# DETERMINANTS OF LOW BACK PAIN AMONG NURSES WORKING AT LEVEL 5 HOSPITALS IN KIAMBU COUNTY, KENYA.

**ALICE WANJA**



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## DECLARATION

This thesis has not been submitted for a degree or other academic honor at Mount Kenya University or any other institution in Kenya and its authorship is thus acknowledged.

**Signature:** ..... **Date: 6TH JUNE 2025**

ALICE WANJA

MSCN/2021/41819

**Supervisor's Approval**

As research supervisors, we approve submission of this thesis for examination. We certify that the candidate while under our supervision completed the work detailed in this thesis

Sign: ..... Date: ..... 12/06/2025

Dr. Nilufa Jivraj Shariff

Senior Lecturer

Mount Kenya University

Sign: ..... Date: ..... 12/06/2025

Madam Beatrice Nkoroi

Senior Lecturer

Mount Kenya University

## DEDICATION

This thesis is dedicated to my family for their unconditional love and support, and to all nurses whose dedication to patient care inspires this work.

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I would like to express my heartfelt gratitude to the Almighty God for giving me the strength and wisdom to complete this study.

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## ABSTRACT

Pain serves as an unconscious warning mechanism to prevent further injury, and low back pain (LBP), specifically, is a common ailment occurring below the 12th rib and above the gluteal folds. The Global Burden of Disease (GBD) 2019 report identified LBP as a significant issue within musculoskeletal conditions, accounting for 7.4% of years lived with disability. Despite its preventability at the primary level, nurses continue to experience varying degrees of LBP, occasionally progressing to chronic stages. This study aimed to investigate the determinants of low back pain among nurses working in level five hospitals in Kiambu County, Kenya, namely Thika, Gatundu, and Kiambu Level 5 Hospitals. It evaluated the prevalence of LBP among nurses in these hospitals and identified both individual-related and health facility-related factors contributing to LBP. The findings will help inform policies and guidelines emphasizing prevention. The study adopted analytical cross-sectional design and included nurses from various departments such as accident/emergency, intensive care, obstetrics and gynecology, medical/surgical, outpatient, pediatrics, renal units, and operating theatres. Participants were selected based on willingness and adherence to inclusion criteria. Data was collected by simple random sampling using self-administered questionnaires and analyzed using the SPSS software version 25. Descriptive statistics such as frequencies, proportions, and percentages were used for data presentation, and a $p$-value of $\leq 0.05$ was considered significant. Associations between variables was examined using the Chi-square test. Ethical clearances and approvals were obtained from Mount Kenya University Ethics and Research Committee, Kiambu County research and training committee, the National Commission for Science, Technology, and Innovation (NACOSTI), and the respective hospitals involved. Informed consent was obtained from all research subjects prior to questionnaire administration. The study findings indicated that there is a statistical significance level (Sig.) for all test items is reported as .000, indicating statistical significance at the $p < .05$ level. This implies that the mean differences observed for each test item were unlikely to have occurred by chance, suggesting a meaningful association between the assessed factors and the prevalence of low back pain among nurses. The study underscored the multifaceted nature of factors influencing low back pain among nurses, emphasizing the critical role of policy implementation, resource allocation, and support systems within healthcare. There is need to develop strategies to manage heavy workloads, particularly patient handling, by ensuring adequate staffing levels and providing training in safe lifting techniques. Further there is need to develop an individual health and fitness plan among nurses through education on proper lifting techniques, encouraging regular breaks, and facilitating access to wellness programs.

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## LIST OF ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| **BMI** | Body mass index. |
| **CRP** | C- reactive protein. |
| **GBD** | Global burden of disease. |
| **GL5H** | Gatundu level 5 hospital. |
| **ICU** | Intensive care unit. |
| **IL6** | Interleukin 6. |
| **KL5H** | Kiambu level 5 hospital. |
| **LBP** | Low back pain. |
| **NACOSTI** | National council for science, technology and innovation. |
| **OPD** | Outpatient Department. |
| **SOPs** | Standard operating procedures. |
| **SPSS** | Statistical Package for Social Science. |
| **TL5H** | Thika level 5 hospital. |
| **TNF** | Tumor necrosis factor. |
| **WHO** | World health organization. |
| **WRMSD** | Work related musculoskeletal disorder |

# CHAPTER ONE

## 1.1 Background Information

Pain serves as an unconscious response designed to prevent further injury, safeguarding the vulnerable part of the body. It is inherently subjective, experienced and described uniquely by each individual. Low back pain (LBP), also referred to as lumbosacral pain, typically manifests in the area below the 12th rib and above the gluteal folds. The Global Burden of Disease (GBD) 2019 report highlights that low back pain represents a significant concern within musculoskeletal conditions, contributing to 7.4% of years lived with disability, thus underscoring its impact on global health (GBD, 2019).

Among the top ten professions, nursing ranks top on risk of low back pain. Work-related low back problems have highest incidence among nursing profession due to their day to day interventions. Nursing duties include physical, personal and ergonomic risk factors for low back pain. Yearly, thousands of nurses in the world are less effective in their work, receive medical reports and/or leave work early before the recommended age (Dlungwane, *et al* 2018).

Nurses usually get episodes of low back pain very often due to repeated movements such as bending forward for long durations, overuse of the back muscles while repositioning patients, and dedicating most of their time for-patient care. While trying to ensure that patients are comfortable and nursing duties are accomplished, nurses try to reach up-forward, lift and turn repeatedly making low back pain prevalence high. This notwithstanding, few studies on low back pain among nurses who work at level five hospitals in Kiambu county have not been documented: TL5H, KL5H, and GL5H. Nurses who provide direct patient care worldwide report increased prevalence of work-related musculoskeletal disorders.

Low back pain among nurses may lead to work absenteeism and high development to chronic pain. Low back pain may affect nurses personally and economically (Negash *et al.*,2022).

Low back pain is a common challenge among nurses. It was assessed to be at 84.7% among Czech registered nurses. Lack of safety measures at the work place was highlighted as the leading cause to painful low back (Gilchrist *et al.*, 2021).

### 1.2 Statement of the problem

Low back pain (LBP) is a pervasive global health issue, significantly affecting individuals' quality of life and work productivity. According to Wang et al., (2018), the Global Burden of Disease report identifies LBP as a leading cause of disability worldwide with substantial implications for healthcare workers. Nurses, in particular, are at heightened risk due to the physical demands of their profession, which often involve lifting patients, maintaining awkward postures, and performing repetitive motions. In Africa, the incidence of LBP among nursing staff is alarmingly high, with reports indicating 68.4% in West Africa, 67.95% in North Africa, and 59% in South Africa. These statistics reflect a widespread concern within the nursing community across the continent. (Semachew *et al.*, 2018).

In Kenya, the prevalence of LBP among nurses is equally concerning. A study conducted at Kenyatta National Hospital identified musculoskeletal disorders, including LBP, as a significant problem among nursing staff, with an incidence rate of 74.2% (Mugga, 2014). In Thika Level 5 Hospital, a targeted study found an even higher incidence of 85% among nurses in the reproductive health department, where risk factors such as inadequate nurse-to-patient ratios, long working hours, frequent forward bending, and the absence of assistive devices for patient lifting were prevalent (Munyau *et al*., 2020).

These findings are significant, hence the urgent need to investigate the specific determinants of LBP among nurses working in Level 5 hospitals in Kiambu County, Kenya. Identifying the key factors contributing to this high prevalence, including both individual-related and health facility factors, in order inform effective interventions, guidelines, SOPs and policy recommendations. Addressing these determinants is crucial for improving nurse health, enhancing workplace safety, and ensuring high-quality patient care.

### 1.3 Justification of The Study

Maintaining and enhancing personal health is a fundamental responsibility of nurses, who must prioritize their own well-being to deliver optimal patient care. Nurses frequently experience low back pain (LBP), a condition that is often exacerbated by the physical demands and urgency of their daily duties. Recent trends indicate an increase in work-related stress among nurses, primarily driven by excessive workload pressures

Kiambu, Thika, and Gatundu Level 5 hospitals serve as critical referral centers, not only for Kiambu County but also for neighboring counties such as Nairobi, Murang'a, Kajiado, and Machakos. As a result, these hospitals experience increased patient volumes, further intensifying the workload and contributing to the physical strain placed on nursing staff. This study was essential for identifying the determinants of LBP among nurses working in these hospitals. By examining both individual-related and health facility-related factors contributing to LBP, the findings enhanced the understanding of this health issue, ultimately fostering policies and guidelines focused on prevention and management.

Although a previous study was conducted at Thika Level 5 Hospital, this research aims to provide updated and comprehensive data specifically addressing LBP among nurses in the entire Kiambu County region. This is crucial as the previous study may not have a true representation of Kiambu county as a whole, hence the importance of this study.

Furthermore, no published research has yet investigated LBP across all Level 5 hospitals in Kiambu County, creating a significant gap in local healthcare knowledge.

The findings of this study were instrumental in informing local healthcare policies and interventions aimed at preventing LBP among nurses. The study will directly benefit nurses by identifying practical strategies to reduce their risk of LBP, improving their health and work satisfaction. The results will also assist policymakers, hospital administrators, and other stakeholders in developing evidence-based policies and health promotion programs focused on improving nurse health and workplace safety. By aligning with national health policies and global health initiatives, including the Sustainable Development Goals (SDGs), this study will contribute to achieving goals related to decent work and health as outlined in SDG 3 and SDG 8. (WHO, 2024)

In conclusion, this study was a valuable resource for enhancing the clinical setting in Kiambu County's Level 5 hospitals, advocating for better policies, and providing critical data for developing targeted interventions to support nurses' well-being and reduce the incidence of low back pain in these healthcare facilities.

## 1.4 Objectives

### 1.4.1 Broad Objective

To assess the determinants of low back pain among nurses working at Level 5 Hospitals in Kiambu County.

### 1.4.2 Specific objectives

1. To assess prevalence of low back pain among nurses working at Level 5 Hospitals in Kiambu county.
2. To identify the individual-related factors associated with low back pain among nurses working at level 5 Hospitals in Kiambu county.

3. To determine the health facility related factors associated with low back pain among nurses working at level 5 Hospitals in Kiambu county.

### 1.5 Research Questions

1. What is the prevalence of low back pain among nurses in level 5 Hospitals in Kiambu county?
2. What are the individual related factors associated with low back pain among nurses working at Kiambu level five hospitals in Kiambu county?
3. What are the health facility related factors associated with low back pain among nurses working at level 5 Hospitals in Kiambu county?

### 1.6 Hypothesis

#### 1.6.1 Null Hypothesis

**1.** There is no statistically significant relationship between individual-related factors and prevalence of low back pain among nurses working at level 5 hospitals in Kiambu county.

**2.** There is no statistically significant relationship between health facility related factors and the prevalence of low back pain among nurses working at level 5 hospitals in Kiambu county.

#### 1.6.2 Alternative Hypothesis

1. There is statistically significant relationship between individual-related factors and prevalence of low back pain among nurses working at level 5 hospitals in Kiambu county.

2. There is statistically significant relationship between health facility related factors and prevalence of low back pain among nurses working at level 5 hospitals in Kiambu county.

## 1.7 Limitation and Delimitation of the Study

### 1.7.1 Limitation of the Study

The study limitation of the study was;

i. Data collection was primarily relied on self-reported measures from nurses regarding their low back pain and contributing factors. Self-reported data can be subjective and may be influenced by respondents' recall bias or willingness to disclose accurate information.

ii. The study employed a cross-sectional analytical design, capturing data at a single point in time. This limits the ability to draw conclusions about the causality or long-term trends related to low back pain among nurses.

iii. The study uncounted a variability in job roles, departments and responsibilities among nurses, which could affect the consistency of data regarding factors contributing to low back pain.

### 1.7.2 Delimitation of the Study

The delimitation of the study was;

The study utilized surveys and questionnaires to gather data. This methodological choice restricts the research to quantitative data and may not capture in-depth qualitative insights into the nurses' experiences and challenges.

### 1.8 Definition of Operating Key Terms

**Low Back Pain (LBP) –** Low back pain refers to discomfort or pain located in the lower part of the spine, typically between the ribs and the hips. It may be caused by a variety of factors such as poor posture, physical exertion, or prolonged standing or sitting, which are often encountered in nursing professions.

**Prevalence of Low Back Pain –** Prevalence refers to the proportion of individuals within a specific population who experience low back pain during a particular period.

# CHAPTER TWO

# LITERATURE REVIEW

## 2.1 Introduction

Literature review is a comprehensive summary and critical evaluation of existing scholarship on a particular research topic. It helps the researcher to have an overview of the existing knowledge, identifying gaps, and highlighting areas for further research making the current study relevant**.**

Essentially this chapter includes synthesizes and interprets information from various sources, demonstrating how new research fits within the existing body of knowledge. This chapter focused on other researcher, s work and writings relevant to low back pain among nurses in order to provide a solid background for a research paper.

## 2.2 Prevalence of Low Back Pain Among Nurses

Low back pain has a significant global impact on health, affecting people's quality of life and work output, particularly among nursing staff. It stands as one of the leading causes of disability worldwide (Wang *et al*., 2018). Globally, LBP among nurses remains a widespread issue. Studies across various countries show high prevalence rates, with England reporting 45% of nurses suffering from LBP, and Australia at 63%. In Hong Kong and China, 40.6% and 56% of nurses are affected, respectively. A meta-analysis of studies indicated that approximately 65% of nurses globally experience LBP, underscoring its impact on the nursing profession (Kasa et al., 2020).

A study conducted in Canada established that the prevalence of low back pain among orthopedic nurses was 30%. Intensive care nurses were also experiencing low back pain at 25%. The researcher recommended that it was necessary to reduce low back pain among nurses in Canada by use of ergonomic interventions (Afshari *et al.*,2018)

Ibrahim (2019) found that in Malaysia, annual prevalence of LBP was 74.8%in public hospitals among nurses. 82% of nurses working in Taiwan had an incidence of LBP in their life time. South Africa is known to have modern medical equipment and systems. Despite this, 84% of nurses working in public hospitals had low back pains. This shows that emphasis should be made on preventive measures by nurses while working despite a country's modern equipment. In Taiwan, LBP was found to be approximately affecting 86% for nurses working in the ambulance. 67% of nurses working in orthopedic departments were found to experience LBP.

A study done in Saudi Arabia found that many nurses had often experienced LBP cumulatively, with a prevalence rate of 82.9%. He found that complains of LBP among nurses was at 53.6% as per the last days of the study. Within a year LBP incidence at King Abdul-Aziz University Hospital in Saudi Arabia was 85.5%. For the last one year of the study, only 14.4% of nurses had not experienced LBP, 50.0% among nurses in the University Hospital had low back pain persisting for less than a week. For one year previously, 7.7% of nurses confirmed to have suffered low back pain daily

(Almaghrabi *et al.*, 2021)

The prevalence of low back pain was at 61.7% among nurses working in Jeddah Saudi Arabia. Severe – moderate back pain was affecting 51.2% of the nurses. Nurses working in the gynecology and obstetrics departments were the most affected, accounting to 20% of all the incidence. According to the study done, 33.3% of the nurses experienced LBP prior employment as a nurse while 66.7% suffered LBP after employment as nurses. The statistics are a great concern and calls for intervention (Gaowgzeh *et al.*, 2019).

In Africa, the prevalence of LBP among nurses is particularly high, with regional variations. The West African region reports the highest incidence, with 68.46% of nurses affected, followed by North Africa at 67.95%. In South Africa, the prevalence stands at 59%, while the overall average for the continent is around 57% (Semachew *et al*, 2018).

In Ethiopia, intensive care unit (ICU) nurses in the Amhara region recorded a 76% annual incidence of LBP Intensive care unit (ICU) nurses recorded a high incidence of LBP in public hospitals of Amhara region, Ethiopia found that nurses experienced low back pain at 76%. Despite LBP being a great concern, its magnitude and factors contributing to its existence is scarce in the public domain. Evidence of the LBP existence is also scarce in Ethiopia among nurses. High use of analgesics was also evident at 58.5%, especially for nurses who had LBP radiating to lower limbs at 27.8%. among the ICU nurses. 35.5% of nurses with LBP had to be allowed to be away from work leading to low work output hence reduced productivity (Tefera *et al.*, 2021). Additionally, a study in Uganda found that 58.7% of nurses at Mulago National Hospital experienced LBP, with stress from their duties contributing to the condition (Mutanda *et al*., 2017).

In Kenya, a study conducted at Kenyatta National Hospital in Nairobi highlighted a 74.2% incidence of musculoskeletal disorders, including LBP, attributed to factors such as heavy lifting, improper positioning during patient handling, and long working hours (Mugga, 2014). similarly, Kiambu County's Level 5 hospitals, the prevalence of LBP is a significant issue among nurses. Previous studies at Thika Level 5 Hospital have revealed high rates of LBP, with 85% of nurses in the reproductive health department affected (Munyau *et al*., 2020).

These statistics reflect a common trend where nurses in high-demand healthcare settings face a disproportionate burden of LBP, regardless of modern medical equipment or technological advancements. The data emphasize the urgent need for targeted interventions to prevent and manage LBP in nursing staff, as well as to improve workplace ergonomics and provide adequate support to reduce the risk of injury.

## 2.2 Individual-Related Factors Predisposing Nurses to Low Back Pain

Low back pain (LBP) among nurses is influenced by several individual-related factors, including lifestyle choices, physical characteristics, work habits, and the adequacy of training on prevention strategies. Understanding these factors is crucial for developing effective interventions aimed at reducing the incidence and severity of LBP among nurses. (Boughattas *et al* 2017)

### Body Mass Index (BMI) and Physical Characteristics

One of the key risk factors for LBP is body mass index (BMI). Nurses who are overweight or obese are more likely to experience LBP due to increased strain on the lower back. Excess body weight can contribute to muscle imbalances, particularly in the lumbar spine, and exacerbate the wear and tear on intervertebral discs. Chan *et al* (2017) found that overweight is a contributing factor to low back pain and 46.4% nurses who were overweight had LBP. Factors leading to lumber lordosis due to over use of abdominal muscles leading to decreased muscle strength contributes to LBP. These factors include obesity, overweight and prior injuries on the lower back. The strongest muscles are the back muscles.

### Work Experience and Seniority

The number of years a nurse spends in the profession is another important determinant. Studies have shown a positive correlation between years of nursing experience and the prevalence of LBP. Nurses with more than ten years of experience, such as those working at King Abdul-Aziz University Hospital, reported an LBP prevalence rate of 88.9% . The more the working years the higher incidence of LBP back pain. Hence there is a positive correlation between total years of nursing experience and development of low back pain (Almaghrabi *et al.*, 2021). Similarly, a study by Chan *et al* (2017) found that nurses with

over 20 years of experience had a significantly higher incidence of LBP (32.7%) compared to those with less than one year of experience (4.5%).

**Posture and Work Habits**

The postures that nurses adopt during their work play a significant role in the development of LBP. Nurses who predominantly sit or bend are at a higher risk of developing LBP. Sitting posture is associated with a 2.74 times higher risk, while standing poses a 3.29 times greater risk compared to bending posture Additionally, nurses who frequently engaged in repetitive motions or rotations during their duties are more likely to suffer from LBP. (Gaowgzeh *et al*., 2019).

Chan (2017) related working total experience of nursing years to low back pain among nurses. 20 years or more working experience in nursing profession made a higher record of low back pain at 32.7%, while nurses with less than one-year experience had a low occurrence at 4.5%. The more senior nurses are, the more the LBP occurrence. Hence there is a positive correlation. The body fats produce and releases chemicals which trigger inflammation, which causes the back pain (Chan *et al*., 2017).

**Lifestyle Factors and Their Impact**

Lifestyle choices such as smoking, physical activity, and diet also contribute to the risk of LBP among nurses. Smoking negatively affects circulation by constricting blood vessels, which reduces blood flow to the back muscles and intervertebral discs. This reduced circulation can increase the risk of injury and exacerbate existing back pain. Furthermore, the frequent coughing associated with smoking can lead to overstretching of the back muscles, further heightening the risk of LBP (Nkhata *et al.*, 2020).

Exercise, on the other hand, has a protective effect against LBP. Regular physical activity improves circulation to the back muscles, reducing muscle stiffness and enhancing

overall back health. Nurses who engage in regular stretching exercises are less likely to develop or experience the severity of LBP (Kazemi *et al*., 2022). Adopting a healthy lifestyle, engaging in regular exercise, and avoiding smoking, can significantly reduce the risk of LBP (Nkhata *et al*., 2020).

**Nutritional Factors**

Nutrition plays an important role in preventing and managing LBP. A study by Pasdar (2022) highlighted that a diet high in protein can decrease the incidence of chronic LBP by improving skeletal muscle strength. Nutrients like amino acids, which are present in protein-rich foods, can reduce inflammation and enhance muscle repair, thereby alleviating back pain. The level of IL-6 and CRP was found to decrease when amino acids were administered, hence an improvement of chronic LBP. Pain sensation can be reduced when there is deficiency of amino acids. This leads to reduced production of neurotransmitters such as glutamate, which affects the brain system and induce pain. This confirms the role of nutrition in management and prevention of chronic low back pain. At middle age for both male and females, there is a decline of skeletal muscle strength which can be an aggravating factor for chronic low back pain. Enough intake of protein guarantees good maintenance of the muscle strength. High levels of cytokines, interleukins, C- reactive protein (CRP) and tumor necrosis factor α have been found to be associated with high levels of inflammation.

Conversely, diets rich in refined grains, processed meats, and high levels of saturated fats can promote chronic inflammation, which may exacerbate LBP. Mediterranean and plant-based diet, which includes vegetable oils usage in the food preparation such as olive oil, was found to reduce musculoskeletal pain, low back pain included. A healthy dietary pattern and moderation of the inflammatory conditions of the body are highly associated.

Therefore, low back pain can be well managed by plant-based diet at primary and secondary level (Mendonca *et al.*,2020).

**Training and Knowledge on Prevention**

Nurses' knowledge and training in preventing LBP are essential for effective management and prevention. Despite having high levels of awareness about the importance of physical activity, stress management, and healthy lifestyle choices, many nurses fail to apply this knowledge in their own health care routines This is often due to high workloads and stressful working conditions that leave little time for self-care or participation in preventive education programs (Kazemi *et al*., 2022).

Training on proper ergonomics, posture, and back health should be incorporated into nursing education programs. Nurses who are educated on how to perform their duties while maintaining proper body mechanics are less likely to experience LBP. Customized training programs that target the specific needs and work conditions of nurses are crucial for both primary and secondary prevention of LBP (Williamson *et al.,* 2022).

Furthermore, introducing training on coping strategies for stress and workload management can help reduce the risk of LBP by addressing contributing psychosocial factors. Nurses feel more empowered when trained coping with work stressful situations including management of heavy workloads (Liu *et al*., 2023).

In conclusion, individual-related factors such as BMI, work experience, posture, lifestyle habits, and the adequacy of training on LBP prevention are critical determinants of the prevalence and severity of low back pain. A holistic approach that addresses these factors through education, lifestyle modification, and workplace ergonomics is essential for reducing the burden of LBP among nurses.

### 2.3 Health Facility related Factors

Working conditions, particularly lack of assistive lifting devices and high workloads, play a critical role in the development of low back pain (LBP) among nurses. Studies have shown that nurses who work long hours, especially in high-stress environments with insufficient staff, face an increased risk of developing musculoskeletal injuries, including LBP. The key facility-related factors contributing to LBP include inadequate equipment, poor working conditions, and the physical demands of patient handling.

#### Lack of Assistive Lifting Devices

The absence of appropriate lifting aids, such as patient trolleys, stretchers, and lifting devices, significantly increases the physical strain on nurses, thereby elevating the risk of back injury. Despite the known benefits of assistive devices, such as reducing physical strain and improving patient safety, only 19% of nurses in certain studies were found to be using these devices. This lack of utilization of lifting devices can be attributed to limited availability and insufficient training or awareness Without these devices, nurses are required to lift and reposition patients manually, which directly contributes to the wear and tear on their back muscles (Schoenfisch *et al.*, 2019).

#### Work Hours and Shift Lengths

Nurses working more than seven hours a day are at higher risk for developing LBP, as longer shifts result in greater physical strain from manual handling and excessive standing. For instance, research indicates that nurses who work 10 or more hours a day have a 35% higher risk of developing LBP for every additional working hour added to their schedule Extended work hours, often combined with inadequate rest periods, exacerbate fatigue and increase the likelihood of poor posture and muscle strain, leading to LBP. (Ibrahim *et al*, 2019).

### Staffing Shortages and High Workload

Insufficient staffing is a major factor that contributes to LBP. In settings where there is a shortage of nursing staff, individuals are often required to work longer hours and handle more patients than they can manage effectively. This increases the frequency of heavy lifting and awkward postures, which are directly linked to back injuries. For instance, in Saudi Arabia, nurses working in busy medical-surgical departments with a shortage of staff reported a high prevalence of LBP, with 78.2% of nurses working more than 10 hours per day suffering from this issue (Almaghrabi *et al*., 2021).

### Poor Posture and Inadequate Equipment

Nurses are often required to perform tasks such as wound dressing, administering medication, and assisting patients with mobility in awkward postures, especially when working with inadequate or poorly designed equipment. For example, nurses working without adjustable beds or with uncomfortable furniture are forced into positions that strain the lower back. The lack of ergonomic furniture and appropriate resting areas further exacerbates the risk of LBP. (Nkhata *et al.*, 2020).

### Comparing to Other Hospital Settings

When comparing hospitals facing similar challenges, it is evident that public hospitals, with their limited resources, tend to have higher incidences of LBP among nurses than private hospitals. For instance, research has shown that LBP is more prevalent among nurses working in public hospitals, with an odds ratio of 4.88 compared to those working in private facilities This disparity can be attributed to differences in staffing levels, available equipment, and the physical demands placed on nurses in the public sector. In contrast, private hospitals often invest more in ergonomic interventions and have a higher

nurse-to-patient ratio, which can mitigate the risks associated with LBP (Shubrandu *et al*., 2017).

**Workplace Support and Facilities**

Inadequate rest facilities for nurses, such as uncomfortable break rooms and a lack of proper space to rest during long shifts, contribute to the development of LBP. Nurses often do not have access to ergonomic rest areas or places where they can take brief breaks to relieve their physical strain. This issue is particularly pronounced during night shifts, where the lack of suitable rest spaces can lead to further exhaustion and increase the risk of developing LBP. Comparing this with hospital settings where proper rest facilities are available reveals the importance of ensuring comfortable and supportive environments for nurses to rest and recover during their shifts. (Ibrahim *et al* 2019)

A phenomenological study done found that nurses who participated in the study indicated that they did not get adequate rest due to high workloads. Either nurses did not pay attention to their low back-health promotion activities. This affected the quality of the services they offered since coping with the high workload was a challenge. Working hours spent by nurses were found to be long shifts, making nurses who directly offer services to the patients stands for long, leading to stress and eventually LBP sets in. They reported that shifts would learn from 7.30 – 16.00 hours which an essentially long shift. Mode of performing tasks was also a contributing factor to low back pain. Participants were also expressing a great concern on the awkward postures adopted while they preform procedures such as stitching wounds, administering drugs and performing a bed bath. These activities train the low back due to high demand of the services. This was due to lack of adjustable beds. Nurses also did procedures for patients on the floor due to limited resources such as beds.  Poor lifting techniques due to staffs being inadequate

were found to be common during the routines of the nursing care provision. Lifting techniques would play a great role in prevention of LBP (Nkhata *et a1.*, 2020).

Conclusively, facility-related factors, including inadequate lifting devices, long work hours, high patient-to-nurse ratios, and poor ergonomic conditions, play a crucial role in the development and exacerbation of low back pain among nurses. To mitigate these risks, healthcare facilities need to prioritize adequate staffing, the use of assistive devices, and ergonomic improvements to the work environment. Comparisons with other hospital settings show that investing in these areas can significantly reduce the incidence of LBP and improve the overall well-being and job satisfaction of nursing staff.

### 2.4 Preventing Back Injuries Among Nurses

Back injuries among nurses are a significant concern, with various studies highlighting the need for effective strategies to mitigate these risks. Ergonomic training and education are fundamental in addressing these issues. The Occupational Safety and Health Administration (OSHA) provides extensive resources on ergonomic principles and training, emphasizing the importance of educating healthcare workers on safe lifting and handling practices. Similarly, the National Institute for Occupational Safety and Health (NIOSH) offers comprehensive guidelines on safe patient handling, which include training programs aimed at reducing musculoskeletal disorders among nurses. Ergonomic furniture and workstations play a crucial role in preventing back injuries. Adjustable beds and stretchers, along with ergonomic chairs, are designed to reduce the need for awkward postures and repetitive strain. Supportive policies and programs are vital for creating a safe working environment. OSHA's Injury and Illness Prevention Programs offer resources for developing and implementing safety policies that protect workers this is according to study by (WHO, 2022)

## 2.5 Theoretical Framework

Dorothea Orem's Self-Care Theory, originally developed to enhance the quality of nursing, is highly relevant in the context of nurses managing their health, especially concerning the prevention and management of low back pain. This theory emphasizes the importance of nurses taking proactive steps in self-care to maintain their health and prevent ailments like low back pain, which can significantly impact their professional and personal lives.

The essence of Orem's theory is the emphasis on primary prevention of low back pain through the adoption of healthy habits. These include maintaining a balanced diet, engaging in regular exercise, ensuring adequate rest, and abstaining from smoking. Additionally, the theory advocates for the use of assistive devices when caring for critically ill patients. By integrating these practices, nurses can uphold the integrity of their back and promote low back health, thereby preventing the onset of low back pain. This proactive approach to health is crucial in a profession that often involves physically demanding tasks, which can put nurses at risk of developing musculoskeletal disorders, including low back pain.

Wang (2018) underscore the potential consequences of improper techniques and the lack of self-care practices in nursing. The application of incorrect procedures or failure to adhere to preventive measures can lead to health issues, including low back pain, which may escalate to the point of causing disability. This outcome not only affects the individual nurse's health and quality of life but also has broader implications for the healthcare system, including increased absenteeism and decreased productivity.

The concept of 'Self-Care Deficit' becomes relevant when nurses are overwhelmed by their workload, especially in situations where the demand for nursing care exceeds their capacity. This imbalance can lead to a decline in the nurses' ability to care for themselves,

resulting in health issues like low back pain. In such scenarios, nurses must recognize the need for secondary prevention strategies. These involve taking steps to prevent the progression of existing low back pain into chronic conditions. Addressing self-care deficit requires a concerted effort to manage workloads effectively and ensure that nurses have the resources and support needed to maintain their health.

In instances where nurses suffer from low back pain, Orem's Self-Care Agency Theory comes into play. This aspect of the theory acknowledges that there are situations where nurses themselves may require care and assistance from other healthcare professionals. For example, a nurse with a severe back injury may need the services of a physiotherapist for rehabilitation or assistance from fellow nurses for daily activities. Orem's theory highlights the importance of allowing patients, including nurses, to perform tasks they are capable of doing independently or with minimal assistance. It also emphasizes that healthcare providers, such as nurses, should only assist in tasks that the patient is unable to perform. This approach not only facilitates the patient's recovery but also respects their autonomy and encourages their active participation in the healing process.

In summary, Dorothea Orem's Self-Care Theory provides a comprehensive framework for nurses to manage their health, particularly in the prevention and management of low back pain. By prioritizing self-care practices, recognizing the signs of self-care deficit, and understanding the role of self-care agency, nurses can better protect their health and ensure their ability to provide high-quality care to their patients. This approach is not only beneficial for the individual nurse but also has positive implications for the healthcare system as a whole.

## 2.6 Conceptual Framework.

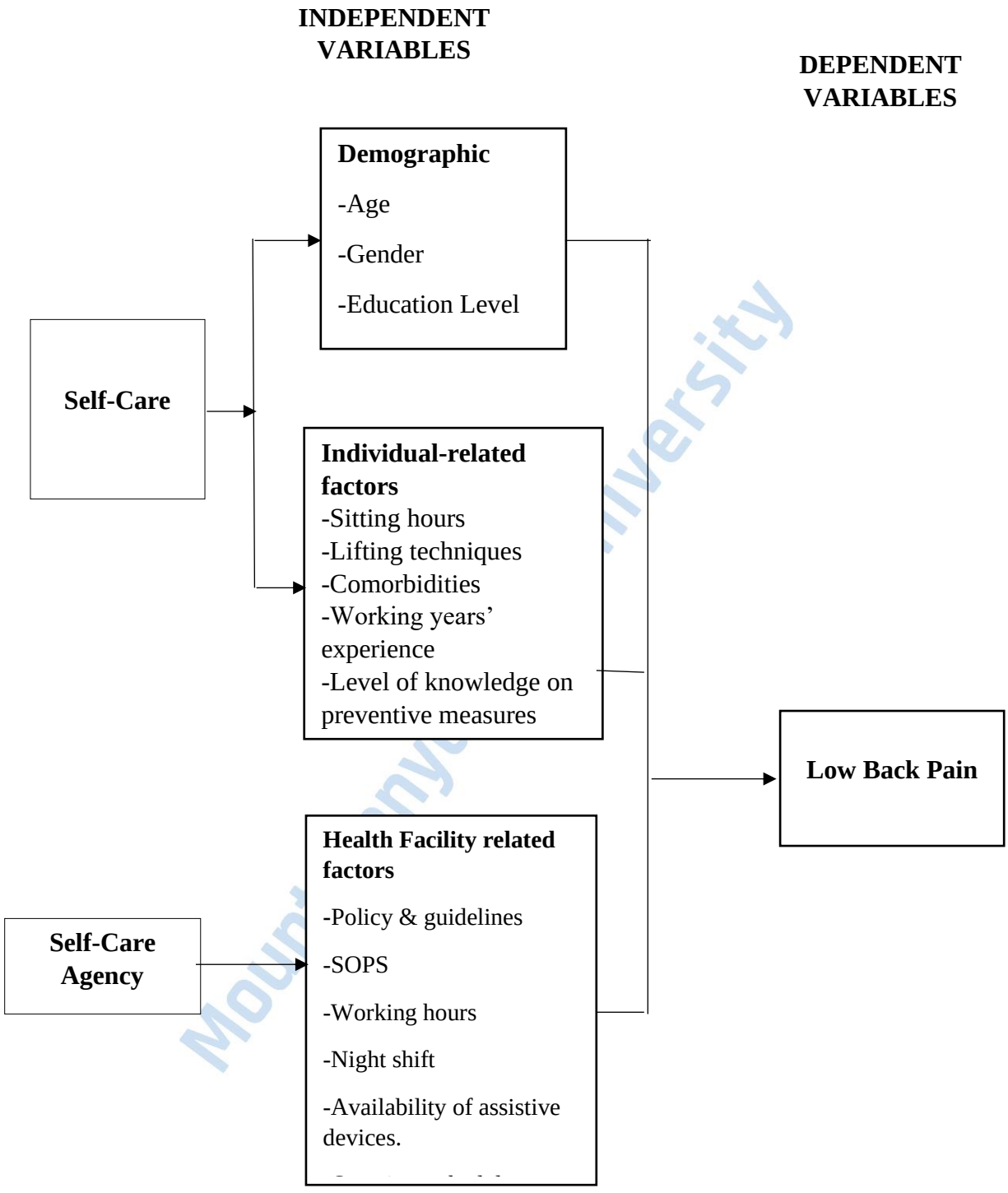



**Figure 1: Conceptual Framework modified from** Smith *et al. (2019), Boughattas (2017)*

## 2.7 Summary

The prevalence of low back pain among nurses is a significant global issue. Factors specific to nurses, including age, lifting techniques, comorbidities, and the duration of their careers, are identified contributors to low back pain worldwide. Furthermore, nurses' awareness of preventive measures for low back health, such as proper nutrition, regular exercise, abstaining from smoking, and the importance of primary prevention, plays a crucial role in mitigating low back pain. Additionally, facility-related factors, including the absence of policies and guidelines for back care, the availability of standard operating procedures, overtime schedules, and the presence of lifting assistive devices in healthcare settings, are also key determinants of low back pain in this demographic.

This study aimed to identify the determinants of low back pain among nurses working in level five hospitals in Kiambu County, Kenya. The findings of this research were instrumental in formulating recommendations for the primary prevention of low back pain among nurses in Kiambu County. These insights will contribute to enhancing Orem's theory of self-care among nurses, ensuring they maintain their health while providing care to patients and avoiding becoming patients themselves. Should primary prevention measures for low back pain prove ineffective, a self-care deficit might occur, necessitating the immediate implementation of secondary prevention strategies to prevent further complications.

# CHAPTER THREE

# RESEARH METHODOLOGY

## 3.1. Introduction

This chapter describes the research design that was adopted for the study. It also describes the study population**.** The sampling design, the sample size determination and the study variables have also been elaborated and outlined in this chapter. The chapter also describes data collection process, data presentation and analysis.

## 3.2 Study Design

This study employed an analytical cross-sectional study design, which is suitable for assessing both the prevalence of a condition and the associations between potential risk factors and outcomes within a defined population at a single point in time. An analytical cross-sectional design is particularly appropriate for this research as it enables the simultaneous collection of data on the presence of low back pain (LBP) among nurses and various facility-related, occupational, and demographic factors that may contribute to it.

Unlike purely descriptive studies that only report frequencies or proportions, an analytical cross-sectional design allows the researcher to test hypotheses and explore statistical associations between variables, such as the relationship between long working hours, lack of assistive devices, and the occurrence of LBP (Levin, 2006). This approach is cost-effective, time-efficient, and well-suited to resource-limited settings where longitudinal studies may be impractical.

Furthermore, the cross-sectional design is widely used in occupational health research to identify risk factors associated with musculoskeletal disorders among healthcare workers (Punnett & Wegman, 2004). Given the focus of this study on identifying facility-related

risk factors contributing to LBP among nurses, this design enables the researcher to make informed inferences that can guide further interventions and preventive strategies.

### 3.2.1 Study variables

The study variables were derived directly from the research objectives and categorized as dependent and independent variables:

### 3.2.2. Dependent variables

For this research was the dependent variable was low back pain (LBP) among nurses, measured based on self-reported experiences of back pain within a specified period (the last 12 months).

### 3.2.3. Independent variables

The independent were divided into two main categories: individual-related factors and facility-related factors. individual-related factors included age, sex, body mass index (BMI), years of professional experience, physical activity levels, smoking status, comorbidities and personal history of low back pain.

Facility-related factors encompassed the number of daily working hours, number of shifts per week, shift duration, manual lifting of patients or equipment, availability and use of assistive lifting devices, staff-to-patient ratio, type of work department (e.g., medical-surgical unit, ICU), availability of ergonomically designed furniture, and access to rest or break facilities. These variables were selected based on existing literature and their potential influence on the development of low back pain among nursing staff.

## 3.3 Study site

The study was carried out in the three level five hospitals in Kiambu county: Kiambu Level 5 Hospital, Thika Level 5 Hospital and Gatundu level 5 hospital. Thika Level 5 Hospital is owned by the county government of Kiambu. It is located in Thika town along

General Kago Road at the location coordinates of -1.0424 latitude and 37.0774 longitude. Thika is approximately 50 Km North East of Nairobi. It serves population from Kiambu, Muranga, Machakos and Nairobi county. The hospital serves as a referral facility for Faith Based Organizations and private owned facilities too. It has a total of 210 nurses and serves approximately 956,820 patients from Kiambu and neighboring counties. Kiambu Level Five Hospital, is a Kiambu county government facility located in Kiambaa subcounty, 13 kilometers from Nairobi and it located on -1.134264284642745 latitude, 36.83715819354583 longitude in the geographical map. Serves as a referral hospital for the Kenyan population from Kiambu, Muranga, Machakos, Nairobi and Kajiando counties. The hospital has a total of 215 nurses and serves a population of approximately 1,041,807. Gatundu level five hospital **is** Located along Gatundu-Kinare Road, Ngenda Location, Gatundu South Constituency of Kiambu County located on geographical coordinates of -1.0137239015387987, 36.905954335830906 in world coordinates**.** It serves as a referral hospital for Kiambu county and its environs. It serves a population of 224,053. The hospital has a total of ninety-five nurses. The areas of focus will include the accident/emergency department, intensive care unit, obstetrics and gynecology department, medical/surgical department, out-patient department pediatrics, renal unit and all operating theatres.

### 3.4 Study population

Polit and Beck (2013) define a study population as a subset of the target population from which a sample is drawn. In this study, the population comprised nursing staff from three county level five hospitals in Kiambu County: Thika, Kiambu, and Gatundu Level 5 Hospitals.

### 3.4.1 Inclusion Criteria

All nurses who have worked in Thika, Kiambu and Gatundu Level Five Hospitals for at least three months were eligible for the study. No nurse was coerced into participating in the study.

### 3.4.2. Exclusion criteria

Nurses who are currently pregnant were excluded from the study since they could be experiencing physiological LBP. Nurses who had experienced low back pain prior employment as a nurse were excluded from the study. Nurses who do not provide direct patient care were excluded from the study

### 3.5. Sample size determination

According to Polit and Beck (2013), the sample size in a study refers to the number of individuals included to represent the entire population. The researchers in this study utilized Taro Yamane's formula for determining the sample size. Yamane, a mathematical statistician, introduced this formula in 1973. It is designed to estimate or determine the appropriate sample size in relation to the population under study. This method ensures that inferences and conclusions derived from the study sample can be validly applied to the entire population from which the sample is drawn.

**Yamane Formula**

$$n_o = \frac{N}{1+N(e^2)}$$

$n_o$ = desired sample size.

N = population size

e = marginal error

For this study, the study population in Thika, Kiambu and Gatundu Level Five Hospitals is 210, 215 and 95 nurses respectively. the marginal error is 5%. The sample size was calculated as follows:

For Thika Level 5 Hospital $n_o$ = $\frac{210}{1+210\times(0.05)^2} = 138 + 10\%\ (attrition) = 152\ nurses$

For Kiambu Level 5 Hospital no = $\frac{215}{1+215\times(0.05)^2} = 140 + 10\%\ (attrition) = 154\ nurses$

For Gatundu level 5 Hospital = $\frac{95}{1+95\times(0.05)^2} = 77 + 10\%\ (attrition) = 85\ nurses$

Total sample to be used in study was 391 nurses.

### 3.6 Sampling Procedure

This is the collection of data, which involves acquiring participants and gathering information needed for a study. The stratified random sampling method was used to sample the study participants across the 3 different hospitals. They had the same characteristics, since they were all level five hospitals. This made the data to be generalized across all the participants/respondents working in the three level five hospitals in Kiambu county. Random sampling method was further applied using hospital database on nurses to select participant in the identified strata. All the study population had an equal chance of being selected and the risk of bias was minimal**.**

#### 3.6.1 Data collection tools

This was done by use of a structured self-administered questionnaire. The questionnaire was standardized where the respondents choose from a set of options, with the order of the questions consistent for all respondents.

Burns (2000) recommends the use of questionnaires when a study involves a large number of respondents. This method ensures that each participant receives an identical assessment tool, leading to standardized responses. Additionally, Polit and Beck (2013) highlight the advantage of questionnaires in maintaining the complete anonymity of respondents, which can be crucial in obtaining unbiased and honest responses.

The questionnaire designed for the study consisted of three distinct sections, each aligned with the specific objectives of the research. It was adapted from established tools such as the Nordic Musculoskeletal Questionnaire, the Keele Start Back Tool Questionnaire and the Pain Numerical Rating Scale, tailored to meet the study's goals. The Keele STarT Back Screening. Tool is designed for use by health care practitioners (Belcher *et al,*.2013). The Nordic Musculoskeletal Questionnaire was developed by a group of Nordin researchers for research for non-commercial use and hence can be used in academic studies (Kuorinka *et al,*.1987)

Part A of the questionnaire focused on gathering demographic data of the respondents. This section included questions related to their age, gender, and educational level. Collecting this information is crucial as it allows for an analysis of how these demographic factors might correlate with or influence the prevalence and characteristics of low back pain among the study participants. This approach ensures a comprehensive understanding of the participants' backgrounds, which is essential for interpreting the results in the context of their personal and professional environments.

Part B included the nurse characteristics as per the second objective, included lifestyle such as regular exercise, BMI, smoking habits, good nutrition, enough rest current deployment, nature of work and its involvement such as good practices on lifting techniques, working hours per week, and heath seeking behavior such as updates on low back care while caring for the patients. This section of the questionnaire will also assess

nurse's level of knowledge on preventive measures of low back pain and promotive measures for maintaining a healthy back.

Part C of the questionnaire was assessing the facility related factors and the preventive measures to be considered. Policy and guidelines, and standard operating procedures information was also captured in this section. Availability of lifting assistive devices was assessed in this part of the questionnaire. It was on a four-point Likert's scale with four options: strongly agree, agree, disagree and strongly disagree.

Data collection was done over 6 weeks from 7.30am to 5pm so as to capture as many nurses as possible working for different shifts. Three research assistants were orientated on data collection process. The researcher incorporated Kenya Medical Training students to assist the researchers on data collection. The student nurses have a good background on the hospital layout hence the importance of incorporating them in the study.

### 3.7. Quality control

Middleton (2023) defines validity as the accuracy with which a method measures what it is intended to measure. Reliability, on the other hand, refers to the consistency of a method in measuring something, such that it would yield the same results if repeated under identical circumstances.

**3.7.1. Validity**- Pretesting of data was done on 10% of the sample population at Igegania level 4 hospital. This is a high-volume hospital which has similar characteristics as that of level five hospital. The researcher evaluated the data collection tool to assess the language used and how answerable the questions were and how they relate to the objectives of the study. The errors found were corrected accordingly.

**3.7.2. Reliability**-Cronbach's alpha coefficient measures the internal consistency or the reliability level of items. The tool was used to test reliability of research tool and adjusted to 0.7 as per standard by analysts.

### 3.8.Data Management

To ensure data quality, questionnaires were checked for completeness and consistency immediately upon collection. Incomplete or ambiguously filled questionnaires were excluded from further analysis. The validated data was then cleaned to remove entry errors and inconsistencies. After cleaning, the data was coded manually using a structured coding frame, and subsequently entered into SPSS version 25 for statistical analysis. Double entry verification was conducted on a sample of the data to enhance accuracy and reliability. The final dataset was stored in a password-protected database to ensure data security.

### 3.9 Data Analysis and Presentation

The statistical analysis was carried out using SPSS version 25. Data analysis was structured in two stages: descriptive and inferential statistics.

Descriptive statistics were used to summarize the demographic and clinical characteristics of the participants. Specific frequency measures included frequencies, percentages, means, and standard deviations. These were presented in the form of tables, charts, and graphs to clearly illustrate trends and distributions in the data.

For inferential statistics, the following tools and techniques were used:

Chi-square tests were applied to examine associations between categorical variables (e.g., presence of low back pain and shift length). One-sample t-tests were used to compare sample means to known or hypothesized values when applicable (e.g., average working hours). A p-value $\leq 0.05$ was considered statistically significant.

Interpretation of results from inferential analysis was guided by statistical significance and direction of association. Where the p-value indicated significance, further interpretation was done based on strength and nature of association using effect sizes where applicable (e.g., odds ratios or chi-square values). Findings were discussed in relation to the research objectives and existing literature to contextualize their meaning.

### 3.10 Ethical Considerations

The researcher obtained ethical clearance from the Mount Kenya University Ethics and Research Committee and further approval from the Kiambu County Research and Training Committee. Authorization was also granted by the National Commission for Science, Technology and Innovation (NACOSTI) and from the management of the respective hospitals involved in the study.

Informed consent was sought from all participants prior to data collection. Each participant was provided with detailed information about the study's objectives, procedures, potential risks, and their right to withdraw at any point without any negative consequences. Participation was entirely voluntary.

To uphold confidentiality, the questionnaires were anonymous—no names or identifiable personal details were collected. All responses were coded and securely stored to prevent unauthorized access. Only the researcher and designated supervisors had access to the data, which was used solely for the purposes of the study.

To promote scientific integrity and prevent research malpractice, the researcher adhered to the principles of honesty, objectivity, accuracy, and transparency throughout the research process. Data was collected and reported truthfully without fabrication, falsification, or manipulation. Plagiarism was avoided by appropriately citing all sources.

The study was conducted in full compliance with established ethical and academic standards for research involving human participants.

# CHAPTER FOUR

# RESULTS AND FINDINGS

## 4.1 Introduction

This chapter provides the study results and findings of determinants of low back pain among nurses working at level 5 hospitals in Kiambu County, Kenya. The flow of this study is as follows; questionnaire return rate, reliability analysis, assessment of incidence of low back pain among nurses, identification of nurse related factors predisposing nurses to low back pain and determination of the facility related factors predisposing nurses to low back pain at level 5 Hospitals in Kiambu county.

The study utilized a structured questionnaire to gather comprehensive data on various factors that may contribute to low back pain (LBP) among nurses. Occupational factors included specific nursing tasks performed, such as lifting patients, prolonged standing, and bending, as well as working hours per week, shift patterns, duration of employment, and years of experience. Additionally, the use of ergonomic aids, such as lifting devices and adjustable chairs, was assessed. Demographic information was collected, including age, gender, marital status, and education level.

Lifestyle factors were also be considered, encompassing physical activity outside of work, smoking and alcohol consumption, and Body Mass Index (BMI). Health history was reviewed to document previous episodes of low back pain and other medical conditions that might catalyze occurrence of LBP.

To specifically identify work-related pain, questions addressed the onset of LBP, asking when the pain started and whether it was associated with any particular work activity. Pain timing was explored to determine if the pain is worse during or after work shifts and if it improves during off days or vacations. The questionnaire also pinpointed pain

locations that might correlate with common occupational activities and inquire about any changes in work duties or modifications to activities due to pain.

### 4.2 Response Rate

**Table 1: Response Rate**

| FACILITY | Thika level 5 hospital | Kiambu level 5 hospital | Gatundu level 5 hospital | Total |
|---|---|---|---|---|
| Sample Size | 152 | 154 | 85 | 391 |
| Respondents | 131 | 114 | 71 | 316 |
| Percentage | 86 | 74 | 84 | 81 |

The response rate is a crucial metric in research projects, indicating the proportion of respondents who completed and returned the questionnaire. A higher response rate typically suggests better data quality and increased representativeness of the sample hence reducing the biasness of the study. Table 1 provides a breakdown of response rates across three level hospitals in Kiambu County: Thika Level 5 Hospital, Kiambu Level 5 Hospital, and Gatundu Level 5 Hospital. Notably, Thika Level 5 Hospital achieved the highest response rate at 86%, indicating a commendable level of engagement and participation from respondents. Gatundu Level 5 Hospital followed closely behind with a response rate of 84% while Kiambu Level 5 Hospital recorded a response rate of 74%, These figures illuminate the varying degrees of responsiveness among the surveyed hospitals' nurse populations.

The overall response rate across all hospitals stood at 81%, with 316 nurses actively participating out of a total sample size of 391. This robust response rate suggests a high level of engagement and cooperation among respondents, contributing to the credibility and reliability of the study findings. Moreover, the frequency of non-participants, comprising 75 nurses who did not return the questionnaire, accounted for 19% of the total

sample. Despite this, the substantial participation rate mitigates concerns regarding potential biases and enhances the study's representativeness.

The findings align with previous research, reinforcing the importance of a robust return rate in ensuring the validity and generalizability of study outcomes. Fincham's (2008) observations underscore the significance of high participation rates in reducing biases and enhancing the reliability of research findings. Therefore, the study's strong response rate of 81% affirms its credibility and reliability, indicating a comprehensive representation of the nurse population across the surveyed hospitals.

### 4.3 Reliability Analysis

**Table 2: Reliability Analysis**

| Test Item | Reliability Statistics Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|---|---|---|---|
| Assessment of prevalence of low back pain among nurses working at Level 5 Hospitals in Kiambu county. | .783 | .811 | 10 |
| Identification of individual-related factors predisposing nurses to low back pain at level 5 Hospitals in Kiambu county. | .895 | 0.792 | 9 |
| Determination of health facility related factors predisposing nurses to low back pain at level 5 Hospitals in Kiambu county. | .914 | .923 | 13 |
| **Total** | **.864** | **.842** | **32** |

Reliability analysis is vital in the study described above to assess the consistency and stability of the research instrument, in this case, the questionnaire used to gather data from nurses and the reliability results were presented as per table 2 above;

According to table 2 Cronbach's Alpha coefficients and the results indicated that there was an internal consistency. The assessment of low back pain incidence among nurses

working in Thika, Kiambu and Gatundu level 5 Hospitals yielded Cronbach's Alpha coefficients of 0.783 and 0.811, indicating satisfactory levels of internal consistency among the ten items comprising this dimension. Similarly, the identification of individual related factors and health facility-related factors showed higher Cronbach's Alpha coefficients of 0.895 and 0.914, respectively, suggesting strong internal consistency among the items within these dimensions.

Taber, n.d. (2018) guideline stipulating a minimum Cronbach's Alpha value of 0.7 for satisfactory reliability, the reliability statistics provided in the study on low back pain among nurses in Kiambu County's Level 5 Hospitals demonstrate the adequacy of the questionnaire's internal consistency.

**4.4 Demographic Characteristics**

Understanding the demographic characteristics of the study population is essential for contextualizing findings, identifying vulnerable groups, tailoring interventions, and informing policy decisions related to low back pain among nurses in Level 5 Hospitals in Kiambu County.

**Table 3: Demographic Characteristics of Study Respondents**

| Demographic Characteristics | | F | % |
|---|---|---|---|
| Age in years | 21 - 30 | 148 | 46.8% |
| | 31 - 40 | 110 | 34.8% |
| | 41 - 50 | 54 | 17.1% |
| | 51 - 60 | 4 | 1.3% |
| Gender | Female | 232 | 73.4% |
| | Male | 84 | 26.9% |
| Education level | Masters | 11 | 3.5% |
| | Bachelors | 72 | 22.9% |
| | Higher diploma | 64 | 20.3% |
| | Diploma | 155 | 49.1% |
| | Certificate | 14 | 4.4% |
| Working Experience (years) | Below 1 | 36 | 11.4% |
| | 1-5 | 79 | 25.0% |
| | 6-10 | 55 | 17.4% |
| | 11 and above | 146 | 46.2% |
| Current Deployment | Accident and emergency | 25 | 7.9% |
| | Maternity department | 74 | 23.4% |
| | ICU | 13 | 4.1% |
| | Operating theatres | 34 | 10.8% |
| | Outpatient department | 40 | 12.7% |
| | Medical/ surgical wards | 52 | 16.5% |
| | Paediatrics | 30 | 9.5% |
| | Others | 48 | 15.2% |

The study focused on the determinants of low back pain among nurses working at Level 5 hospitals in Kiambu County, Kenya, various demographic characteristics of the respondents were examined. Firstly, respondents were categorized based on their age range, which spanned from 21 to 60 years. The majority of respondents (46.8%) were aged between 21 and 30 years, followed by 31 to 40 years (34.8%), 41 to 50 years (17.1%), with a smaller percentage falling in the 51 to 60 years category (1.3%). Regarding gender distribution, respondents were divided into male and female categories, with females comprising the majority at 73.4% and males making up 26.6%. Education

levels were also considered, ranging from Masters level to Certificate level, with the highest proportion of respondents holding education up to the Diploma level (49.1%), followed by Bachelors level (22.9%), Higher diploma level (20.3%), Masters level (3.5%), and Certificate level (4.4%). Furthermore, respondents' working experience in years was analyzed, with the largest percentage having 11 years and above of experience (46.2%), followed by 1-5 years (25.0%), 6-10 years (17.4%), and 1 Year and Below (11.4%). Finally, respondents' current deployment within the hospital was explored, with the Maternity department having the highest percentage of respondents (23.4%), followed by Medical/surgical wards (16.5%), Operating theatres (10.8%), and other departments. These demographic insights provide valuable context for understanding the diverse backgrounds and experiences of the nurses participating in the study, which could shed light on the factors contributing to low back pain in this specific population.

### 4.5 Assessment of the prevalence of low back pain among nurses working at Level 5 Hospitals in Kiambu county

The first objective was to assess the prevalence of low back pain among nurses working at Level 5 Hospitals in Kiambu county. The study findings and results were presented into two categories which comprised of descriptive and inferential analysis as below;

#### 4.5.1 Descriptive Analysis on assessment of prevalence of low back pain among nurses

The assessment of occupational health among nurses is paramount to ensuring their well-being and maintaining high-quality patient care standards. Low back pain (LBP) is a prevalent issue among nurses, often stemming from the physical demands of their profession. Understanding the prevalence and factors associated with LBP is crucial for implementing preventive measures and interventions to alleviate its impact. In this context, Tables 4, 5, and 6 present comprehensive data on the assessment of LBP

prevalence among nurses, focusing on nurse-related factors, comorbidity issues, and lifestyle contribution.

**Table 4: Nurse responses on the assessment of prevalence of low back pain among nurses**

| No | Test Item | F | % |
|---|---|---|---|
| 1 | Experienced low back pain related to nursing duties | | |
| | Yes | 249 | 79.6% |
| | No | 64 | 20.4% |
| 2 | Treated for low back pain for the last three months | | |
| | Yes | 132 | 43.0% |
| | No | 175 | 57.0% |
| 3 | If yes, have you been absent from duty for more than 3 days due to low back pain in the last three months? | | |
| | Yes | 42 | 31.8% |
| | No | 90 | 68.2% |
| 4 | On a Scale of 0-10, how do you rate the LBP are experiencing? | | |
| | No pain/zero pain | 49 | 15.8% |
| | 1-3 (mild pain) | 74 | 23.8% |
| | 4-6 (moderate pain) | 155 | 49.8% |
| | 8-10(Severe pain) | 33 | 10.6% |
| 5 | Has the LBP spread down your leg at some time in the last 2 weeks? | | |
| | Yes | 132 | 42.9% |
| | No | 176 | 57.1% |
| 6 | Does the LBP limit your activity? | | |
| | Yes | 180 | 58.4% |
| | No | 128 | 41.6% |
| 7 | Do you feel your back may not get better due to pain? | | |
| | Yes | 104 | 33.9% |
| | No | 203 | 66.1% |
| 8 | Has the LBP been extremely troublesome in the last 2 weeks? | | |
| | Yes | 82 | 26.7% |
| | No | 224 | 73.0% |

Table 4 offers an exhaustive examination of individual-related factors influencing the occurrence of low back pain (LBP) among nurses, meticulously presenting frequencies and percentages to elucidate the prevalence and consequences of LBP within this professional cohort.

The incidence of LBP related to nursing duties emerges prominently, with 249 nurses, comprising 79.6% of the sample, reporting experiences of LBP attributable to their work responsibilities. An insightful aspect revealed by the data is the treatment history for LBP over the last three months. Among the surveyed nurses, 132 individuals (43.0%) sought treatment for LBP during this period, whereas 175 nurses (57.0%) did not pursue any form of treatment for their condition.

Moreover, the impact of LBP on work related services showed a significant concern, with 42 nurses (31.8%) disclosing absenteeism exceeding three days due to LBP within the last three months. This underscores the considerable influence of LBP on workforce attendance, contrasting with 90 nurses (68.2%) who did not report any absenteeism attributed to LBP. Pain severity ratings unveil a spectrum of experiences among nurses, ranging from no pain or zero pain (15.8%) to severe pain (10.6%), as delineated by ratings on a scale of 0-10. Additionally, 49.8% of the nurses, or 155 individuals, reported experiencing moderate pain.

The data also underscores the profound impact of LBP on daily activities, with 180 nurses (58.4%) reporting limitations imposed by LBP, while 128 nurses (41.6%) did not encounter such activity restrictions.

In summation, the findings underscore the pervasive nature of LBP among nurses and its profound repercussions on workforce productivity and well-being. The detailed breakdown of frequencies and percentages within Table 4 accentuates the imperative for targeted interventions aimed at mitigating LBP within the nursing profession.

**Table 5: Co-morbidity Table on the assessment of prevalence of low back pain among nurses**

| | Test Item | F | % |
|---|---|---|---|
| 1 | Diabetic mellitus | | |
| | Yes | 37 | 12.1% |
| | No | 268 | 87.9% |
| 2 | Cardiovascular disorders | | |
| | Yes | 36 | 11.7% |
| | No | 273 | 88.3% |
| 3 | Anxiety and depressive disorders | | |
| | Yes | 23 | 7.5% |
| | No | 285 | 92.5% |
| 4 | Cigarette smoking | | |
| | Yes | 35 | 11.1% |
| | No | 279 | 88.9% |

Table 5 provides a comprehensive assessment of the prevalence of low back pain (LBP) among nurses concerning various comorbidities and health factors. Through frequencies and percentages, this table offers valuable insights into the prevalence of comorbidities such as diabetes mellitus, cardiovascular disorders, anxiety, depressive disorders, and smoking habits among nurses.

The data reveals that among the surveyed nurses, 37 individuals (12.1%) reported having diabetes mellitus, while the majority, comprising 268 nurses (87.9%), did not report this condition. Similarly, concerning cardiovascular disorders, 36 nurses (11.7%) disclosed they had the condition, while 273 nurses (88.3%) reported no such disorders. These findings shed light on the presence of comorbidity conditions among nurses, underscoring the need for comprehensive health assessments and targeted interventions to address potential risk factors associated with LBP.

Mental health aspects such as anxiety and depressive disorders were also explored. It shows that 23 nurses (7.5%) reported experiencing these disorders, whereas the majority, totaling 285 nurses (92.5%), did not disclose such conditions. This insight into the mental

well-being of nurses is crucial, as mental health can significantly impact physical health outcomes, including the experience and management of LBP. Lastly, the table examines smoking habits among nurses, revealing that 35 individuals (11.1%) reported a history of smoking cigarettes. This finding underscores the importance of lifestyle factors in influencing health outcomes, including the potential exacerbation of LBP symptoms among smokers. Overall, Table 5 provides a nuanced understanding of the health profile and associated risk factors among nurses in relation to LBP.

**Table 6: Activity Table on the assessment of prevalence of low back pain among nurses**

| | Test Item | F | % |
|---|---|---|---|
| 1 | How often do you engage in physical activity lasting 30 minutes per session within a week? | | |
| | - Never | 151 | 48.1% |
| | - Three Times | 123 | 39.2% |
| | - Above Three Times | 40 | 12.7% |
| 2 | How many hours do you work in a week? | | |
| | - Less than 40 hours | 28 | 9.0% |
| | - 40 hours | 147 | 47.1% |
| | - More than 40 hours | 137 | 43.9% |
| 3 | While on duty do you take at least one-hour rest? | | |
| | - Yes | 104 | 33.2% |
| | - No | 207 | 66.1% |
| 4 | Do you exercise to strengthen your low back muscles? | | |
| | - Yes | 144 | 45.9% |
| | - No | 170 | 54.1% |

Table 6 provides a comprehensive assessment of the activity levels and work-related factors influencing prevalence of low back pain (LBP) among nurses. Through frequencies and percentages, this table offers valuable insights into nurses' engagement in physical activity, working hours, rest breaks during duty, and participation in back-strengthening exercises.

The data reveals that a significant proportion of nurses do not engage in regular physical activity, with 151 individuals (48.1%) reporting never engaging in physical activity lasting 30 minutes per session within a week. Conversely, 123 nurses (39.2%) reported engaging in physical activity three times a week, while 40 nurses (12.7%) reported engaging in physical activity more than three times a week. This highlights a potential area for improvement in promoting physical activity among nurses to mitigate the risk of LBP and enhance overall health and well-being.

Regarding working hours, the majority of nurses reported working a standard 40-hour week, with 147 nurses (47.1%) falling into this category. However, a notable proportion of nurses reported working more than 40 hours per week, totaling 137 individuals (43.9%). This finding raises concerns about potential work-related factors contributing to LBP, such as prolonged sitting or heavy lifting, which may be more prevalent among nurses working longer hours.

Another significant finding relates to rest breaks during duty, with only 104 nurses (33.2%) reporting taking at least one-hour rest while on duty. In contrast, a substantial majority of nurses, totaling 207 individuals (66.1%), reported not taking any rest breaks during duty. This highlights a potential area for organizational intervention to promote rest breaks and alleviate the physical strain associated with prolonged periods of activity.

Lastly, the data shows that a considerable proportion of nurses do not actively participate in exercises to strengthen their low back muscles, with 170 individuals (54.1%) reporting no engagement in such exercises. Conversely, 144 nurses (45.9%) reported exercising to strengthen their low back muscles. This underscores the importance of promoting preventive measures, such as regular exercise and ergonomic practices, to reduce the risk of LBP among nurses.

Overall, Table 6 provides valuable insights into the activity levels and nurse-related factors influencing the incidence of LBP among nurses. The frequencies and percentages presented underscore the importance of promoting physical activity, optimizing working conditions, promoting rest breaks, and encouraging back-strengthening exercises to mitigate the risk of LBP and promote the overall health and well-being of nurses in the workplace.

**Table 7: Summary Statistics on experience of low back pain related to nursing duties**

| | | | Have you experienced low back pain related to your nursing duties? | |
|---|---|---|---|---|
| **Variable** | | | **Yes** | **No** |
| Age in years | 21 - 30 | F | 120 | 48 |
| | | % | 71.4% | 28.6% |
| | 31 - 40 | F | 2 | 0 |
| | | % | 100.0% | 0.0% |
| | 41 - 50 | F | 124 | 16 |
| | | % | 88.6% | 11.4% |
| | 51 - 60 | F | 3 | 0 |
| | | % | 100.0% | 0.0% |
| Gender | Male | F | 53 | 27 |
| | | % | 66.3% | 33.7% |
| | Female | F | 193 | 37 |
| | | % | 83.9% | 16.1% |
| Working Experience in years | Below 1. | F | 20 | 16 |
| | | % | 55.6% | 44.4% |
| | 1-5 | F | 50 | 25 |
| | | % | 66.7% | 33.3% |
| | 6-10 | F | 46 | 9 |
| | | % | 83.6% | 16.4% |
| | 11 and above | F | 131 | 13 |
| | | % | 91.0% | 9.0% |
| Current deployment | Accident/emergency | F | 21 | 4 |
| | | % | 84.0% | 16.0% |
| | Maternity | F | 60 | 11 |
| | | % | 84.5% | 15.5% |
| | ICU | F | 9 | 4 |
| | | % | 69.2% | 30.8% |
| | Operating theatres | F | 26 | 6 |

| | | | | |
|---|---|---|---|---|
| | | % | 81.3% | 18.8% |
| | Outpatient | F | 34 | 6 |
| | | % | 85.0% | 15.0% |
| | Medical/ surgical | F | 41 | 11 |
| | wards | % | 78.8% | 21.2% |
| | Paediatrics | F | 22 | 8 |
| | | % | 73.3% | 26.7% |
| | Others | F | 34 | 14 |
| | | % | 70.8% | 29.2% |
| BMI | below 18.5 kg/m | F | 18 | 0 |
| | | % | 100.0% | 0.0% |
| | between 18.6- | F | 117 | 47 |
| | 24.9kg/m | % | 71.3% | 28.7% |
| | between 25 - 29 five | F | 81 | 11 |
| | kg/m | % | 88.0% | 12.0% |
| | above and 30kg/m | F | 29 | 1 |
| | | % | 96.7% | 3.3% |
| Diabetic mellitus | Yes | F | 30 | 5 |
| | | % | 85.7% | 14.3% |
| | No | F | 211 | 57 |
| | | % | 78.7% | 21.3% |
| Cardiovascular | Yes | F | 30 | 4 |
| disorders. | | % | 88.2% | 11.8% |
| | No | F | 215 | 58 |
| | | % | 78.8% | 21.2% |
| Smoked | Yes | F | 24 | 11 |
| | | % | 68.6% | 31.4% |
| | No | F | 224 | 53 |
| | | % | 80.9% | 19.1% |

The data indicates various levels of low back pain experienced by nurses related to their duties, categorized by age, gender, working experience, current deployment, BMI, diabetic mellitus status, cardiovascular disorders, and smoking status. Among nurses aged 21-30 years, 71.4% reported experiencing low back pain. This figure dramatically increases to 100.0% for those aged 31-40 years and 51-60 years, though it's worth noting that the sample sizes for these groups are very small (2 and 3 respondents, respectively). For nurses aged 41-50 years, the percentage is 88.6%.

Gender-wise, 66.3% of male nurses and 83.9% of female nurses reported low back pain. Regarding working experience, 55.6% of those with 1 year and below, 66.7% of those with 1-5 years, 83.6% of those with 6-10 years, and 91.0% of those with over 11 years of experience reported low back pain. When considering current deployment, the percentages vary slightly: 84.0% in Accident and Emergency, 84.5% in Maternity, 69.2% in ICU, 81.3% in Operating Theatres, 85.0% in Outpatient, 78.8% in Medical/Surgical Wards, 73.3% in Pediatrics, and 70.8% in other departments reported low back pain.

Regarding BMI, 100.0% of nurses with a BMI below 18.5 kg/m² reported experiencing low back pain, though the sample size is small. For those with a BMI between 18.6-24.9 kg/m², 71.3% reported pain. This percentage increases to 88.0% for a BMI between 25-29.9 kg/m², and 96.7% for those with a BMI above 30 kg/m². Diabetic status shows 85.7% of diabetic nurses and 78.7% of non-diabetic nurses reported low back pain. For cardiovascular disorders, 88.2% of those with the condition and 78.8% of those without it reported pain. Lastly, 68.6% of nurses who smoked and 80.9% of non-smokers reported experiencing low back pain.

The most affected groups with the highest percentage of "Yes" responses include nurses aged 31-40 years and 51-60 years, both with 100.0%, although their sample sizes are very small. Nurses with a BMI below 18.5 kg/m² also reported 100.0% low back pain, but again, with a small sample size. More consistently affected groups with larger sample sizes include nurses with over 11 years of experience (91.0%), those with a BMI above 30 kg/m² (96.7%), nurses aged 41-50 years (88.6%), and female nurses (83.9%).

### 4.5.2 Inferential Analysis on assessment of prevalence of low back pain among nurses

Table 8 presents the results of one-sample tests conducted on various aspects of the assessment of low back pain among nurses to test the statistical relationship on low back

pain among nurses. Each test item is analyzed against a test value of 0, indicating no presence or effect. The table includes statistics such as t-values, degrees of freedom (df), and significance levels (Sig.) for each test, along with mean differences and confidence intervals.

**Table 8: One sample Test on assessment of prevalence of low back pain among nurses**

| One-Sample Test | | | | | | |
|---|---|---|---|---|---|---|
| | Test Value = 0 | | | | | |
| | | | | | 95% Confidence Interval of the Difference | |
| **Test Item** | **T** | **Df** | **Sig. (2-tailed)** | **Mean Difference** | **Lower** | **Upper** |
| Experienced low back pain related to nursing duties | 52.751 | 312 | .000 | 1.204 | 1.16 | 1.25 |
| Treated for low back pain for the last three months. | 55.476 | 306 | .000 | 1.570 | 1.51 | 1.63 |
| If yes, absent from duty for more than 3 days due to low back pain in the last three months. | 53.288 | 226 | .000 | 1.683 | 1.62 | 1.75 |
| On a Scale of 0-10, rating the LBP being experienced. | 51.077 | 310 | .000 | 2.553 | 2.45 | 2.65 |
| Spreading of LBP down the leg at some time in the last 2 weeks. | 55.638 | 307 | .000 | 1.571 | 1.52 | 1.63 |
| LBP limiting activity. | 50.329 | 307 | .000 | 1.416 | 1.36 | 1.47 |
| Feeling LBP may not get better due to pain. | 61.400 | 306 | .000 | 1.661 | 1.61 | 1.71 |
| LBP extremely troublesome in the last 2weeks. | 67.784 | 306 | .000 | 1.736 | 1.69 | 1.79 |
| BMI. | 56.660 | 303 | .000 | 2.441 | 2.36 | 2.53 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Diabetic mellitus | 100.328 | 304 | .000 | 1.879 | 1.84 | 1.92 |
| Cardiovascular disorders. | 103.030 | 308 | .000 | 1.883 | 1.85 | 1.92 |
| Anxiety and depressive disorders. | 128.333 | 307 | .000 | 1.925 | 1.90 | 1.95 |
| Cigarette smoking | 106.167 | 313 | .000 | 1.889 | 1.85 | 1.92 |
| Engaging in physical activity lasting 30 minutes per session within a week. | 20.212 | 313 | .000 | 1.742 | 1.57 | 1.91 |
| Working more than 40 hours in a week. | 64.959 | 311 | .000 | 2.349 | 2.28 | 2.42 |
| Taking at least one-hour rest while on duty. | 24.668 | 312 | .000 | 1.735 | 1.60 | 1.87 |
| Exercising to strengthen low back muscles | 54.728 | 313 | .000 | 1.541 | 1.49 | 1.60 |

The significance level (Sig.) for all test items is reported as .000, indicating statistical significance at the $p < .05$ level. This implies that the mean differences observed for each test item are unlikely to have occurred by chance, suggesting a meaningful association between the assessed factors and the incidence of low back pain among nurses.

The mean differences and confidence intervals provide additional insights into the magnitude and direction of the observed effects. For instance, significant mean differences are observed in responses related to experiencing low back pain, being treated for low back pain, absence from duty due to low back pain, pain severity, symptom presence, activity limitation, perceived recovery prospects, health conditions such as BMI, diabetes mellitus, cardiovascular disorders, anxiety and depressive disorders, smoking habits, physical activity levels, working hours, rest breaks, and engagement in back-strengthening exercises.

Overall, the results from Table 8 suggest that various factors, including personal characteristics, lifestyle habits and health conditions, are significantly associated with the incidence and impact of low back pain among nurses. These findings have important implications for the study, highlighting the multifactorial nature of low back pain and informing targeted interventions aimed at reducing its prevalence and mitigating its adverse effects on nurses' health and well-being.

### 4.6 Identification of the individual-related factors predisposing nurses to low back pain at level 5 Hospitals in Kiambu county

The second objective was to determine the identification of the nurse related factors predisposing nurses to low back pain at level 5 Hospitals in Kiambu county and the study finding and results were presented into two parts which comprised of descriptive analysis and inferential analysis as provided in subheading below;

### 4.6.1 Descriptive Analysis on the identification of individual-related factors predisposing nurses to low back pain at level 5 Hospitals in Kiambu county

**Table 9: Nurses Responses on identification of individual-related factors predisposing nurses to low back pain**

| | Always | | Sometimes | | Never | |
|---|---|---|---|---|---|---|
| **Test Item** | **F** | **%** | **F** | **%** | **F** | **%** |
| Ask for assistance while turning or lifting a patient. | 91 | 29.0% | 208 | 66.2% | 15 | 4.8% |
| Adjust the bed to the appropriate level when performing procedure. | 101 | 32.2% | 157 | 50.0% | 56 | 17.8% |
| Unlock the wheels of bed/trolley when transferring patients | 246 | 78.3% | 44 | 14.0% | 23 | 7.3% |
| Put your feet apart to maintain a stable base while lifting patients. | 135 | 43.0% | 151 | 48.1% | 28 | 8.9% |
| Take rest on a comfortable chair during your working hours to rest your back. | 61 | 19.4% | 157 | 50.0% | 96 | 30.6% |
| Put patient directly in front of you before lifting to avoid rotation of spine | 153 | 48.7% | 130 | 41.4% | 31 | 9.9% |
| Discuss low back health with your colleagues or supervisor. | 59 | 18.8% | 137 | 43.6% | 118 | 37.6% |
| Take a balanced diet at least one meal while on duty? | 66 | 21.0% | 113 | 36.0% | 135 | 43.0% |

Table 9 presents nurses' responses regarding the identification of individual-related factors predisposing them to low back pain. The responses are categorized into three levels: "Always," "Sometimes," and "Never," providing insights into the frequency with

which nurses engage in certain behaviors or practices that may contribute to low back pain. The test items cover various aspects of nursing practices and behaviors related to back health and injury prevention.

The analysis reveals notable trends in nurses' behaviors and practices related to low back pain prevention. For instance, while a significant proportion of nurses reported always unlocking the wheels of the bed/trolley when transferring patients (78.3%) and sometimes adjusting the bed to the appropriate level during procedures (50.0%), indicating a general awareness of ergonomic principles, fewer nurses reported always asking for assistance while turning or lifting a patient (29.0%). Similarly, while a substantial percentage of respondents reported sometimes putting their feet apart to maintain a stable base while lifting patients (48.1%), suggesting some adherence to proper lifting techniques, a relatively small proportion reported always discussing low back health with colleagues or supervisors (18.8%). Additionally, a notable proportion of nurses reported sometimes taking rest on a comfortable chair during working hours to rest their back (50.0%), indicating an opportunity for improvement in self-care practices.

### 4.6.2 Inferential Analysis on the identification of the individual-related factors predisposing nurses to low back pain at level 5 Hospitals in Kiambu county.

To check whether there was statistical relationship among individual related factors predisposing nurses to low back pain at level 5 Hospitals in Kiambu county the study used performed linear regression and it was presented in 3 tables which comprised of model summary, One-way ANOVA summary and multiple linear regression.

**Table 10: Model Summary on the identification of individual-related factors predisposing nurses to low back pain**

| Model Summary | | | | |
|---|---|---|---|---|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
| 1 | .779[a] | .732 | .613 | .5665278 |

Table 10 presents the model summary statistics for the identification of individual- related factors predisposing nurses to low back pain. The model summary provides key information about the overall performance and goodness of fit of the regression model used in the analysis.

The correlation coefficient (R) of .779 indicates a strong positive correlation between nurse-related factors and low back pain, suggesting that these factors are significantly associated with the occurrence of low back pain among nurses. The coefficient of determination (R Square) at .732 signifies that approximately 73.2% of the variance in low back pain can be explained by the nurse-related factors included in the model, indicating a substantial degree of explanatory power. The adjusted R Square value of .613 adjusts for the number of predictor variables and sample size, providing a more conservative estimate of the model's goodness of fit.

**Table 11: One-way ANOVA Summary on the identification of the individual related factors predisposing nurses to low back pain**

| ANOVA[a] | | | | | | |
|---|---|---|---|---|---|---|
| **Model** | | **Sum of Squares** | **Df** | **Mean Square** | **F** | **Sig.** |
| 1 | Regression | 3.215 | 9 | .357 | 1.113 | .003[b] |
| | Residual | 97.570 | 304 | .321 | | |
| | Total | 100.785 | 313 | | | |

Table 11 presents one-way ANOVA summary for evaluating the significance of the regression model used to identify individual related factors predisposing nurses to low

back pain. The Regression component assesses the variance in low back pain explained by the predictor variables (individual- related factors), with a sum of squares of 3.215 and 9 degrees of freedom. The mean square for this component is calculated as .357. The F-value of 1.113 indicates the ratio of the variance explained by the regression model to the unexplained variance. The significant value (Sig.) of .003 indicates that the regression model is statistically significant, suggesting that individual- related factors included in the model significantly contribute to explaining low back pain among nurses hence the ANOVA summary indicated a valuable insight into the significance of the regression model in understanding the relationship between individual- related factors and low back pain among nurses. Hence the study findings rejected null hypothesis 1, since there was a statistical significance between individual related factors and low back pain.

Identification of individual- related factors predisposing nurses to low back pain involves understanding various aspects of nursing practice and its impact on physical health. Several factors contribute to the development of low back pain among nurses, including ergonomic challenges, workload, patient handling, and individual characteristics. Ergonomic challenges play a significant role in causing low back pain among nurses.

**Table 12: Regression Summary on the identification of individual-related factors predisposing nurses to low back pain**

| Model | | Coefficients[a] Unstandardized Coefficients | | Standardized Coefficients | | |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | T | Sig. |
| 1 | (Constant) | 2.081 | .177 | | 11.752 | .000 |
| | Ask for assistance while turning or lifting a patient. | .007 | .069 | .006 | .099 | .000 |
| | Adjust the bed to the appropriate level when performing procedure. | .006 | .053 | .008 | .122 | .000 |
| | Unlock the wheels of bed/trolley when transferring patients | -.038 | .059 | -.041 | -.643 | .000 |
| | Put your feet apart to maintain a stable base while lifting patients. | -.085 | .056 | -.096 | -1.534 | .000 |
| | Take rest on a comfortable chair during your working hours to rest your back. | .080 | .056 | .099 | 1.446 | .000 |
| | Put patient directly in front of you before lifting to avoid rotation of spine | -.002 | .054 | -.002 | -.032 | .000 |
| | Discuss low back health with your colleagues or supervisor. | -.098 | .052 | -.125 | -1.864 | .000 |
| | Take a balanced diet at least one meal while on duty? | .045 | .052 | .061 | .865 | .000 |

Table 12 provides a regression summary for the identification of individual related factors predisposing nurses to low back pain. The table displays coefficients associated with each

predictor variable, including unstandardized coefficients (B), standard errors of the coefficients, standardized coefficients (Beta), t-values, and significance levels (Sig.).

The regression analysis reveals significant associations between various individual-related factors and low back pain among nurses. Firstly, the constant term provides a baseline expectation of low back pain when all predictor variables are absent, showing a statistically significant intercept of 2.081 ($p < .001$). Notably, "Take rest on a comfortable chair during your working hours to rest your back" exhibits a positive coefficient ($B = .080$, $p < .001$), implying that this practice is linked with increased low back pain. Conversely, "Unlock the wheels of bed/trolley when transferring patients" demonstrates a negative coefficient ($B = -.038$, $p < .001$), suggesting a potential protective effect against low back pain when adhered to. Additionally, "Ask for assistance while turning or lifting a patient," "Put your feet apart to maintain a stable base while lifting patients," and "Discuss low back health with your colleagues or supervisor" also reveal significant associations with low back pain. These findings underscore the importance of workplace practices and behaviors in influencing the occurrence of low back pain among nurses, highlighting potential areas for intervention and preventive measures to mitigate the risk of low back pain in this population.

From the regression summary a regression equation can be formulated and represented as below; which can be used to predict whether a nurse have nurse related factors predisposing nurses to low back pain.

$$Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \beta_6 x_6 + \beta_7 x_7 + \beta_8 x_8 + \beta_9 x_9 + \varepsilon$$

$$Y = 2.081 + 0.007x_1 + 0.006x_2 - 0.038x_3 - 0.085x_4 + 0.080x_5 - 0.002x_6 - 0.098x_7 + 0.018x_8 + 0.045x_9 + \varepsilon$$

Where;

Y = Low Back Pain

x1 = Ask for assistance while turning or lifting a patient.

x2 = Adjust the bed to the appropriate level when performing procedure.

x3 = Unlock the wheels of bed/trolley when transferring patients

x4 = Put your feet apart to maintain a stable base while lifting patients.

x5 = Take rest on a comfortable chair during your working hours to rest your back.

x6 = Put patient directly in front of you before lifting to avoid rotation of spine

x7 = Discuss low back health with your colleagues or supervisor.

X8 = Take a balanced diet at least one meal while on duty?

In conclusion, identifying individual-related factors predisposing nurses to low back pain requires consideration of ergonomic challenges, workload, and individual characteristics. Addressing these factors through ergonomic interventions, workload management strategies, and promoting individual health and fitness can help mitigate the risk of low back pain among nurses for all parameters that had positive correlation.

### 4.7 Determination of the health facility related factors predisposing nurses to low back pain at level 5 Hospitals in Kiambu county.

The third objective was to determine heath facility related factors predisposing nurses to low back pain at level 5 Hospitals in Kiambu county and the study results were presented in two formats descriptive analysis and inferential analysis.

#### 4.7.1 Descriptive Analysis on determination of health facility related factors predisposing nurses to low back pain

Table 13 illustrates nurses' ratings on the determination of health facility related factors predisposing nurses to low back pain. Each test item is accompanied by the frequency (F) and percentage (%), categorized into four response options: Strongly agree (SA), Agree (A), Disagree (D), and Strongly disagree (SD).

**Table 13: Nurses Rating on determination of health facility related factors predisposing nurses to low back pain**

| | SA | | A | | D | | SD | |
|---|---|---|---|---|---|---|---|---|
| **Test Item** | **F** | **%** | **F** | **%** | **F** | **%** | **F** | **%** |
| Policies and guidelines for low back care are important. | 257 | 81.6% | 36 | 11.4% | 9 | 2.9% | 13 | 4.1% |
| Policies and guidelines on low back care are available to all nursing staff | 28 | 8.9% | 54 | 17.1% | 120 | 38.1% | 113 | 35.9% |
| Standard operating procedures for lifting and transferring patients are available in my department | 31 | 9.9% | 49 | 15.6% | 112 | 35.7% | 122 | 38.9% |
| Lifts for transferring patients from one floor to another are working. | 43 | 13.7% | 85 | 27.0% | 118 | 37.5% | 69 | 21.9% |
| Most of the hospital beds are adjustable. | 59 | 18.7% | 89 | 28.2% | 135 | 42.7% | 33 | 10.4% |
| I can easily get assistance when I need to lift a patient. | 42 | 13.3% | 97 | 30.7% | 135 | 42.7% | 42 | 13.3% |
| When documenting, I can easily find a comfortable chair and table | 48 | 15.2% | 90 | 28.5% | 135 | 42.7% | 43 | 13.6% |
| I can easily access a balanced diet while am on duty’ | 23 | 7.3% | 62 | 19.7% | 110 | 34.9% | 120 | 38.1% |
| I have the skills of promoting low back pain prevention behavior. | 47 | 14.9% | 116 | 36.8% | 114 | 36.2% | 38 | 12.1% |
| My facility devotes some times for doing low back pain prevention behaviours | 15 | 4.7% | 22 | 7.0% | 108 | 34.2% | 171 | 54.1% |
| Lifting assistive devices are available for use in my facility. | 18 | 5.7% | 41 | 13.0% | 73 | 23.1% | 184 | 58.2% |
| My facility advocate and assign nursing duties for not more than 40 hours per week. | 53 | 16.8% | 84 | 26.6% | 75 | 23.7% | 104 | 32.9% |

A significant majority (81.6%) of nurses strongly agree on the importance of having policies and guidelines for low back care, emphasizing the recognition of structured protocols for maintaining low back health. However, a notably smaller proportion (11.4%) merely agrees with this sentiment, suggesting potential discrepancies in the perceived necessity or efficacy of such guidelines. Conversely, concerning the actual

availability of these policies and guidelines to all nursing staff, the response is considerably less positive. Only 8.9% strongly agree, indicating a lack of widespread access, while a significant portion (38.1%) disagrees with their availability, highlighting a potential gap in implementation or dissemination.

Similarly, dissatisfaction is expressed regarding the accessibility of standard operating procedures (SOPs) for lifting and transferring patients. A considerable percentage of nurses (35.7%) disagree, and an additional 38.9% strongly disagree with the accessibility of SOPs. This indicates potential challenges in accessing crucial protocols designed to mitigate the risk of low back injuries during patient handling. The mixed responses regarding the functionality of lifts for patient transfer further underscore the variability in experiences among nurses. While 13.7% strongly agree that the lifts are operational, a substantial proportion (37.5%) disagrees, suggesting inconsistencies in equipment maintenance or availability.

Opinions also diverge regarding the availability of adjustable hospital beds, which play a significant role in facilitating ergonomic patient care practices. While 18.7% strongly agree with their availability, a substantial portion (42.7%) disagrees, indicating potential limitations in providing optimal patient care environments. Additionally, the challenges in obtaining assistance when lifting patients are evident, with only 13.3% strongly agreeing on the ease of obtaining assistance, while 42.7% disagree, suggesting potential gaps in staffing or support systems.

Lastly, concerning dietary access while on duty, only a small fraction (7.3%) strongly agree that they can access a balanced diet, contrasting sharply with the 38.1% who strongly disagree. This highlights potential barriers to maintaining proper nutrition during working hours, which can impact overall health and potentially exacerbate the risk of musculoskeletal injuries like low back pain. Overall, the analysis underscores the

multifaceted nature of factors influencing low back pain among nurses, suggesting areas for improvement in policy implementation, resource allocation, and support systems within healthcare facilities.

### 4.7.2 Inferential Analysis on determination of health facility related factors predisposing nurses to low back pain

A chi-square test was performed to determine the statistical relationship on the determination of health facility related factors predisposing nurses to low back pain and Posterior Distribution Characterization for One-Sample Mean was performed to show the variation of probability of back pain among the nurses and the results were presented as below;

**Table 14: Chi square test on determinants of health facility related factors predisposing nurses to low back pain**

**Chi-Square Tests**

| | Value | Df | Asymptotic Significance (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 36.000[a] | 304 | .015 |
| Likelihood Ratio | 12.811 | 304 | 1.000 |
| Linear-by-Linear Association | 1.242 | 1 | .025 |
| N of Valid Cases | 316 | | |

Table 14 presents the results of the Chi-square test conducted to analyze the association between health facility-related factors and the predisposition of nurses to low back pain. The Pearson Chi-Square value of 36.000, with 304 degrees of freedom, yields an asymptotic significance of 0.015. This signifies a statistically significant association between the variables at a significance level of 0.05. Therefore, null hypothesis 2 was rejected since there was a significant statistical relationship between health facility related factors and low bac pain. Conversely, the Likelihood Ratio test, with a value of 12.811 and a significance of 1.000, does not reveal any substantial difference between observed

and expected frequencies. Since there was enough evidence the study decided to determine posterior distribution characterization for one-sample mean on determination of health facility related factors predisposing nurses to low back pain and results were presented as below;

**Table 15: Posterior Distribution Characterization for One-Sample Mean on determination of health facility related factors predisposing nurses to low back pain**

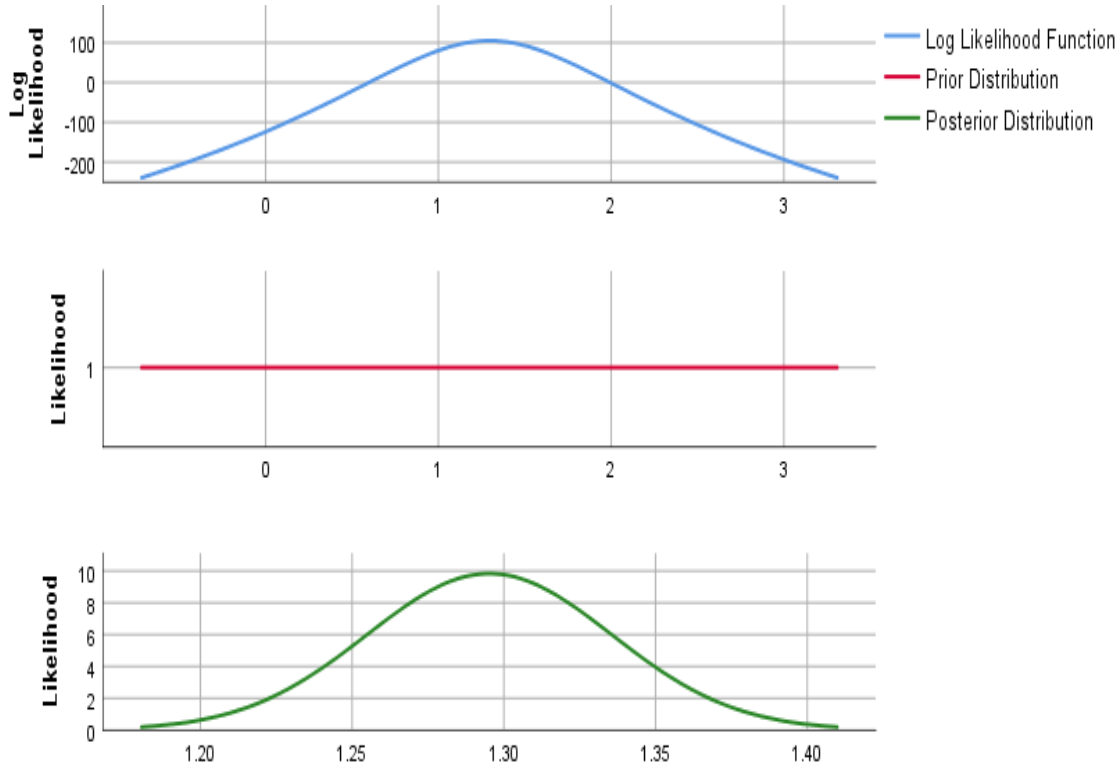
| Posterior Distribution Characterization for One-Sample Mean | | | | | | |
|---|---|---|---|---|---|---|
| | | Posterior | | | 95% Credible Interval | |
| | N | Mode | Mean | Variance | Lower Bound | Upper Bound |
| Policies and guidelines for low back care are important. | 315 | 1.30 | 1.30 | .002 | 1.22 | 1.38 |
| Policies and guidelines on low back care are available to all nursing staff | 315 | 3.01 | 3.01 | .003 | 2.90 | 3.11 |
| Standard operating procedures for lifting and transferring patients are available in my department | 314 | 3.04 | 3.04 | .003 | 2.93 | 3.14 |
| Lifts for transferring patients from one floor to another are working. | 315 | 2.68 | 2.68 | .003 | 2.57 | 2.78 |
| Most of the hospital beds are adjustable. | 316 | 2.45 | 2.45 | .003 | 2.35 | 2.55 |
| I can easily get assistance when I need to lift a patient. | 316 | 2.56 | 2.56 | .003 | 2.46 | 2.66 |
| When documenting, I can easily find a comfortable chair and table | 316 | 2.55 | 2.55 | .003 | 2.45 | 2.65 |
| I can easily access a balanced diet while am on duty’ | 315 | 3.04 | 3.04 | .003 | 2.93 | 3.14 |
| I have the skills of promoting low back pain prevention behavior. | 315 | 2.45 | 2.45 | .003 | 2.36 | 2.55 |
| My facility devotes some times for doing low back pain prevention behaviors | 316 | 3.38 | 3.38 | .002 | 3.29 | 3.47 |
| Lifting assistive devices are available for use in my facility. | 316 | 3.34 | 3.34 | .003 | 3.24 | 3.44 |
| My facility advocate and assign nursing duties for not more than 40 hours per week. | 316 | 2.73 | 2.73 | .004 | 2.61 | 2.85 |

The table 15 presents the posterior distribution characterization for one-sample mean estimates regarding various factors related to low back pain among nurses. Each factor was assessed based on its posterior mode, mean, variance, and a 95% credible interval. The mode represents the most probable value of the parameter, while the mean indicates the average estimate. Variance reflects the dispersion or variability of the estimates. The 95% credible interval provides a range within which the true value of the parameter is likely to lie with 95% probability.

For instance, concerning the importance of policies and guidelines for low back care, the posterior mode and mean are both estimated to be 1.30, with a small variance of 0.002. The 95% credible interval ranges from 1.22 to 1.38. This suggests a high level of agreement among respondents regarding the importance of these policies, with minimal uncertainty in the estimation.

Similarly, for the availability of policies and guidelines on low back care to all nursing staff, the posterior mode and mean are estimated to be 3.01, with a variance of 0.003. The 95% credible interval ranges from 2.90 to 3.11, indicating a relatively high level of agreement among respondents, albeit with slightly more variability compared to the previous factor.

**Figure 2: Bayesian analysis mean on determination of health facility related factors predisposing nurses to low back pain**




**Mean on determination of health facility related factors predisposing nurses to low back pain**

According to figure 2 above, it indicates a same pattern on factors that determine health facility related factors predisposing nurses to low back pain, with estimates provided for each parameter, indicating the level of agreement or disagreement among nurses regarding various aspects related to low back pain prevention and management within their facilities.

### 4.8 Discussion of findings

#### 4.8.1 Prevalence of low back pain among nurses working in level hospital in Kiambu county

The incidence of LBP related to nursing duties emerges prominently, with 249 nurses, comprising 79.6% of the sample, reporting experiences of LBP attributable to their work

responsibilities. These findings are similar to a study done in Saudi Arabia, where the incidence of LBP was found to be 82.9% among nurses. Conversely, 64 nurses (20.4%) conveyed no instances of LBP in connection with their duties. (Almaghrabi *et al.,* 2021) The study showed a significant concern, with 42 nurses (31.8%) disclosing absenteeism exceeding three days due to LBP within the last three months. A similar study done in Ethiopia found similar findings where 35.5% of nurses reported being off duty for more than three days due to LBP (Tefera *et al*.,2021).

Similarly, Smith *et al.* (2018) found that LBP was a common occupational health problem among nurses in China, leading to high rates of absenteeism and reduced work performance, with many nurses reporting moderate to severe pain levels that affected their ability to perform job-related tasks.

**4.8.2 Individual- related factors Associated with LBP among nurses working in level 5 hospital in Kiambu county**

The study conducted in Kiambu level 5 hospitals revealed that among the surveyed nurses, 37 individuals (12.1%) reported having diabetes mellitus, while the majority, comprising 268 nurses (87.9%), did not report this condition. Similarly, concerning cardiovascular disorders, 36 nurses (11.7%) disclosed they had the condition, while 273 nurses (88.3%) reported no such disorders. These findings shed light on the presence of comorbidity conditions among nurses, underscoring the need for comprehensive health assessments and targeted interventions to address potential risk factors associated with LBP. These findings are consistent with other studies that have examined the impact of comorbidities and lifestyle factors on the prevalence of LBP among healthcare professionals. Shahid *et al*, (2021) found that comorbid conditions such as diabetes and cardiovascular disorders were significant predictors of LBP among nurses, due to

increased cholesterol levels which leads to calcifying lesions of the blood vessels. This emphasizes the importance of managing these health issues to prevent LBP.

Additionally, a study by Kazemi *et al.* (2022) highlighted the correlation between mental health disorders, such as anxiety and depression, and the increased risk of LBP, suggesting that mental well-being plays a crucial role in the overall health of nurses. The association between smoking and LBP has also been well-documented. According to Nkhata (2020), smoking is a significant risk factor for the development of LBP, as it can impair blood flow and reduce nutrient supply to the spine, thereby exacerbating pain symptoms. This aligns with the findings in this study, which indicate a notable percentage of nurses with a history of smoking.

The results from analyzed data on individual factors suggest that various factors, including personal characteristics, lifestyle habits and health conditions, are significantly associated with the prevalence of LBP among nurses at reported 79.6%. This is similar to a study by S Sikiru & Hanifa, (2016) which found LBP presently and within the last 12 months on 300 respondents at 73.53%. A notable portion of nurses being underweight or obese underscores the role of BMI in exacerbating LBP risk. The study also highlights the profound impact of LBP on work performance, with implications ranging from absenteeism to intentions of leaving the nursing profession. These findings underscore the urgent need for interventions targeting LBP prevention and management, including promoting exercise regimens and ergonomic practices tailored to the unique demands of nursing duties.

Similarly addressing systemic factors contributing to workplace stress and ergonomic hazards is imperative to ensure the well-being and retention of nursing staff as reported by Abebe A.D (2015). Overall, the study underscores the complex interplay of individual and organizational factors in shaping the prevalence and impact of LBP among nurses,

emphasizing the importance of comprehensive strategies to safeguard the health and productivity of this vital workforce.

One Way ANOVA summary indicated a valuable insight into the significance of the regression model in understanding the relationship between individual-related factors and low back pain among nurses with a significant value (Sig.) of .003, meaning that the assessed factors on the model were significantly associated with LBP. These findings are similar to a study done Smith *et al*. (2019), Which concluded that several factors contributing to the development of low back pain among nurses, including ergonomic challenges, workload, patient handling, and individual characteristics. Improper workstation setups, such as poorly designed chairs or desks, which can lead to awkward postures and strain on the lower back. Additionally, repetitive movements and prolonged standing or sitting without adequate breaks can exacerbate the risk of low back pain.

Yassi *et al*.(2018) had the same findings in his study which indicated that nurses often face heavy workloads, which may require them to lift and transfer patients frequently. Manual handling of patients, particularly those who are obese and critically ill, can put immense strain on the back muscles and lead to injuries. Furthermore, long working hours and shift work contribute to fatigue, which can compromise posture and increase susceptibility to LBP.

The study done at Kiambu county level five hospitals found that 71.4% of nurses who reported experiencing low back pain were aged between 21-30 years, this figure dramatically increased to 100.0% for those aged 31-40 years and 51-60 years while those aged 41-50 years reported LBP at 88.6%. These findings were similar to a study by Astita, *et al*. (2018) which found older nurses experiencing more frequent and severe back pain due to age-related changes in musculoskeletal health.

### 4.8.3. Determinants of health facility related factors associated with low back pain among nurse working in level 5 Hospitals in Kiambu county.

On health facility related factors, a significant majority (81.6%) of nurses strongly agree on the importance of having policies and guidelines for low back care, emphasizing the recognition of structured protocols for maintaining low back health.

These findings are consistent with other studies that have examined the impact of workplace policies, equipment availability, and support systems on the incidence of low back pain (LBP) among healthcare professionals. For example, Boughattas (2017) emphasized the importance of organizational policies and support systems in managing and preventing LBP. The study indicated that the presence of clear guidelines and the availability of supportive equipment, such as adjustable hospital beds and lifts, were critical in mitigating LBP. The study also pointed out that insufficient access to these resources could lead to higher rates of low back injuries.

Concerning dietary access while on duty, only a small fraction (7.3%) strongly agree that they can access a balanced diet, contrasting sharply with the 38.1% who strongly disagree. This highlights potential barriers to maintaining proper nutrition during working hours, which can impact overall health and potentially exacerbate the risk of musculoskeletal injuries like low back pain. A similar study on importance of proper nutrition and adequate rest breaks found that nurses who had better access to nutritious meals and regular rest breaks reported lower levels of LBP. This study suggested that workplace interventions aimed at improving dietary options and promoting regular rest periods could significantly enhance overall health and reduce the risk of LBP among nursing staff. The study found that amino acids leads to reduction of neurotransmitters, therefore reducing pain. Nurses should at least access a balanced diet at least once while on duty (Pasdar *et al*,.2022).

Concerning the importance of policies and guidelines for low back care, the posterior mode and mean are both estimated to be 1.30, with a small variance of 0.002. The 95% credible interval ranges from 1.22 to 1.38. This suggests a high level of agreement among respondents regarding the importance of these policies, with minimal uncertainty in the estimation. These findings are similar to a study done and found that factors predisposing nurses to low back pain is a critical aspect of ensuring the occupational health and well-being of nursing staff is safeguarded by availing policies and guidelines, highlighting various environmental and organizational factors within healthcare facilities that contribute to the prevalence of low back pain among nurses. These factors encompass ergonomic design, work processes, workload, equipment availability, and workplace culture. (Shubrandu *et al*,.2017)

Opinions also diverge regarding the availability of adjustable hospital beds, which play a significant role in facilitating ergonomic patient care practices for this study. While 18.7% strongly agree with their availability, a substantial portion (42.7%) disagrees, indicating potential limitations in providing optimal patient care environments. Additionally, the challenges in obtaining assistance when lifting patients are evident, with only 13.3% strongly agreeing on the ease of obtaining assistance, while 42.7% disagree, suggesting potential gaps in staffing or support systems. These findings are similar to a study which indicated that heavy lifting or transferring patients without proper assistive devices or techniques can place excessive strain on the lower back, leading to acute or chronic injuries Moreover, long work hours and insufficient rest breaks can contribute to fatigue, which further compromises nurses' ability to maintain proper body mechanics and increases their susceptibility to low back pain (Schoefisch *et al*,.2019).

Similar findings were documented on a study where 89.7% of nurses were not using assistive devices either due to inadequate access to such equipment or reluctance to use

them due to time constraints or perceived inefficiency undermining their potential benefits. Almaghrabi *et al* (2020)

The Kiambu county level 5 hospitals study study found that 13.7% of the nurses strongly agree that the lifts are operational, a substantial proportion (37.5%) disagrees, suggesting inconsistencies in equipment maintenance or availability. Opinions also diverge regarding the availability of adjustable hospital beds, which play a significant role in facilitating ergonomic patient care practices. It was evident from the study that 18.7% strongly agreed with their availability, a substantial portion (42.7%) disagrees, indicating potential limitations in providing optimal patient care environments. Additionally, the challenges in obtaining assistance when lifting patients were evident, with only 13.3% strongly agreeing on the ease of obtaining assistance, while 42.7% disagree, suggesting potential gaps in staffing or support systems. The findings were similar to a study done by Seo (2020) indicating processes within healthcare facilities can also influence the occurrence of low back pain among nurses. Staffing levels and workload management policies are critical determinants of nurses' risk of low back pain. Inadequate staffing levels may lead to heavier workloads and increased physical demands on individual nurses, resulting in fatigue and musculoskeletal strain. Similar study highlighted that lack of accessibility to lifting aids and ergonomic equipment significantly increases the risk of LBP among nurses. The study found that providing adequate training and regular updates was crucial in reducing the incidence of LBP. The researcher also found that lack of access to lifting devices was a major contributor to low back pain (Nkhata *et al*, 2020).

Likewise, other researchers indicated that ergonomic design plays a pivotal role in mitigating or exacerbating the risk of low back pain among nurses. Poorly designed workstations, such as improper height of work surfaces or inadequate support for the

lumbar region, can strain the back muscles and lead to musculoskeletal issues over time (Odebiyi *et al*, 2023).

# CHAPTER FIVE

# SUMMARY, CONCLUSION AND RECOMMENDATION

## 5.1 Introduction

In this section of the study it provides the summary, conclusion and recommendation of the study finding and results. It provides summary of the research outcomes and conclusions. Additionally, recommendations are provided based on study findings as a guide to future actions aimed at preventing low back pain among nurses.

## 5.2 Summary

### 5.2.1 Summary on assessment of prevalence of low back pain among nurses

A comprehensive overview provided in Table 4, it's noteworthy that the study revealed various health and lifestyle factors associated with LBP among nurses. For instance, a notable proportion of nurses reported being underweight or obese, which underscores the role of body mass index (BMI) in exacerbating the risk of LBP. the more the weight the more stress on the spines joint and intervertebral discs causing inflammation. Furthermore, the study revealed significant trends: Nurses with low back pain were typically older (mean age 2.05 vs. 1.50) and more often female (mean score 1.79 vs. 1.58). age is a significant factor due to age related changes in the spine and surrounding tissues. Surprisingly, those with low back pain had lower mean scores for medical conditions. These insights emphasize the intricate relationship between demographic factors, health conditions, and the occurrence of low back pain among nurses, informing targeted interventions and preventive measures in healthcare settings.

The study indicated significant associations between LBP and personal characteristics such as BMI, health conditions including diabetes mellitus and cardiovascular disorders, lifestyle habits like smoking, physical activity levels, working hours, and engagement in

back-strengthening exercises. These findings underscore the multifactorial nature of LBP and its significant impact on nurses' health and well-being.

These findings emphasize the importance of implementing targeted interventions to prevent and manage LBP effectively, promote a healthy work environment, and safeguard the well-being and productivity of nursing staff.

### 5.2.2 Summary on identification of individual - related factors predisposing nurses to low back pain

The study conducted at level 5 Hospitals in Kiambu County aimed to investigate individual-related factors predisposing nurses to low back pain (LBP). The study conducted at level 5 Hospitals in Kiambu County aimed to investigate nurse-related factors predisposing nurses to low back pain (LBP). Through descriptive and inferential analyses, the findings were presented to shed light on behaviors and practices among nurses that could potentially contribute to LBP. Table 6 outlined nurses' responses regarding various practices related to LBP prevention, revealing both strengths and areas for improvement. Further insights were provided by Table 7, which presented model summary statistics indicating a strong positive correlation between nurse-related factors and the occurrence of LBP. Additionally, Table 8's ANOVA summary underscored the significance of the regression model in understanding this relationship. The regression analysis detailed in Table 9 identified specific individual related factors significantly associated with LBP. These factors included good practices by the nurses while handling patients such as asking for assistance while lifting patients, adjusting the bed to the appropriate level when performing procedures and unlocking the wheels of bed/trolley when transferring patients.

### 5.2.3 Summary on determination of health facility related factors predisposing nurses to low back pain

The study aimed to identify health facility-related factors contributing to low back pain among nurses in Level 5 Hospitals in Kiambu County. Through a comprehensive analysis utilizing both descriptive and inferential methods, the research sought to shed light on the nuances of nurses' perceptions and experiences regarding various aspects of low back care within their work environment.

In the descriptive analysis, nurses' ratings provided insight into their opinions on the importance and availability of policies, guidelines, and equipment relevant to low back care. Notably, the findings highlighted disparities in agreement among nurses, particularly regarding the accessibility of essential protocols and resources. While a significant majority recognized the importance of policies and guidelines for low back care, there was a notable discrepancy in the perceived availability and accessibility of these resources, suggesting potential gaps in implementation or dissemination within the healthcare facilities.

Furthermore, the inferential analysis, employing chi-square tests, revealed a statistically significant association between health facility related factors and nurses' predisposition to low back pain. This statistical analysis provided quantitative evidence supporting the notion that the organizational aspects of healthcare facilities play a crucial role in shaping nurses' risk of experiencing low back pain.

Building upon these findings, the posterior distribution characterization offered additional insights by providing estimates and intervals for key factors related to low back pain among nurses.

Overall, the study's comprehensive approach and analytical techniques illuminated the complex interplay of factors contributing to low back pain among nurses in Level 5

Hospitals in Kiambu County. The findings underscored the importance of addressing health facility related factors nurse related factors at individual-level interventions, to effectively mitigate the risk of low back pain and promote the occupational health and well-being of nursing staff.

## 5.3 Conclusion

### 5.3.1 Conclusion on the Assessment of the Prevalence of Low Back Pain Among Nurses

This study found a high prevalence of low back pain (LBP) among nurses in Level 5 hospitals in Kiambu County, with 79.6% of respondents reporting LBP. Inferential analysis using one-sample t-tests indicated that all relevant factors—such as experiences of LBP, BMI, diabetes, cardiovascular disorders, anxiety, smoking habits, physical activity, long working hours, and rest breaks—were significantly associated with LBP ($p < 0.05$). These results suggest that LBP is a multifactorial occupational hazard affecting nurse performance and well-being. The findings reinforce the urgent need for workplace interventions that include physical fitness programs, ergonomic practices, and psychological support systems to reduce the burden of LBP on nursing staff.

### 5.3.2 Conclusion on identification individual- related factors predisposing nurses to low back pain.

The regression analysis demonstrated a strong positive correlation ($R = 0.779$) between nurse-related factors and the occurrence of LBP, with an $R^2$ value of 0.732, indicating that 73.2% of the variance in LBP can be attributed to these factors. The model was statistically significant ($F = 1.113$, $p = 0.003$), confirming the influence of variables such as age, physical fitness, ergonomic practices, workload, prolonged standing, and manual patient handling. The study found that lack of ergonomic training (OR = 1.8, $p < 0.05$), prolonged standing hours (OR = 2.5, $p < 0.05$), and frequent manual patient lifting (OR

= 3.1, p = 0.02) were among the most significant predictors. These findings underscore the need for targeted ergonomic education, staffing reviews, and safe patient-handling protocols to protect nurses from LBP.

### 5.3.3 Conclusion on determination of health facility related factors predisposing nurses to low back pain

Facility-related factors were also significantly associated with LBP among nurses, as indicated by the Chi-square analysis (Pearson Chi-Square = 36.000, df = 304, p = 0.015). This suggests a meaningful association between institutional elements and LBP. Although the Likelihood Ratio test did not yield significant results, the evidence from the Chi-square test and the posterior distribution analysis supported the conclusion that facility-related factors matter. Key contributing elements included lack of ergonomic equipment, absence of standard operating procedures for patient lifting, inadequate staffing, and long working shifts. These findings point to the critical need for healthcare administrators to invest in facility improvements such as ergonomic redesign, consistent staff training, proper resource allocation, and policy development to mitigate the incidence of LBP.

## 5.4 Recommendations

Based on the study findings, it is crucial to implement evidence-based and policy-driven interventions aimed at reducing prevalence and impact of Low Back Pain (LBP) among nurses in Level 5 hospitals in Kiambu County. The recommendations are directed toward different stakeholders and are anchored in the study's key conclusions:

### i. Policy and Hospital Administration Recommendations

The County Health Department and hospital boards should develop and enforce occupational health and safety policies that include specific provisions for ergonomic risk

assessment, regular reviews of nursing workloads, and implementation of standard operating procedures (SOPs) for safe patient handling and movement.

County policymakers should mandate ergonomic training programs as part of induction and continuous professional development (CPD) for all healthcare workers, with an emphasis on preventive back care and proper lifting techniques.

Hospital staffing policies should be reviewed to ensure adequate nurse-to-patient ratios, limiting overexertion and prolonged standing hours.

**ii. Recommendations for Hospital Management Teams**

Hospital managers should invest in ergonomic equipment, including adjustable beds, hoists, patient transfer devices, and height-adjustable workstations, and ensure their routine maintenance through scheduled service contracts.

A workplace safety framework should be established to promote open communication about musculoskeletal injuries, early reporting, and timely intervention.

Hospitals should allocate resources for wellness and rehabilitation programs, including physiotherapy support for nurses experiencing LBP, and enforce rest breaks during long shifts to reduce fatigue.

**iii. Recommendations for Nursing Services Managers**

Develop institutional policies on shift scheduling and workload balancing to prevent physical exhaustion. Implement flexible staffing models that provide sufficient rest periods. Incorporate back care training and lifting technique modules into continuous medical education (CME) programs for all nursing staff. They should also Maintain proper documentation and monitoring of LBP cases among nurses to inform future interventions and improve workplace ergonomics.

### iv Recommendations for Nurses

Nurses should actively engage in wellness programs, maintain personal physical fitness, and adopt correct lifting and transfer techniques. They are encouraged to report early symptoms of LBP and seek timely treatment to prevent chronic conditions, in alignment with primary prevention strategies. Peer-to-peer training and knowledge sharing on ergonomic practices should be encouraged at the departmental level.

### V Recommendations for Researchers

Future research should focus on evaluating the long-term impact of ergonomic interventions and staffing models on prevalence of LBP.

Additional qualitative studies should be conducted to explore nurse perceptions and attitudes toward LBP prevention and reporting, which may influence uptake of interventions.

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# APPENDICES

## Appendix I: Consent Form

Good morning/Good afternoon,

My name is **Alice Wanja,** a nurse working in Kiambu County. I am currently pursuing a Master degree in Medical- Surgical nursing at Mount Kenya University. I am conducting a study on **determinants of low back pain among nurses working at level five hospitals Kiambu county, Kenya.**

Findings from the study will generate more insight on the determinants of low back pain and generate the need for policies and guideline emphasis in prevention. The study findings will enhance clinical setting improvement in Kiambu level five hospitals in order to promote low back health among nurses and also guide in future research.

The data collected in this study was handled with utmost confidentiality and privacy, both during and after the research. To maintain the anonymity of the respondents, no names was recorded on the questionnaires. Participation in this study will not involve any monetary compensation.

Your participation in this study is entirely voluntary. By consenting to participate, you acknowledge that the researcher has provided a thorough explanation of the study and has addressed all your concerns regarding your involvement. Your voluntary consent signifies your agreement to be a part of this research.

Respondent's Signature …….

Date …… Time …….

Researcher's Name: -Alice Wanja.

P.O Box 84 Gatundu, Kenya.

Phone No. 0722283546.

School Contact: Mt. Kenya University; Department of Nursing

P.O Box 342-00100

**Appendix II: Questionaire**

**Section A: Demographic Data**

1. AGE IN YEARS

   A. 21 – 30 -------

   B. 31 – 40 -------

   C. 41 - 50 -------

   D. 51 - 60 -------

2. SEX -------

   A. Male -------

   B. Female -------

3. EDUCATION LEVEL

   Masters level ------

   Bachelors level ------

   Higher diploma level ------

   Diploma level -------

   Certificate level ------

6. Working Experience in Years

   A. Below 1 ……

   B. 1-5 -------

   C. 6-10 -------

   D. 11 and above --------

7. Current Deployment

   A. Accident and emergency -------

   B. Maternity department -------

   C. ICU ------

D. Operating theatres ------

E. Outpatient department ------

F. Medical/ surgical wards…….

F. Pediatrics ------

G. others -------

**Section B: Nurse Related Factors**

1. Have you experienced low back pain related to your nursing duties?

A. Yes -------

B. No -------

If yes, for how long?.....

2. Have you been treated for low back pain for the last three months?

A. Yes ------

B. No -------

If yes, have you been absent from duty for more than 3 days due to low back pain in the last three months?

A. Yes ------

B. No -------

3. On a Scale of 0-10, how do you rate the LBP are experiencing?

A. 0 (No pain) ……

B. 1-3 (mild pain) ……...

C. 4-6 (moderate pain) ……

D. 8-10 (Severe pain) ……...

4.Give the correct answer for the following questions.

| | YES | NO |
|---|---|---|
| Has the LBP spread down your leg at some time in the last 2 weeks? | | |
| Does the LBP limit your activity? | | |
| Do you feel your back may not get better due to pain? | | |
| Has the LBP been extremely troublesome in the last 2weeks? | | |

5.What is your BMI?

A. Below 18.5kg/$m^2$

B. Between 18.6-24.9kg/$m^2$

C. Between 25-29.9kg/$m^2$

D. 30kg/$m^2$ and above

6. Do you have any of the following conditions

| **Condition** | **Yes** | **No** |
|---|---|---|
| 1. Diabetic mellitus | | |
| 2. Cardiovascular disorders. | | |
| 3. Anxiety and depressive disorders. | | |

7. Have you ever smoked cigarettes?

A. Yes

B. Never

8. How often do you engage in physical activity lasting 30 minutes per session within a week?

A. Never

B. Three times

C. More than 3 times

9. How many hours do you work in a week?

A. More than 40 hours ------

B. Less than 40 hours -------

10.While on duty do you take at least one-hour rest?

A. Yes ------

B. No ------

11. Do you practice the following to protect low back from injury?

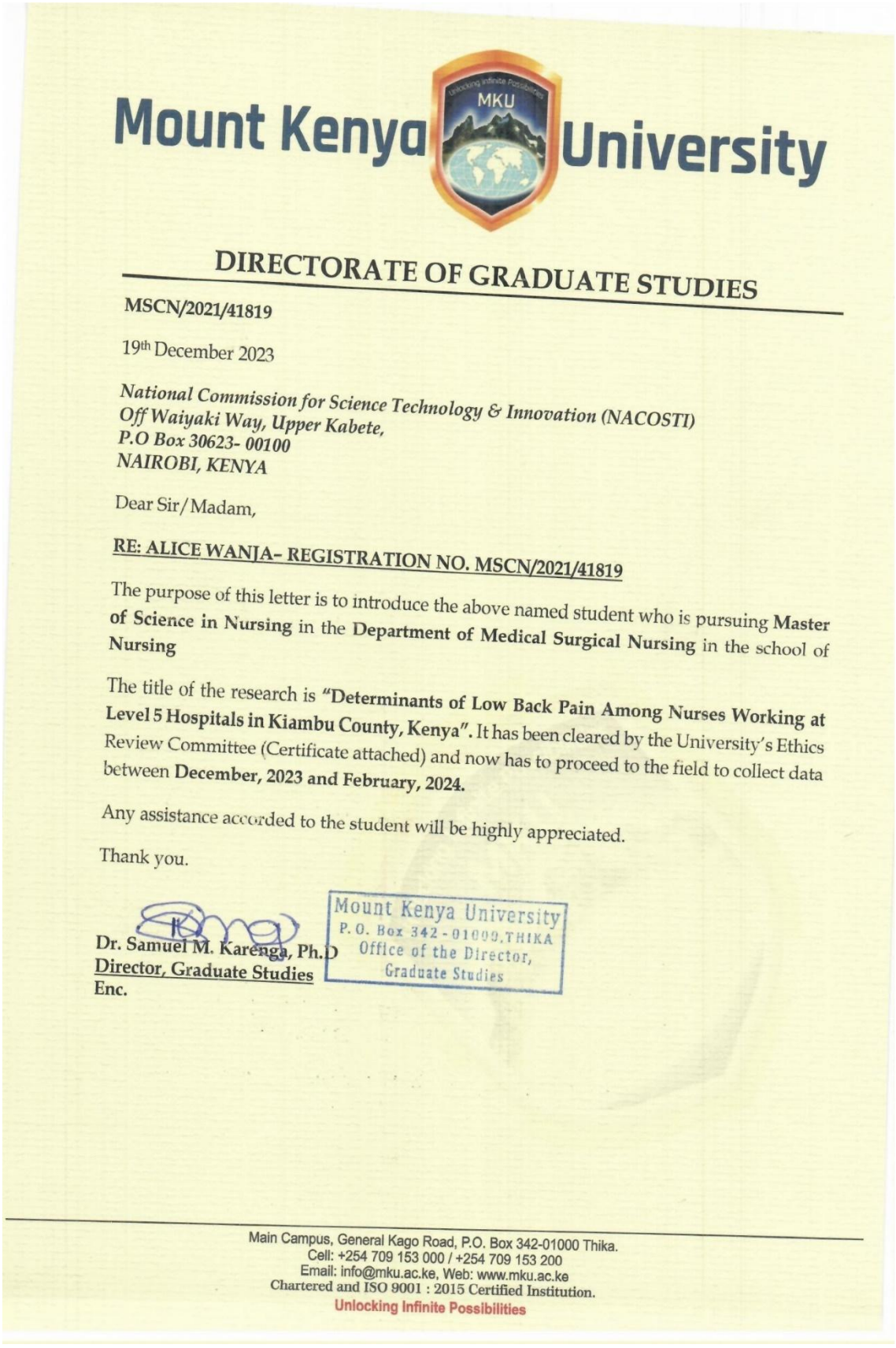
| ACTIVITY/RESPONCE | Always | Sometimes | Never |
|---|---|---|---|
| 1.Ask for assistance while turning or lifting a patient. | | | |
| 2.Adjust the bed to the appropriate level when performing procedure. | | | |
| 3.Unlock the wheels of bed/trolley when transferring patients | | | |
| 4.Put your feet apart to maintain a stable base while lifting patients. | | | |
| 5.Take rest on a comfortable chair during your working hours to rest your back. | | | |
| 6.Put patient directly in front of you before lifting to avoid rotation of spine | | | |
| 7.Discuss low back health with your colleagues or supervisor. | | | |
| 8.Take a balanced diet at least one meal while on duty? | | | |

**C. Facility Related Factors**

Please indicate your rating on the following statements.

| No | Statement | Strongly Agree | Agree | Disagree | Strongly Disagree |
|---|---|---|---|---|---|
| 1. | Policies and guidelines for low back care are important. | | | | |
| 2. | Policies and guidelines on low back care are available to all nursing staff | | | | |
| 3. | Standard operating procedures for lifting and transferring patients are available in my department | | | | |
| 4. | Lifts for transferring patients from one floor to another are working. | | | | |
| 5. | Most of the hospital beds are adjustable. | | | | |
| 6. | I can easily get assistance when I need to lift a patient. | | | | |
| 7. | When documenting, I can easily find a comfortable chair and table | | | | |
| 8. | I can easily access a balanced diet while am on duty' | | | | |
| 9. | I have the skills of promoting low back pain prevention behavior. | | | | |
| 12 | My facility devotes some times for doing low back pain prevention behaviours | | | | |
| 12. | Lifting assistive devices are available for use in my facility. | | | | |
| 13. | My facility advocate and assign nursing duties for not more than 40 hours per week. | | | | |

## Appendix III: Introductory Letter



Mount Kenya University

DIRECTORATE OF GRADUATE STUDIES

MSCN/2021/41819

19th December 2023

*National Commission for Science Technology & Innovation (NACOSTI)*
*Off Waiyaki Way, Upper Kabete,*
*P.O Box 30623- 00100*
*NAIROBI, KENYA*

Dear Sir/Madam,

**RE: ALICE WANJA- REGISTRATION NO. MSCN/2021/41819**

The purpose of this letter is to introduce the above named student who is pursuing **Master of Science in Nursing** in the **Department of Medical Surgical Nursing** in the school of **Nursing**

The title of the research is **"Determinants of Low Back Pain Among Nurses Working at Level 5 Hospitals in Kiambu County, Kenya".** It has been cleared by the University's Ethics Review Committee (Certificate attached) and now has to proceed to the field to collect data between **December, 2023 and February, 2024.**

Any assistance accorded to the student will be highly appreciated.

Thank you.

Mount Kenya University
P. O. Box 342 - 01000, THIKA
Office of the Director,
Graduate Studies

**Dr. Samuel M. Karenga, Ph.D**
**Director, Graduate Studies**
**Enc.**

Main Campus, General Kago Road, P.O. Box 342-01000 Thika.
Cell: +254 709 153 000 / +254 709 153 200
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**Appendix IV: ERC Approval**

# Mount Kenya University

REF: **MKU/ISERC/3408**
TO: **ALICE WANJA**

Date: 18 December 2023

REG: **MSCN/2021/41819**

Dear Sir/Madam,

**RE: DETERMINANTS OF LOW BACK PAIN AMONG NURSES WORKING AT LEVEL 5 HOSPITALS IN KIAMBU COUNTY, KENYA.**

This is to inform you that **Mount Kenya University** has reviewed and approved your above research proposal. Your application approval number is **2452.** The approval period is **18/12/2023 - 17/12/2024.**

This approval is subject to compliance with the following requirements;

i. Only approved documents including informed consents, study instruments, MTA will be used
ii. All changes including amendments, deviations and violations are submitted for review and approval by **Mount Kenya University**
iii. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to **Mount Kenya University** within 72 hours of notification
iv. Any changes, anticipated or otherwise that may increase the risks or affect the safety or welfare of study participants and others or affect the integrity of the research must be reported to **Mount Kenya University** within 72 hours
v. Clearance for export of biological specimens must be obtained from relevant institutions
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal
vii. Submission of an executive summary report within 90 days upon completion of the study to **Mount Kenya University**

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) https://research-portal.nacosti.go.ke and also obtain other clearances needed.

Yours sincerely,

The Chairman
Mount Kenya University
Ethics Review Committee
P. O. Box 342 - 0100, Thika

**Dr. Alfred Owino, PhD**
**Chairman, Mount Kenya University ISERC**

## Appendix V: NACOSTI Approval

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **343767**

Date of Issue: **22/December/2023**

**RESEARCH LICENSE**

**This is to Certify that Ms.. Alice Wanja Maina of Mount Kenya University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Kiambu on the topic: DETERMINANTS OF LOW BACK PAIN AMONG NURSES WORKING AT LEVEL 5 HOSPITALS IN KIAMBU COUNTY, KENYA for the period ending : 22/December/2024.**

License No: **NACOSTI/P/23/32260**

**343767**

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.

**See overleaf for conditions**

**Appendix VI:Kiambu Level 5 Hospital Approval**

COUNTY GOVERNMENT OF KIAMBU

DEPARTMENT OF HEALTH SERVICES

Telephone: (066) 2022191
Email address:
kiambudistricthospital@yahoo.com

When replying please quote:

KIAMBU COUNTY REFERRAL
LEVEL 5 HOSPITAL
P. O. BOX 39 – 00900,
KIAMBU

Ref No: KBU/STAFF 17/VOL.LIV (54)/59 Date: 1st February, 2024

Alice Wanja
P. O. Box 227-01000,
THIKA

RE: APPROVAL TO CONDUCT RESEARCH

In reference to your request letter dated 22nd January, 2024 on conducting research of "Determinants of Low Back Pain among Nurses working at Level 5 Hospital in Kiambu County, Kenya". We hereby inform you that your request has been approved.

This approval also accords you the duty to provide feedback on this research to the institution at the conclusion of your research.

MEDICAL SUPERINTENDENT
KIAMBU SUB COUNTY LEVEL 4
HOSPITAL
P.o. Box 39-00900
KIAMBU
TEL: 0662022191

For

DR. ANTONY MURAGE
MEDICAL SUPERINTENDENT
KIAMBU REFERRAL HOSPITAL

## Appendix VII: Gatundu Level 5 Hospital Approval

COUNTY GOVERNMENT OF KIAMBU
DEPARTMENT OF HEALTH SERVICES
GATUNDU LEVEL 5 HOSPITAL

Telegram:"MEDICAL"Gatundu
Telephone:0786916894
When replying please quote
Email Adress

GATUNDU LEVEL 5 HOSPITAL
P.O. BOX 84 - 01030
GATUNDU
gatundul4h@gmail.com

Ref: GTD/GEN/37/VOL.1/364

8TH FEBRUARY 2024

ALICE WANJA
MT. KENYA UNIVERSITY

RE: AUATHORITY TO COLLECT DATA

Your application to carry out research on *"Determinants of Low Back Pain among Nurse Working at Level 5 Hospitals in Kiambu County Kenya"* in this institution has been granted.

During the entire period of your research, you will be reporting to the Nursing Services Manager, who will be the key Hospital Co-ordinator during the pretest. She will support you to access any information that may be relevant for the successful undertaking of the research.

Finally, you are expected to adhere to all the regulations relating to confidentiality of patient information, ethics in research as well as all norms regarding conduct in a Public Health Institution.

Wishing you a successful research.

THE MEDICAL SUPERINTENDENT
Sign.....
P.O. Box 84 - 01030
GATUNDU
GATUNDU LEVEL 5 HOSPITAL

DR. RITA MUTHAMI
F:MEDICAL SUPERINTENDENT
GATUNDU LEVEL 5 HOSPITAL

## Appendix VIII: Kiambu County Approval

COUNTY GOVERNMENT OF KIAMBU
DEPARTMENT OF HEALTH SERVICES
P.O Box 2344 - 00900 Kiambu, Kenya
**Tel**: +254 709 877 000 **Email**: info@Kiambu.go.ke **Website**: www.Kiambu.go.ke **Twitter**: @KiambuCountyGov

**REFERENCE KIAMBU/HRDU/AUTHO/WANJA A.**

**Date: 17th JAN 2024**

**TO WHOM IT MAY CONCERN,**

**RE: CLEARANCE TO CONDUCT RESEARCH IN KIAMBU COUNTY**

Kindly note that we have received a request by **Alice Wanja** of **Mt Kenya University** to carry out research in Kiambu County, the research topic being on ***"Determinants of low back pain among nurses working at Level 5 hospitals in Kiambu County, Kenya"***

We have duly inspected her documents and found that she has been cleared by **Mt Kenya University ISERC** until **17th Dec 2024**. She thus does not need any further clearance with another regulatory body in order to conduct research within the county of Kiambu.

However, it is incumbent upon the facility in which the research is being carried out to ensure that they are conversant with the remit of the study and operate in line with their institutional norms on conducting research. This note also accords her the duty to provide feedback on her research to the county at the conclusion of her research.

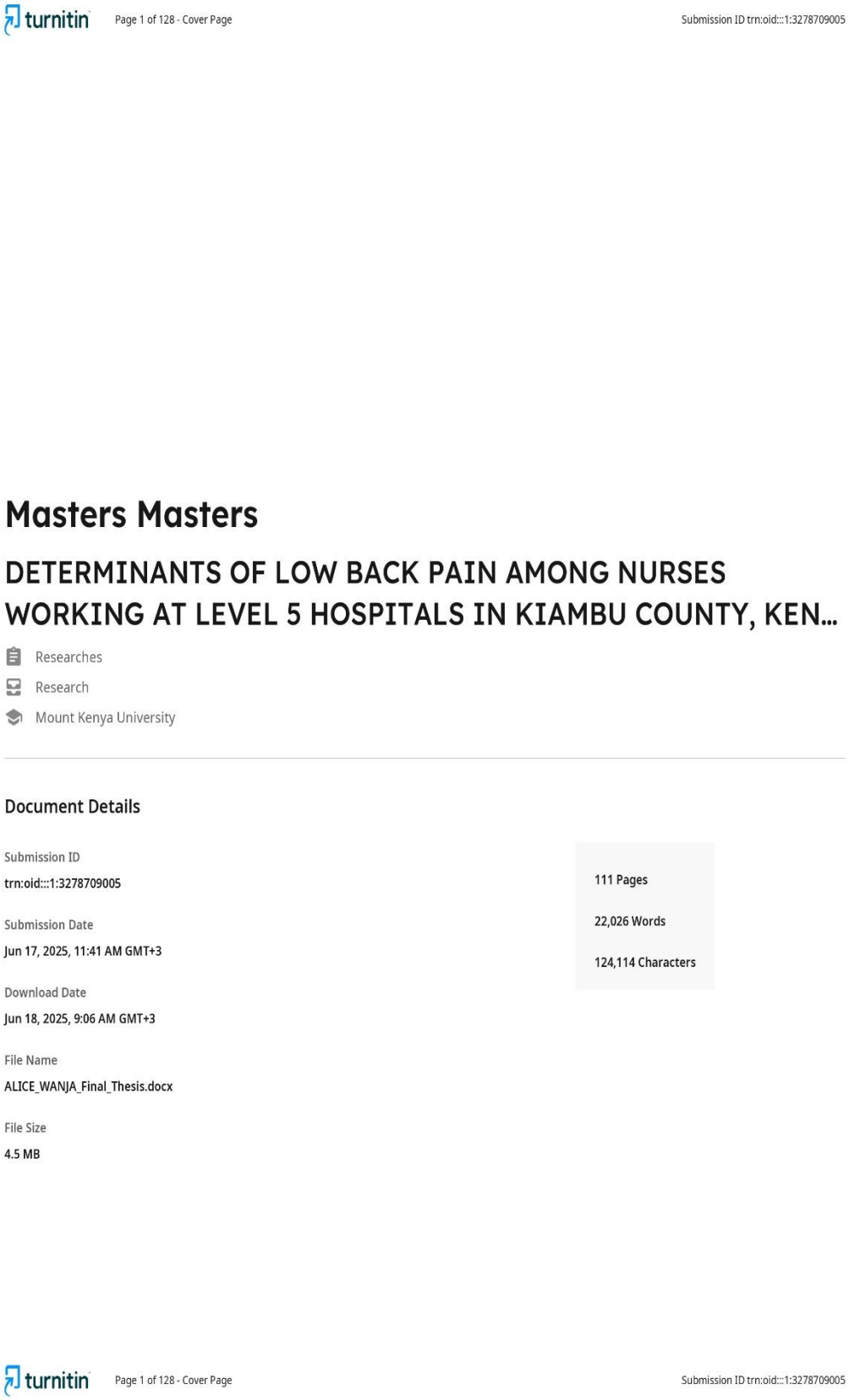
**DR. JUNE MUTHIORA**
**COUNTY HEALTH RESEARCH OFFICER**
**KIAMBU COUNTY**

**Appendix IX: Kiambu County Map**


**KEY**

**Study sites**

## Appendix X: Similarity Index



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Matches with neither in-text citation nor quotation marks

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## Top Sources

13% Internet sources
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  Matches with in-text citation present, but no quotation marks

## Top Sources

13% Internet sources
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