related studies. Biological differences between genders, including hormonal variations, anatomical disparities, and differences in pain processing pathways, could contribute to differences in pain experiences. These factors might influence the likelihood of individuals seeking pain treatment and could potentially impact the gender distribution observed in the study (Ehsani *et al.,* 2017).

5.6 Conclusion

- The research highlights a substantial risk of chronification in neck pain, with a predominant proportion of participants demonstrating a moderate to high risk of developing chronic neck pain.
- The assessment of disability unveiled a significant prevalence of moderate to severe disability among those experiencing neck pain.
- A noteworthy aspect of the study is the identification of a moderate, inverse correlation between the degree of disability and the risk of chronification. This unexpected correlation suggests that factors such as healthcare-seeking behaviour, individual pain tolerance, and coping mechanisms may play pivotal roles in influencing the course of neck pain from acute to chronic stages.
- while the study revealed a marginally non-significant trend towards increased risk of chronification among individuals classified as having a moderate risk, no significant associations were found with most socio-demographic characteristics. However, the significant association observed with occupation suggests that certain occupational factors may contribute to the risk of chronification among individuals with neck pain disability.
- Furthermore, the study revealed a higher risk of pain and chronicity in individuals aged 36 years and above, linking increased pain levels to degenerative changes in the musculoskeletal system associated with ageing.
- Additionally, the observation that females are more susceptible to neck pain corresponds with broader trends reported in various studies

5.7 Recommendations

- Based on the research findings, it is recommended that healthcare professionals consider the identified risk of chronification in neck pain, especially among individuals exhibiting moderate to high-risk levels.
- Tailored interventions should be developed, taking into account individualized healthcare-seeking behaviors, pain tolerance, and coping mechanisms.

- Based on the findings, it is recommended that future research endeavors delve deeper into occupational factors influencing the risk of chronification among individuals with neck pain disability. Understanding the specific occupational hazards and ergonomic factors contributing to chronification may inform targeted interventions aimed at reducing the risk among vulnerable populations.
- Based on the findings of this study, it is recommended that future research endeavors explore additional determinants and employ alternative methodologies to further elucidate the complexities of neck pain disability. Investigating factors such as psychological, environmental, and genetic influences may provide a more comprehensive understanding of the condition.
- Given the higher risk observed in individuals aged 36 years and above, healthcare providers should emphasize proactive management strategies for this age group, considering potential degenerative changes in the musculoskeletal system associated with ageing.
- Additionally, recognizing the higher susceptibility of females to neck pain, it is crucial to integrate gender-specific considerations in both preventive measures and treatment approaches. Furthermore, promoting awareness among the general population about the risk factors and consequences of chronic neck pain can contribute to early intervention and better management outcomes. Continued research exploring the nuanced relationships between disability, chronification, and individual characteristics is warranted for a more comprehensive understanding of neck pain and to inform targeted therapeutic approaches.

REFERENCES

Adam, A. M. (2020). Sample Size Determination in Survey Research. *Journal of Scientific Research and Reports*, *26*(5), 90–97. https://doi.org/10.9734/jsrr/2020/v26i530263.

Alalawi, A., Evans, D. W., Liew, B., Peolsson, A., Heneghan, N., Rushton, A., … Falla, D. (2022). Does Pain Extent Predict Ongoing Pain and Disability in Patients with Chronic Whiplash-Associated Disorders? *Journal of Clinical Medicine*, *11*(3), 555. https://doi.org/10.3390/jcm11030555.

Algorani, E. B., & Gupta, V. (2023). Coping mechanisms. In *StatPearls [Internet]*. StatPearls Publishing. Retrieved from https://www.ncbi.nlm.nih.gov/books/NBK559031/.

Alshami, A. M. (2015). Prevalence of spinal disorders and their relationships with age and gender. *Saudi medical journal*, *36*(6), 725.

Ayhualem, S., Alamer, A., Dabi, S. D., Bogale, K. G., Abebe, A. B., & Chala, M. B. (2021). Burden of neck pain and associated factors among smart phone user students in University of Gondar, Ethiopia. *Plos one*, *16*(9), e0256794.

Beltran-Alacreu, H., López-de-Uralde-Villanueva, I., Calvo-Lobo, C., Fernández-Carnero, J., & La Touche, R. (2018). Clinical features of patients with chronic non-specific neck pain per disability level: A novel observational study. *Revista da Associação Médica Brasileira*, *64*(8), 700-709.

Blanpied, P. R., Gross, A. R., Elliott, J. M., Devaney, L. L. E. E., Ferland, A., Kaplan, D. P. T. S., … Torburn, L. (2017). *Neck Pain : Revision 2017 Clinical Practice Guidelines Linked to the International Classification of Functioning, Disability and Health From the Orthopaedic Section of the American Physical Therapy Association*. https://doi.org/10.2519/jospt.2017.0302.

Bussieres, A. E., Stewart, G., Al-Zoubi, F., Decina, P., Descarreaux, M., Hayden, J., ... & Ornelas, J. (2016). The treatment of neck pain–associated disorders and whiplash-associated disorders: a clinical practice guideline. *Journal of manipulative and physiological therapeutics*, *39*(8), 523-564. Retrieved from https://www.sciencedirect.com/science/article/pii/S0161475416301920.

Carvalho, G. F., Chaves, T. C., Gonçalves, M. C., Florencio, L. L., Braz, C. A., Dach, F., … Bevilaqua-Grossi, D. (2014). Comparison Between Neck Pain Disability and Cervical Range of Motion in Patients With Episodic and Chronic Migraine: A Cross-Sectional Study. *Journal of Manipulative and Physiological Therapeutics*, *37*(9), 641–646. https://doi.org/10.1016/j.jmpt.2014.09.002.

Chen, X., O'Leary, S., & Johnston, V. (2018). Modifiable individual and work-related factors associated with neck pain in 740 office workers: a cross-sectional study. *Brazilian Journal of Physical Therapy*, *22*(4), 318–327. https://doi.org/10.1016/ j.bjpt.2018.03.003.

Childress MA, Stuek SJ. Neck Pain: Initial Evaluation and Management. Am Fam Physician. 2020 Aug 1;102(3):150-156. PMID: 32735440.

Cohen, S. P. (2015). Epidemiology, Diagnosis, and Treatment of Neck Pain. *Mayo Clinic Proceedings*, *90*(2), 284–299. https://doi.org/10.1016/j.mayocp. 2014.09.008.

de Melo Castro Deligne, L., Rocha, M. C. B., Malta, D. C., Naghavi, M., & de Azeredo Passos, V. M. (2021). The burden of neck pain in Brazil: estimates from the global burden of disease study 2019. BMC Musculoskeletal Disorders, 22, 1-10.

Dennison, B. S., & Leal, M. H. (2015). Mechanical neck pain definition. *Manual therapy for musculoskeletal pain syndromes: an evidence-and clinical-informed approach. London: Churchill Livingstone,* 95

Domingues, L., Cruz, E. B., Pimentel-santos, F. M., Ramiro, S., Donato, H., Manica, S. R., … Branco, J. C. (2018). *Prognostic factors for recovery and non-recovery in patients with non-specific neck pain : a protocol for a systematic literature review*. 1–6. https://doi.org/10.1136/bmjopen-2018-023356.

Dorner, T. E., Stein, K. V., Hahne, J., Wepner, F., Friedrich, M., & Mittendorfer-Rutz, E. (2018). How are socio-demographic and psycho-social factors associated with the prevalence and chronicity of severe pain in 14 different body sites? A cross-sectional population-based survey. *Wiener Klinische Wochenschrift*, *130*(1–2), 14–22. https://doi.org/10.1007/s00508-017-1223-x.

Ehsani, F., Mosallanezhad, Z., & Vahedi, G. (2017). The Prevalence, Risk Factors and Consequences of Neck Pain in Office Employees. Middle East Journal of Rehabilitation and Health Studies, 4(1), e42031. https://doi.org/10.5812/mejrh.42031.

Elbinoune, I., Amine, B., Shyen, S., Gueddari, S., Abouqal, R., & Hajjaj-Hassouni, N. (2016). Chronic neck pain and anxiety-depression: prevalence and associated risk factors. *Pan African Medical Journal*, *24*(1).

Ernst, T., Katharina, D., Stein, V., Hahne, J., Wepner, F., Friedrich, M., & Mittendorfer-rutz, E. (2018). *How are socio-demographic and psycho-social factors associated with the prevalence and chronicity of severe pain in 14 different body sites ? A cross-sectional population- based survey*. 14–22. https://doi.org/10.1007/s00508-017-1223-x.

Fejer, R., & Hartvigsen, J. (2018). Neck pain and disability due to neck pain: what is the relation? *European Spine Journal*, *17*(1), 80–88. https://doi.org/10.1007/s00586-007-0521-9.

Genebra, C. V. D. S., Maciel, N. M., Bento, T. P. F., Simeão, S. F. A. P., & Vitta, A. De. (2017). Prevalence and factors associated with neck pain: a population-based study. *Brazilian Journal of Physical Therapy*, *21*(4), 274–280. https://doi.org/ 10.1016/j.bjpt.2017.05.005.

Hansen, I. R., Barbero, M., Falla, D., Larsen, M. H., Kraft, M. N., Søgaard, K., & Juul-Kristensen, B. (2019). Pain extent is more strongly associated with disability, psychological factors, and neck muscle function in people with non-traumatic versus traumatic chronic neck pain: a cross-sectional study. *European journal of physical and rehabilitation medicine*, *55*(1), 71-78.

Hashemi, S. M., Rohanifar, R., Azarfarin, R., & Razavi, S. S. (2016). *A Comparison of the Sociodemographic and Clinical Characteristics of Patients Referring to a Pain Clinic with Subacute and Chronic Pain*. *6*(6). https://doi.org/10.5812/aapm. 39373.Research.

He, Y., & Kim, P. (2023). Allodynia. *StatPearls*. https://www.statpearls.com/point-of-care/17379.

Heikkala, E., Oura, P., Ruokolainen, O., Ala-Mursula, L., Linton, S. J., & Karppinen, J. (2023). The Örebro Musculoskeletal Pain Screening Questionnaire-Short Form and 2-year follow-up of registered work disability. *European Journal of Public Health*, *33*(3), 442–447.https://doi.org/10.1093/eurpub/ckad 079.

Henschke, N., Kamper, S. J., & Maher, C. G. (2015, January). The epidemiology and economic consequences of pain. In *Mayo Clinic Proceedings* (Vol. 90, No. 1, pp. 139- 147). Elsevier.

Hoy, D., March, L., Woolf, A., Blyth, F., Brooks, P., Smith, E., … Murray, C. (2014). *The global burden of neck pain : estimates from the Global Burden of Disease 2010 study*. https://doi.org/10.1136/annrheumdis-2013-204431.

Hruschak, V., & Cochran, G. (2018). Psychosocial predictors in the transition from acute to chronic pain: a systematic review. *Psychology, health & medicine*, *23*(10), 1151-1167.

Isa, A. S., & Chetty, S. (2022). Physiology and pathophysiology of chronic pain (Part II): how does pain become chronic? *Southern African Journal of Anaesthesia and Analgesia*, *28*(1), 11–14. https://doi.org/10.36303/SAJAA.2022.28.1.2497.

Kaur Ajit Singh, D. (2018). Socio-Demographic and Physical Factors Associated with Disability in Adults with Non- Specific Chronic Neck Pain. *Medicine & Health*, *13*(2), 122–132. https://doi.org/10.17576/mh.2018.1302.12.

Kazeminasab, S., Nejadghaderi, S. A., Amiri, P., Pourfathi, H., Araj-Khodaei, M., Sullman, M. J. M., … Safiri, S. (2022). Neck pain: global epidemiology, trends and risk factors. *BMC Musculoskeletal Disorders*, *23*(1), 1–13. https://doi.org/10.1186/s12891-021-04957-4.

Kelly, J., Ritchie, C., & Sterling, M. (2017). *Musculoskeletal Science and Practice Clinical prediction rules for prognosis and treatment prescription in neck pain : A systematic review*. *27*. https://doi.org/10.1016/j.math.2016.10.066.

Kim, R., Wiest, C., Clark, K., Cook, C., & Horn, M. (2018). Identifying risk factors for first-episode neck pain: A systematic review. *Musculoskeletal Science and Practice*. https://doi.org/10.1016/j.msksp.2017.11.007.

Kuć, J., & Żendzian-Piotrowska, M. (2020). A Pilot Study Evaluating the Prevalence of Cervical Spine Dysfunction Among Students of Dentistry at the Medical University. *Frontiers in Neurology*, *11*(March), 1–12. https://doi.org/10.3389/fneur.2020.00200.

Langenfeld, A., Bastiaenen, C., Brunner, F., & Swanenburg, J. (2018). Validation of the Orebro musculoskeletal pain screening questionnaire in patients with chronic neck pain NCT02540343 02540343. *BMC Research Notes*, *11*(1), 1–5. https://doi.org/10.1186/s13104-018-3269-x.

Meints & Edwards, 2017. (2017). HHS Public Access. *Physiology & Behavior*, *176*(10), 139–148. https://doi.org/10.1016/j.pnpbp.2018.01.017.

Mills, S. E. E., Nicolson, K. P., & Smith, B. H. (2019). Chronic pain: a review of its epidemiology and associated factors in population-based studies. *British Journal of Anaesthesia*, *123*(2), e273–e283. https://doi.org/10.1016/j.bja.2019.03.023.

Morlion, B., Coluzzi, F., Aldington, D., Kocot-Kepska, M., Pergolizzi, J., Mangas, A. C., … Kalso, E. (2018). Pain chronification: what should a non-pain medicine specialist know? *Current Medical Research and Opinion*, *34*(7), 1169–1178. https://doi.org/10.1080/03007995.2018.1449738.

Muñoz-García, D., Gil-Martínez, A., López-López, A., Lopez-De-Uralde-Villanueva, I., La Touche, R., & Fernández-Carnero, J. (2016). Chronic Neck Pain and Cervico-Craniofacial Pain Patients Express Similar Levels of Neck Pain-Related Disability, Pain Catastrophizing, and Cervical Range of Motion. *Pain Research and Treatment*, *2016*. https://doi.org/10.1155/2016/7296032.

Nasef, N. A., Mehta, S., & Ferguson, L. R. (2017). Susceptibility to chronic inflammation: an update. *Archives of Toxicology*, *91*, 1131-1141. Retrieved from https://link.springer.com/article/10.1007/s00204-016-1914-5.

Nejati, P., Lotfian, S., Moezy, A., & Nejati, M. (2015). The study of correlation between forward head posture and neck pain in Iranian office workers. *International journal of occupational medicine and environmental health*, *28*(2), 295-303.

Ogwumike, O. O., Kaka, B., Adeniyi, A. F., Fawole, H. O., & Idowu, O. A. (2015). Prevalence of neck pain in a rural community in northwest Nigeria. *Journal of Medicine and Biomedical Research, 14*(1), 104–116. https://doi.org/ 10.4314/jmbr.v14i1.

Palacios-Ceña, D., Albaladejo-Vicente, R., Hernández-Barrera, V., Lima-Florencio, L., Fernández-de-Las-Peñas, C., Jimenez-Garcia, R., ... & Perez-Farinos, N. (2021). Female gender is associated with a higher prevalence of chronic neck pain, chronic low back pain, and migraine: results of the Spanish National Health Survey, 2017. *Pain Medicine*, *22*(2), 382-395.

Praveen, J. J., Lim, T. J., & O'Brien, A. (2014). Neck pain in Changi general hospital: An observational study. *Proceedings of Singapore Healthcare*, *23*(3), 209–217. https://doi.org/10.1177/201010581402300306.

Puspa Zuleika, & Legiran. (2022). Cross-Sectional Study as Research Design in Medicine. *Archives of The Medicine and Case Reports*, *3*(2), 256–259. https://doi.org/10.37275/amcr.v3i2.193.

Qu, N., Graven-Nielsen, T., Lindstrøm, R., Dc, V. B. A., & Hirata, R. P. (2020). Recurrent neck pain patients exhibit altered joint motion pattern during cervical flexion and extension movements. *Clinical Biomechanics*, *71*, 125-132.

Safiri, S., Kolahi, A. A., Hoy, D., Buchbinder, R., Mansournia, M. A., Bettampadi, D., ... & Ferreira, M. L. (2020). Global, regional, and national burden of neck pain in the general population, 1990-2017: systematic analysis of the Global Burden of Disease Study 2017. *bmj*, *368*.

Shahidi, B., Curran-Everett, D., & Maluf, K. S. (2015). Psychosocial, Physical, and Neurophysiological Risk Factors for Chronic Neck Pain: A Prospective Inception Cohort Study. *Journal of Pain*. https://doi.org/10.1016/j.jpain.2015.09.002

Siahaan, Y. M. T. (2022). Clinical Approach to Diagnosing and Treatment of Neck Pain. *Open Journal of Medical Sciences*, 17-23.

Vassilaki, M., & Hurwitz, E. L. (2014). Insights in public health: perspectives on pain in the low back and neck: global burden, epidemiology, and management. *Hawai'i Journal of Medicine & Public Health*, *73*(4), 122

Verwoerd, M., Wittink, H., Maissan, F., de Raaij, E., & Smeets, R. J. (2019). Prognostic factors for persistent pain after a first episode of nonspecific idiopathic, non-traumatic neck pain: a systematic review. *Musculoskeletal Science and Practice*, *42*, 13-37.

Vitor, C., Santos, D., Machado, N., Paulo, T., Bento, F., Fiorelli, S., … Vitta, A. De. (2017). Brazilian Journal of Prevalence and factors associated with neck pain : a population-based study. *Brazilian Journal of Physical Therapy*, *21*(4), 274–280. https://doi.org/10.1016/j.bjpt.2017.05.005.

Williams, D. A. (2018). Phenotypic features of central sensitization. *Journal of Applied Biobehavioral Research*, *23*(2). Retrieved from https://www.ncbi.nlm. nih. gov/ pmc/articles/PMC6251410/.

Wright, A. R., Shi, X. A., Busby-Whitehead, J., Jordan, J. M., & Nelson, A. E. (2015). The Prevalence of Neck and Shoulder Symptoms and Associations with Comorbidities and Disability: The Johnston County Osteoarthritis Project. *MYOPAIN*, *23*(1–2), 34–44. https://doi.org/10.3109/10582452.2015.1132026.

Xavier, N. da S., Benatto, M. T., Florencio, L. L., Fernández-de-las-Peñas, C., Dach, F., & Bevilaqua-Grossi, D. (2021). Are There Gender Differences in Neck Pain and Musculoskeletal Disorders of the Cervical Spine Associated with Migraine? *Pain Medicine*, *22*(12), 3021–3029. https://doi.org/10.1093/pm/pnab106.

Yabe, Y., Hagiwara, Y., Sekiguchi, T., Sugawara, Y., Tsuchiya, M., Yoshida, S., ... & Tsuji, I. (2022). The 5-year course of neck pain among natural disaster survivors: the association of prior neck pain with new episodes of neck pain. *Pain Medicine*, *23*(4), 635-641.

Ye, S., Jing, Q., Wei, C., & Lu, J. (2017). Risk factors of non-specific neck pain and low back pain in computer-using office workers in China: A cross-sectional study. *BMJ Open*, *7*(4), 9–11. https://doi.org/10.1136/bmjopen-2016-014914.

Zheng, B., Zheng, L., Li, M., Lin, J., Zhu, Y., Jin, L., … Wang, S. (2022). Sex differences in factors associated with neck pain among undergraduate healthcare students: a cross-sectional survey. *BMC Musculoskeletal Disorders*, *23*(1), 842. https://doi.org/10.1186/s12891-022-05782-z.

APPENDICES

Appendix I: Study Participant Consent Form

I have read and understood the provided information and have had the opportunity to ask questions. I do understand that my participation is voluntary and that I am free to withdraw at any time without giving a reason and without any cost. I understand that I will be given a copy of this consent form. I voluntarily agree to take part in this study.

Participant's

signature……..Date…….

Researcher's

signature……..Date**……..**

Appendix II: Child Consent Form

I…… willingly agree to participate in the research study.

I have a clear understanding of the study's purpose, which has been explained to me comprehensively.

My participation is entirely voluntary.

I commit to upholding the confidentiality of the study.

I acknowledge that I have the option to withdraw from the study without providing reasons.

I comprehend that the information gathered is solely for research purposes.

I am aware that my survey responses will remain anonymous, with no linkage to my identity or any identifying information.

Furthermore, I understand that my parent(s) / legal guardian(s) must also provide consent before I can participate in the study.

Date: _____

Signature: _____

Yes, I consent to take part in this study.

No, I do not consent to take part in this study.

Thank you

Appendix III: Parent / Guardian Consent Form

I…… permit my child(ren) to participate in this study.

I have received a written explanation regarding the purpose and nature of the study.

I understand that my child's participation is voluntary.

I am aware that anonymity will be maintained, as personal data is solely collected for consent purposes and stored separately from data gathered from children, with no attempt to link them. My child's data will be assigned an anonymous identifier composed of letters and numbers.

I understand that my child has the option to withdraw from the study at any point, without facing any consequences, whether before commencement or during participation, and there is no requirement to provide reasons for withdrawal.

I confirm that I am a legal decision-maker for the child(ren) listed below) ☐

I consent to my child(ren) participating in this study ☐

I do not consent to my child(ren) participating in this study ☐

Signature: _____ Date: _____

Name (CAPS): _____

Child 1's name (CAPS): _____

Appendix IV: Participants Information Sheet

Study title: Risk of Chronification and Level of Disability of Neck Pain.

Dear Participant,

Dear Participant,

You are cordially invited to participate in a research study conducted by Irene Kemunto Makendo, a Master of Science student at the Department of Rehabilitation Sciences, Jomo Kenyatta University of Agriculture and Technology. This study aims to assess the Risk of Chronification and Level of Disability associated with Neck Pain among Patients receiving care at Nakuru Level 5 Hospital.

Study procedure

participants will be requested to fill out three questionnaires which will take approximately 20 minutes to complete.

Risk and discomforts

There are no foreseeable risks or discomfort associated with participating in this research. You have the option to decline to answer any or all questions, and you may end your participation at any time of your choosing.

Potential benefits

As a participant, there are no immediate or direct benefits to you. However, your contribution of time and effort will advance our collective understanding of neck pain, thereby benefiting the broader community by potentially improving treatment strategies and outcomes.

Protection of confidentiality

The researcher is committed to safeguarding your privacy diligently. Your identity will remain undisclosed in any publication stemming from this study. All data provided will be treated with utmost confidentiality and anonymity, ensuring that neither the researchers nor anyone else can correlate questionnaires with specific individuals. Each questionnaire will be identified solely by a code number, omitting any personal information. Although your name will be included on this consent form, it will not be linked to your survey and will be securely stored separately. All research materials will be securely stored in a locked file cabinet within a locked office, accessible only to the researcher. No external parties will have access to any information that could identify you.

Voluntary participation

Your involvement in this research study is entirely voluntary. You have the option to decline participation or to withdraw your consent at any point without facing any repercussions. Choosing not to participate or withdrawing from the study will not result in any penalties. Should you decide to participate, you will be asked to sign a consent form. Even after signing the consent form, you retain the freedom to withdraw at any time without needing to provide a justification. In the event of your withdrawal before the completion of data collection, your data will either be returned to you or securely destroyed.

Contact information

If you have any inquiries or concerns regarding this study, or encounter any issues, please feel free to reach out to Nassib Tawa at +254 750802786 or via email at nassibtawa@gmail.com (Jomo Kenyatta University of Technology and Agriculture). For questions or concerns regarding your rights as a research participant, please contact the Ethical Review Board at Jomo Kenyatta University of Technology and Agriculture, or alternatively, NACOSTI.

Appendix V: Social Demographics

Instructions: For choice fields please place a firm cross e.g. ☒ in a single box per item. For all numeric responses (including dates) please complete all the boxes with leading zeros as required e.g. 05 All dates are in dd/mm/yyyy format.

Initials ☐☐☐☐ **Date of birth** d d ☐☐ / m m ☐☐ / y y y y ☐☐☐☐

Gender
- Male ☐
- Female ☐

Marital status
- Single ☐
- Married ☐
- Divorced or separated ☐
- Widowed ☐

Educational attainment
- Primary school ☐
- Secondary school ☐
- College/Diploma ☐
- University/Degree ☐
- Postgraduate ☐

Ethnic origin
- Caucasian ☐
- Black ☐
- Asian/Chinese ☐
- Mixed ☐

Religious affiliation
- Christian ☐
- Muslim ☐
- Hindu ☐
- None ☐
- Prefers not to say ☐
- Other ☐

Occupational group
- Professional ☐
- Managerial & technical ☐
- Skilled non manual ☐
- Skilled manual ☐
- Unskilled ☐
- Not applicable ☐

Occupational status
- Employed full-time ☐
- Employed part-time ☐
- Retired ☐
- Unemployed ☐
- Casual worker ☐
- Not working due to ill health ☐
- Housewife ☐
- Other ☐

Smoking history
- Never ☐
- Previously ☐
- Current ☐

Date completed d d ☐☐ / m m ☐☐ / y y y y ☐☐☐☐ Signed _____

Appendix VI: Orebro Musculoskeletal Pain Questionnaire

Orebro Musculoskeletal Pain Questionnaire (OMPQ)

Linton and Boersma 2003[1]

1. Name_____ Phone _____Date _____

2. Date of Injury _____ Date of Birth _____

3. Male or Female? M or F

4. Were you born in Australia? Y or N

These questions and statements apply if you have aches or pains, such as back, shoulder, or neck pain. Please read and answer questions carefully. Do not take long to answer the questions, however, it is Important that you answer every questions. There is **always** a response for your particular situation.

5. Where do you have pain? Please X for all appropriate sites. 2x
___Neck ___Shoulder ___Arm ___Upper Back ___Leg ___Lower Back [max 10]
___Other (please state where)_____

6. How many days of work have you missed because of pain during the past 18 months? [ ]
___0 days(1) ___1-2 days(2) ___3-7 days(3) ___8-14 days(4) ___15-30 days(5)
___1 month(6) ___2 months(7) ___3-6 months(8) ___6-12 months(9) ___over 1 year(10)

7. How long have you had your current pain problem? Please X only one answer. [ ]
___0-1 week(1) ___1-2 weeks(2) ___3-4 weeks(3) ___4-5 weeks(4) ___6-8 weeks(5)
___9-11 weeks(6) ___3-6 months(7) ___6-9 months(8) ___9-12 months(9) ___over 1 year(10)

8. Is your work heavy or monotonous? Please circle the best answer on a scale from 0 to 10. [ ]
(Not at all) 0 1 2 3 4 5 6 7 8 9 10 (Extremely)

9. How would you rate the pain that you have had during the past week? Circle one. [ ]
(No pain) 0 1 2 3 4 5 6 7 8 9 10 (Pain as bad as it could be)

10. In the past three months, on average, how bad was your pain on a 1-10 scale? Circle one. [ ]
(No Pain) 0 1 2 3 4 5 6 7 8 9 10 (Pain as bad as it could be)

11. How often would you say that you have experience pain episodes, on average, during the past three months? Circle one. [ ]
(Never) 0 1 2 3 4 5 6 7 8 9 10 (Always)

12. Based on all things you do to cope, or deal with your pain, on an average day, how much Are you able to decrease it? Circle one. [10- x]
(No at all) 0 1 2 3 4 5 6 7 8 9 10 (Completely)

13. How tense or anxious have you felt in the past week? Circle one. [ ]
(Absolutely calm and relaxed) 0 1 2 3 4 5 6 7 8 9 10 (As tense and anxious as I've ever felt)

[1] Linton SJ, Boersma K. Early identification of patients at risk of developing a persistent back problem: the predictive validity of the Örebro Muscuoloskeletal Pain Questionnaire. Clin J Pain 2003;19: 80-86.

14. How much have you been bothered by feeling depressed in the past week? Circle one. [ ]
(Not at all) 0 1 2 3 4 5 6 7 8 9 10 (Extremely)

15. In your view, how large is the risk that your current pain may become persistent? Circle one. [ ]
(No risk) 0 1 2 3 4 5 6 7 8 9 10 (Very large risk)

16. In your estimation, what are the chances that you will be able to work in six months? Circle one. [10-x]
(No chance) 0 1 2 3 4 5 6 7 8 9 10 (Very large chance)

17. If you take into consideration your work routines, management, salary, promotion possibilities [10-x]
And work mates, how satisfied are you with your job? Circle one.
(Not satisfied at all) 0 1 2 3 4 5 6 7 8 9 10 (Completely satisfied)

Here are some of the things that other people have told us about their pain. For each statement, circle one Number from 0 to 10 to say how much physical activity, such as bending, lifting, walking, or driving, would affect your pain.

18. Physical activity makes my pain worse. [ ]
(Completely disagree) 0 1 2 3 4 5 6 7 8 9 10 (Completely agree)

19. An increase in pain is an indication that I should stop what I'm doing until the pain decreases. [ ]
(Completely Disagree) 0 1 2 3 4 5 6 7 8 9 10 (Completely agree)

20. I should not do my normal work with my present pain. [ ]
(Completely Disagree) 0 1 2 3 4 5 6 7 8 9 10 (Completely agree)

Here is a list of five activities. Circle the one number that best describes your current ability to participate in each of these activities.

21, I can do light work for an hour. [10-x]
(Can't do it because of pain) 0 1 2 3 4 5 6 7 8 9 10 (Can do it without pain being a problem)

22. I can walk for an hour. [10-x]
(Can't do it because of pain) 0 1 2 3 4 5 6 7 8 9 10 (Can do it without pain being a problem)

23. I can do ordinary household chores. [10-x]
(Can't do it because of pain) 0 1 2 3 4 5 6 7 8 9 10 (Can do it without pain being a problem)

24. I can do the weekly shopping. [10-x]
(Can't do it because of pain) 0 1 2 3 4 5 6 7 8 9 10 (Can do it without pain being a problem)

25. I can sleep at night. [10-x]
(Can't do it because of pain) 0 1 2 3 4 5 6 7 8 9 10 (Can do it without pain being a problem)

Name_____ Date_____

Appendix VII: Neck Disability Index

THIS QUESTIONNAIRE IS DESIGNED TO HELP US BETTER UNDERSTAND HOW YOUR **NECK PAIN** AFFECTS YOUR ABILITY TO MANAGE EVERYDAY -LIFE ACTIVITIES. PLEASE MARK IN EACH SECTION THE **ONE BOX** THAT APPLIES TO YOU.
ALTHOUGH YOU MAY CONSIDER THAT TWO OF THE STATEMENTS IN ANY ONE SECTION RELATE TO YOU, PLEASE MARK THE BOX THAT **MOST CLOSELY** DESCRIBES YOUR PRESENT -DAY SITUATION.

SECTION 1 - PAIN INTENSITY

- ☐ I have no neck pain at the moment.
- ☐ The pain is very mild at the moment.
- ☐ The pain is moderate at the moment.
- ☐ The pain is fairly severe at the moment.
- ☐ The pain is very severe at the moment.
- ☐ The pain is the worst imaginable at the moment.

SECTION 2 - PERSONAL CARE

- ☐ I can look after myself normally without causing extra neck pain.
- ☐ I can look after myself normally, but it causes extra neck pain.
- ☐ It is painful to look after myself, and I am slow and careful
- ☐ I need some help but manage most of my personal care.
- ☐ I need help every day in most aspects of self -care.
- ☐ I do not get dressed. I wash with difficulty and stay in bed.

SECTION 3 – LIFTING

- ☐ I can lift heavy weights without causing extra neck pain.
- ☐ I can lift heavy weights, but it gives me extra neck pain.
- ☐ Neck pain prevents me from lifting heavy weights off the floor but I can manage if items are conveniently positioned, ie. on a table.
- ☐ Neck pain prevents me from lifting heavy weights, but I can manage light weights if they are conveniently positioned
- ☐ I can lift only very light weights.
- ☐ I cannot lift or carry anything at all.

SECTION 4 – READING

- ☐ I can read as much as I want with no neck pain.
- ☐ I can read as much as I want with slight neck pain.
- ☐ I can read as much as I want with moderate neck pain.
- ☐ I can't read as much as I want because of moderate neck pain.
- ☐ I can't read as much as I want because of severe neck pain.
- ☐ I can't read at all.

SECTION 5 – HEADACHES

- ☐ I have no headaches at all.
- ☐ I have slight headaches that come infrequently.
- ☐ I have moderate headaches that come infrequently.
- ☐ I have moderate headaches that come frequently.
- ☐ I have severe headaches that come frequently.
- ☐ I have headaches almost all the time.

SECTION 6 – CONCENTRATION

- ☐ I can concentrate fully without difficulty.
- ☐ I can concentrate fully with slight difficulty.
- ☐ I have a fair degree of difficulty concentrating.
- ☐ I have a lot of difficulty concentrating.
- ☐ I have a great deal of difficulty concentrating.
- ☐ I can't concentrate at all.

SECTION 7 – WORK

- ☐ I can do as much work as I want.
- ☐ I can only do my usual work, but no more.
- ☐ I can do most of my usual work, but no more.
- ☐ I can't do my usual work.
- ☐ I can hardly do any work at all.
- ☐ I can't do any work at all.

SECTION 8 – DRIVING

- ☐ I can drive my car without neck pain.
- ☐ I can drive my car with only slight neck pain.
- ☐ I can drive as long as I want with moderate neck pain.
- ☐ I can't drive as long as I want because of moderate neck pain.
- ☐ I can hardly drive at all because of severe neck pain.
- ☐ I can't drive my care at all because of neck pain.

SECTION 9 – SLEEPING

- ☐ I have no trouble sleeping.
- ☐ My sleep is slightly disturbed for less than 1 hour.
- ☐ My sleep is mildly disturbed for up to 1-2 hours.
- ☐ My sleep is moderately disturbed for up to 2-3 hours.
- ☐ My sleep is greatly disturbed for up to 3-5 hours.
- ☐ My sleep is completely disturbed for up to 5-7 hours.

SECTION 10 – RECREATION

- ☐ I am able to engage in all my recreational activities with no neck pain at all.
- ☐ I am able to engage in all my recreational activities with some neck pain.
- ☐ I am able to engage in most, but not all of my recreational activities because of pain in my neck.
- ☐ I am able to engage in a few of my recreational activities because of neck pain.
- ☐ I can hardly do recreational activities due to neck pain.
- ☐ I can't do any recreational activities due to neck pain.

PATIENT NAME _____ DATE _____

SCORE _____ [50]

Appendix VIII: Publication

LEVEL OF DISABILITY AND RISK OF CHRONIFICATION AMONG PATIENTS PRESENTING WITH NECK PAIN AT A TERTIARY HOSPITAL

I. K. Makendo, N. Tawa, B. Olivier and G. Kikuvi

ABSTRACT

Objective: This study aimed to determine the level of disability and risk of chronification among patients presenting with neck pain at a tertiary hospital in Kenya.

Design*:* A cross-sectional descriptive study.

Setting*:* Physiotherapy and general outpatient clinics at Nakuru Level V Hospital in Nakuru, Kenya.

Subjects: 45 patients who presented with neck pain

Main outcome measures: Neck Disability Index (NDI) and Orebro Musculoskeletal Pain Screening Questionnaire (OMPSQ) to screen for disability and pain chronicity respectively.

Method**:** Data was collected using the Neck Disability Index (NDI) and Orebro Musculoskeletal Pain Screening Questionnaire (OMPSQ). It was then analyzed using the statistical package for the social sciences (SPSS) version 25.0 for descriptive and inferential statistics.

Results**-** Out of the 45 participants, the majority were female 73.3% (n=33), 82.2 % (n=37) were aged 36 years and above, 68.9% (n=31) were married, 42% (n=19) were office workers and 60% (n=27) were employed. Most of the participants (55.5%) were at low risk of chronification and 56% had a moderate disability. The mean NDI score was highest among the patients who scored high on the (OMPSQ) (45.5). There were significant mean differences between the domains of pain chronification with the Orebro score.

***Conclusion*:** Persistence and high pain duration in neck pain patients seem to be associated with high levels of disability. The results have implications on the importance of early screening and timely pain management in preventing the progression of acute neck pain to chronic conditions. Clinicians should focus on strategies that prioritize pain reduction and functional improvement to minimize long-term disability.

Appendix IX: Ethical Approval

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: 187148

Date of Issue: 24/October/2019

RESEARCH LICENSE

This is to Certify that Ms.. IRENE MAKENDO of Jomo Kenyatta University of Agriculture and Technology, has been licensed to conduct research in Nakuru on the topic: CLINICAL CHARACTERIZATION AND RISK OF CHRONIFICATION OF NECK PAIN AMONG PATIENTS ATTENDING NAKURU COUNTY HOSPITAL for the period ending : 24/October/2020.

License No: NACOSTI/P/19/2347

187148

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

JOMO KENYATTA UNIVERSITY
OF
AGRICULTURE AND TECHNOLOGY
P. O. Box 62000-00200 Nairobi, Kenya Tel 0675870225 OR Extn 3209
Institutional Ethics Review Committee

October 4th, 2019 **REF: JKU/2/4/896B**

Irene Kemunto Makendo,
Department of Rehabilitation Sciences.

Dear Ms. Makendo,

RE: CLINICAL CHARACTERIZATION AND RISK OF CHRONIFICATION OF NECK PAIN AMONG PATIENTS ATTENDING NAKURU COUNTY HOSPITAL

The JKUAT Institutional Ethics Review Committee has reviewed your responses to issues raised regarding your application to conduct the above mentioned study with you as the Principal Investigator.

This is to inform you that the IERC has approved your protocol. The approval period is from October 4th 2019 to October 4th 2020 and is subject to compliance with the following requirements:

a) Only approved documents (informed consent, study instruments, study protocol, etc.) will be used.
b) All changes (amendments, deviations, violations, etc.) must be submitted for review and approval by the JKUAT IERC before implementation.
c) Death and life threatening problems and severe adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the IERC immediately.
d) Any changes, anticipated or otherwise that may increase the risks to or affect the welfare of study participants and others or affect the integrity of the study must be reported immediately.
e) Should you require an extension of the approval period, kindly submit a request for extension 60 days prior to the expiry of the current approval period and attach supporting documentation.
f) Clearance for export of data or specimens must be obtained from the JKUAT IERC as well as the relevant government agencies for each consignment for export.
g) The IERC requires a copy of the final report for record to reduce chances for duplication of similar studies.

Should you require clarification, kindly contact the JKUAT IERC Secretariat.

Yours Sincerely,

DR. PATRICK MBINDYO
SECRETARY, IERC

ETHICS REVIEW COMMITTEE
04 OCT 2019