PREVALENCE AND FACTORS ASSOCIATED WITH LOW BACK PAIN AMONG HEALTH CARE WORKERS IN NYAMAGANA DISTRICT, MWANZA

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PREVALENCE AND FACTORS ASSOCIATED WITH LOW BACK PAIN AMONG HEALTH CARE WORKERS IN NYAMAGANA DISTRICT, MWANZA

By

James N. Allan

A Dissertation Submitted in (Partial) Fulfillment of the Requirements for the Degree of Master of Science (Applied Epidemiology) of

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CERTIFICATION

The undersigned certify that they have read and hereby recommend for acceptance by Muhimbili University of Health and Allied Sciences a dissertation entitled; **‘‘P*revalence and Factors Associated with Low Back Pain among Health Care Workers in Nyamagana District, Mwanza’’*** in (partial) fulfillment of the requirements for the degree of Master of Science (Applied Epidemiology) of Muhimbili University of Health and Allied Sciences**.**

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Dr. Hussein Mwanga

(Supervisor)

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Date

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Dr. Azma Ayoub Simba

(Co-Supervisor)

_____

Date

DECLARATION AND COPYRIGHT

I, **James N. Allan**, declare that this **dissertation** is my original work and that it has not been presented and will not be presented to any other University for a similar or any other degree award.

Signature……..…… **Date**…….……...….....

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DEDICATION

I would like to dedicate this work to my family, particularly my wife and daughters, who made sacrifices, supported and encouraged me so I could achieve these significant goals.

ABSTRACT

Background: Low back pain (LBP) is a prevalent musculoskeletal condition affecting workers and healthcare professionals globally, with an estimated 619 million people affected. This number is projected to rise to 843 million by 2050, a 36.4% increase. In Africa, LBP prevalence rates are estimated at 62%, but specific data on Tanzanian healthcare workers, particularly in Nyamagana District, is limited.

Objectives: This study aimed to determine the prevalence and factors associated with LBP among healthcare professionals in Nyamagana District, Mwanza.

Methodology: An analytical cross-sectional study was conducted among 334 healthcare workers in Nyamagana District, using stratified random sampling. Data were collected through a pretested questionnaire adapted from the Nordic Musculoskeletal Questionnaire. Descriptive statistics were used for demographic variables, and chi-square and Fisher's exact tests compared categorical variables. Modified Poisson regression with robust error variance, adjusted for age, sex, and BMI, identified independent factors associated with LBP, with a p-value of ≤ 0.05 considered significant.

Results: The point prevalence of LBP was 40.12% (95% CI: 35%-45%), and the annual prevalence was 44% (95% CI: 39%-49%). LBP was more prevalent among females (47.23%) and older age groups (36-45 years at 52.10% and >45 years at 51.52%). Significant factors associated with LBP included age (36-45 years: aPR 1.19, 95% CI: 1.09-1.29; >45 years: aPR 1.19, 95% CI: 1.09-1.31), female sex (aPR 1.16, 95% CI: 1.07-1.25), work experience of 10 years and above (aPR 1.22, 95% CI: 1.11-1.34), physically demanding tasks (aPR 1.12, 95% CI: 1.01-1.23), lack of supervisor' support (aPR 1.13, 95% CI: 1.03-1.22), fatigue (aPR 1.13, 95% CI: 1.05-1.22), and stress (aPR 1.15, 95% CI: 1.00-1.32).

Conclusion: Approximately 40.12% of healthcare workers in Nyamagana District experience LBP. Factors associated with increased risk of LBP include higher age groups, female sex, obesity, physically demanding tasks, lack of supervisors' support, fatigue, and stress.

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ABBREVIATIONS

BMI	Body Mass Index
GBD	Global Burden Disease
HCWs	Healthcare Workers
HF	Health Facility
LBP	Low Back Pain
MOI	Muhimbili Orthopedic Institute
MUHAS	Muhimbili University of Health and Allied Sciences
NMQ	Nordic Musculoskeletal Questionnaire

DEFINITIONS OF TERMS AND CONCEPTS

Low Back Pain	The pain occurring at the rear part of the body specifically the area located above the gluteal curvature and below the costal margin
Healthcare Workers	Individuals who directly deliver health services, care, or treatment to patients, including but not limited to nurses, doctors, pharmacists, and laboratory technicians.
Primary healthcare facility	The initial point of contact within the healthcare system for individuals seeking medical care such as dispensaries, health centres and hospitals at the district level
Nordic Musculoskeletal Questionnaire	A standardized questionnaire used to evaluate the presence and frequency of musculoskeletal discomfort or disorders in various body parts

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Low back pain (LBP) is a dorsal ache that is located above the gluteal curvature and below the costal margin (1). It is one of the workplace-related musculoskeletal discomforts affecting healthcare professionals and other working populations worldwide. It is particularly prevalent among healthcare workers (HCWs) who are exposed to physically demanding tasks and are required to lift and move patients (2). The several types of pain that can be experienced include muscle pain, nerve pain, and bone pain. The way that pain feels can vary as well. The pain may be dull or sharp, well-defined or diffuse, aching, searing, stabbing, tingling, or any combination of these (3).

Low back discomfort is linked to several factors. One primary factor is poor posture, especially when sitting or standing for extended periods without proper support (4). Lack of regular physical activity and sedentary lifestyles can also contribute to weak muscles and a lack of flexibility, increasing the risk of experiencing LBP. Additionally, factors including obesity and excessive body weight can strain the spine and its supporting structures, leading to pain and discomfort (5). Occupational hazards, including heavy lifting, repetitive motions, and prolonged periods of bending or twisting, can place undue stress on the lower back (6). Psychological factors like stress, anxiety, and depression can also lead to the development or worsening of lower back pain (7,8). Factors such as ageing, degenerative alterations in the spine, and underlying medical conditions like arthritis or herniated discs can increase the likelihood of experiencing LBP (9).

Noticeably, LBP is higher among medical professionals employed in secondary and tertiary healthcare hospitals when compared to those working in primary healthcare facilities (10). The demanding nature of the work environment in secondary and tertiary hospitals, coupled with the complex and specialized care provided, puts healthcare professionals at higher risk for LBP. These settings frequently involve tasks that require frequent lifting and transferring of

patients, prolonged standing, and repetitive motions, which can place significant strain on the lower back. In contrast, primary healthcare facilities typically involve a more diverse range of responsibilities and patient interactions, potentially resulting in a lower incidence of LBP among healthcare workers.

Based on the 2019 Global Burden of Disease (GBD) Study, LBP is the main reason for disability globally, and its prevalence is increasing over time. It is estimated that around 568.4 million individuals are impacted by pain in the lower back at any given time, with point prevalence standardized by age estimated at 6972.5 per 100,000 populations (11). In 2020, it was estimated that there were 619 million people globally suffering from LBP, which marked a significant rise compared to the combined number of cases for all ages, genders, and both males and females in 1990. Looking ahead, by 2050, the projected population changes suggest that the number of individuals worldwide experiencing LBP will reach 843 million, indicating a global increase of 36.4% in total cases (12).

According to a comprehensive assessment carried out in Africa, the mean point prevalence of LBP in adults and adolescents is 32% and 12%, respectively, making it a serious public health concern. According to the study, adults had a greater average one-year prevalence of LBP (50%) than adolescents (33%). Moreover, adults had a significantly greater average lifetime LBP prevalence of (62%) than adolescents (36%). These results highlight the need for prevention and management strategies as they imply that LBP is a chronic and recurrent disorder that affects a sizable number of the African population, especially adults (13). A more recent systematic review study in Africa (2018) involving Sixty five (65) studies showed a point prevalence of LBP of 39%, a 57% annual and a 47% lifetime prevalence of lower back pain (14).

A study carried out in 2008 at Tanzania's Muhimbili Orthopedic Institute (MOI) revealed a noteworthy rate of 73.6% for LBP among nurses, offering important insights into the condition's prevalence (15). This research specifically focused on nurses, who engage in a crucial role in the provision of healthcare but often face demanding work conditions that may promote the development of LBP. The demanding nature of their shifts, long working hours,

and exposure to stressful situations can exacerbate the risk of developing LBP. Research indicates that implementing a comprehensive ergonomic program along with patient-handling devices reduces patient-handling injuries by 59.8%, decreases lost workdays by 86.7%, and lowers workers' compensation costs by 90.6% (16).

1.2 Problem statement

LBP is a widespread and significant problem in the realm of occupational health, particularly among healthcare workers, as it profoundly impacts their well-being and ability to perform their duties effectively (17). Research has shown that the prevalence of LBP varies, demonstrating fluctuations in point, annual, and lifetime occurrences (14,18–20).

However, within the specific context of Nyamagana district, there is a notable dearth of research exploring the prevalence of LBP and its associated risk factors among healthcare professionals. This research gap hampers our understanding of the scope of the problem and highlights the urgent need for comprehensive investigations.

This study is designed to address the existing knowledge gap by determining the prevalence and identifying the factors associated with LBP among healthcare workers in Nyamagana District. By doing so, it aims to provide evidence-based insights that will inform the development of targeted interventions to improve healthcare workers' well-being, prevent workplace injuries, reduce absenteeism, and enhance the quality of patient care in the district.

1.3 Conceptual framework

Low back pain was the dependent variable. The socio-demographic factors (age, sex, BMI and marital status) served as independent variables that may influence LBP among healthcare workers. The work-related factors included the health facility type, job title, department/unit, duration of the job, job satisfaction, nature of work in the facility (physical demands, frequency of lifting, working in awkward positions, workload control, and supervisor/manager support) and occupational health training. Furthermore, psychological factors, such as sleep disturbances, fatigue, stress, depression, and anxiety, were additional independent variables that may contribute to LBP. Lifestyle factors, including smoking, alcohol and physical activity, were also included as independent variables that can impact LBP among healthcare professionals.

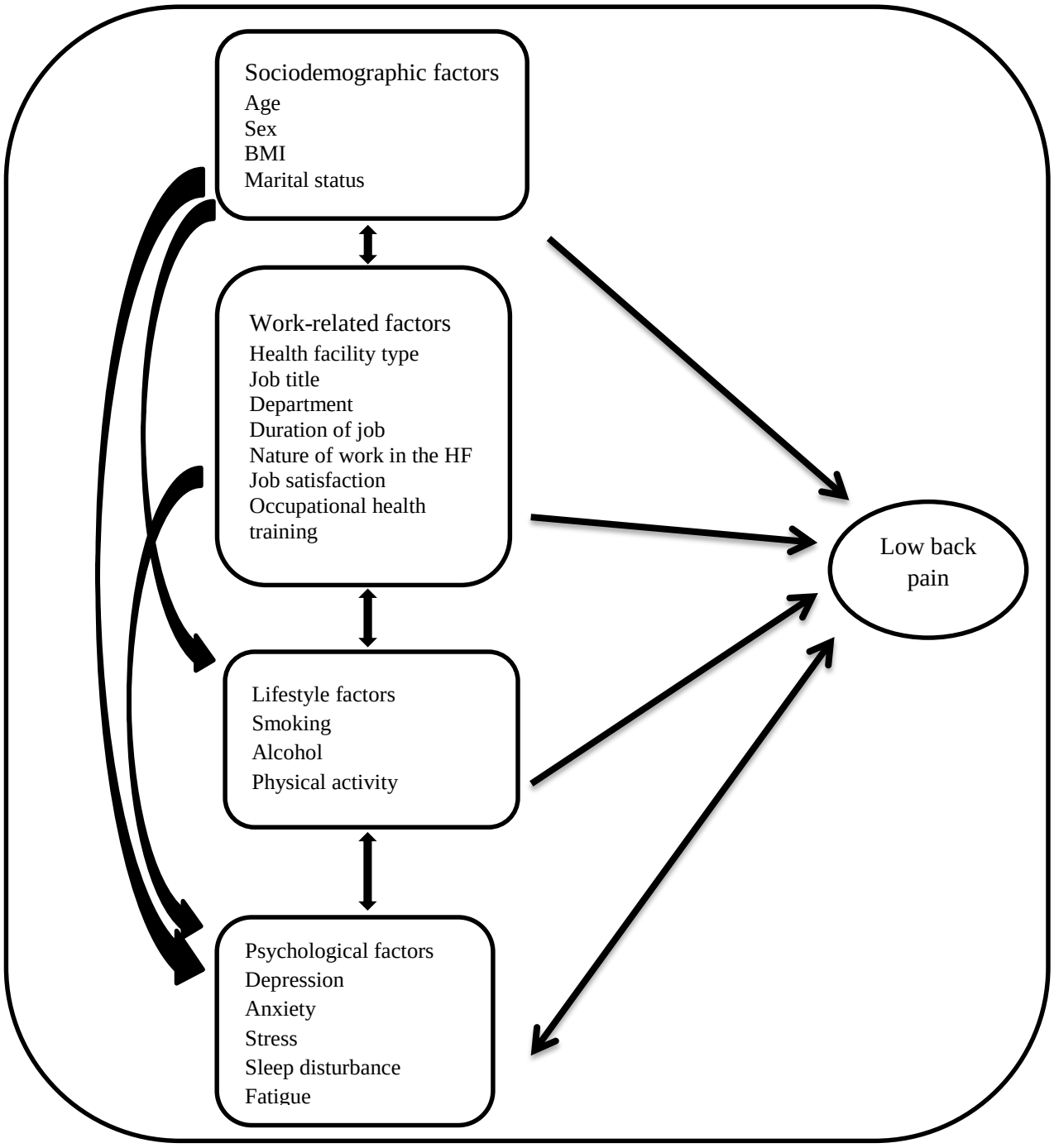


Figure 1: An illustration of the factors that were thought to impact the occurrence of LBP among HCWs in Nyamagana District, Mwanza Region.

1.4 Rationale

The study on the prevalence of LBP and associated factors among HCWs in Nyamagana district is necessary to improve occupational health approaches, improve the well-being of healthcare professionals, enhance patient care quality, reduce costs, and fill the existing knowledge gap in this field. The results of this research will serve as a foundation for developing targeted interventions intended to manage and prevent LBP among HCWs, ultimately creating a healthier and more supportive work environment.

1.5 Research questions

1.5.1 Broad Research question

What is the prevalence and factors associated with LBP among healthcare workers in Nyamagana district?

1.5.2 Specific Research questions

1. What is the prevalence of LBP among healthcare workers in Nyamagana district?
2. What social-demographic factors are associated with LBP among healthcare workers in Nyamagana district?
3. What work-related factors are associated with LBP among healthcare workers in Nyamagana district?
4. What psychosocial factors are associated with LBP among healthcare workers in Nyamagana district?
5. What lifestyle factors are associated with LBP among healthcare workers in Nyamagana district?

1.6 Hypothesis

1. For research question one
    a) Null hypothesis: There is no significant difference in the prevalence of LBP among healthcare workers in Nyamagana district.
    b) Alternate hypothesis: There is a significant difference in the prevalence of LBP among healthcare workers in Nyamagana district.
2. For research questions two to five
    a) Null hypothesis: There is no significant association between any demographic, work-related, lifestyle, or psychosocial factors and the occurrence of LBP among healthcare workers in Nyamagana district.
    b) Alternate hypothesis: There is a significant association between at least one demographic, work-related, lifestyle, or psychosocial factor and the occurrence of LBP among healthcare workers in Nyamagana district.

1.7 Objectives

1.7.1 Broad objective

The main objective of this study is to determine the prevalence of LBP and the associated factors among HCWs in Nyamagana district, Mwanza region.

1.7.2 Specific objectives

1. To determine the prevalence of LBP among HCWs in Nyamagana district
2. To determine social-demographic factors associated with LBP among HCWs in Nyamagana district
3. To determine work-related factors associated with LBP among HCWs in Nyamagana district
4. To determine lifestyle factors associated with LBP among HCWs in Nyamagana district
5. To determine psychosocial factors associated with LBP among HCWs in Nyamagana district

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Prevalence of LBP in HCW

Several studies have investigated the prevalence of LBP among HCWs, indicating that this occupational group experiences a higher LBP prevalence in comparison to the general population (21,22). These studies have been conducted on a global scale, emphasizing the considerable impact of this condition on the healthcare workforce. In one study conducted in Turkey among healthcare workers in various departments, including nurses, doctors, and support staff, the prevalence of LBP was found to be around 53% (23). In contrast, healthcare workers in the operating room, including surgeons, anesthesiologists, and scrub nurses, face a higher burden of LBP, with prevalence rates reported as high as 87% (24). Among HCWs in the United States and in European countries, LBP stands out as a prevalent and financially burdensome health issue (25,26). Additional studies have provided insights into the lifetime prevalence of LBP among HCWs in specific age groups. Notably, research indicates that among medical professionals between 30 and 49 years of age, the prevalence of LBP in a lifetime is estimated to be around 66.6% (27). A recent systematic review conducted in 2021 revealed that among healthcare personnel, the average lifetime prevalence of LBP was approximately 54.8%(19). This finding aligns with previous studies conducted in Turkey and Thailand, which reported similar prevalence rates of 53% and 55% respectively (23,28).

The prevalence rates of LBP among HCWs in Africa exhibit variations across different studies and populations. A study conducted in Nigeria specifically among nurses reported varying prevalence rates for LBP. The study found a lifetime prevalence of 79%, a current prevalence of 30%, and a 12-month prevalence of 59% (29). However, a study carried out in South Africa, encompassing nurses at a Regional hospital in KwaZulu-Natal, reported a higher point prevalence rate of approximately 59% for LBP (30). The disparity between the prevalence rates could be attributed to the addition of a broader range of healthcare workers in the South African study compared to the focus solely on nurses in the Nigerian study. Various healthcare professions may experience different levels of occupational demands, work environments, and

physical activities, which can influence the prevalence of LBP. Moreover, a study conducted in an Ethiopian university hospital among healthcare workers indicated a prevalence rate of 57.46% for LBP (31). Similarly, research undertaken in South Africa, Tunisia, Malaysia, and Pakistan reported prevalence rates of 56.9%, 58%, 58.1%, and 59% respectively (30,32,33), aligning with the findings from Ethiopia. The similarity in prevalence rates across these countries could be ascribed to factors such as comparable work settings, socio-economic statuses, health care delivery systems, and socio-demographic distributions.

Although specific studies focusing exclusively on the prevalence of LBP among HCWs in Tanzania are limited, available evidence suggests that LBP is a significant concern in this context. A research investigation carried out in a tertiary hospital in Tanzania showed a prevalence rate of LBP among nurses at approximately 73.6% with 96% of them attributing the problem to their job activities (15). The findings highlight that a considerable proportion of healthcare workers in Tanzania experience LBP during their careers.

Efforts to minimize or prevent LBP among healthcare personnel focused on several key strategies. These included ergonomic interventions such as the use of lifting equipment and patient-handling devices, manual handling training, and workplace education programs to improve body awareness and patient transfer techniques (34). Additionally, early rehabilitation and job modifications were essential in preventing injury recurrence, while comprehensive ergonomic programs have significantly reduced injuries, lost workdays, and workers' compensation costs (16).

2.2 Factors associated with LBP in HCW

2.2.1 Socio-demographic factors

Age

LBP can affect individuals of all age groups, including children and adolescents. It is a regular experience for most people at some stage of their lives. The incidence of LBP reaches its highest point between the ages of 50 and 55, with women being more susceptible to LBP

compared to men (35). Among older individuals, particularly those aged 80 to 85 years, LBP's prevalence and effects on daily functioning and disability are most pronounced (35). As individuals age, the likelihood of recurrent episodes of LBP also tends to increase. The second age group that seeks medical assistance for LBP most frequently is those 65 years of age or older (9). Studies indicate that the prevalence of LBP tends to progressively rise from adolescence (36) until around the age of 60, after which it starts to decline (37). The occupational factors affecting working-age adults could be the cause of this pattern of predominance or changes in pain perception brought on by ageing (9).

Sex

The occurrence of LBP may be influenced by sex. Research has repeatedly shown that women tend to be more likely than men to experience LBP. According to a cross-sectional study based on a Brazilian population survey, women had a higher prevalence of LBP (60.9%) than males (39.1%) (38). The same findings have been supported by research conducted in Qatar (39). However, it is noteworthy that a study conducted in Canada reported the opposite trend, suggesting a higher prevalence of LBP among men (40).

Marital status

Marital status can influence the prevalence of LBP, and research has shown varying percentages across different studies. Some studies have reported a higher risk of occurrence of LBP among married compared to unmarried individuals (20). While the exact reasons behind this increased risk among married individuals are not yet fully understood, it is evident that the intricate interplay of psychosocial and physical factors contributes to the complex nature of LBP (41). These findings underscore the need for further research in order to delve deeper into the specific factors within marital relationships that may lead to the occurrence of LBP.

BMI

Research has consistently shown a notable interaction between elevated body mass index (BMI) and a higher prevalence of LBP. Studies have consistently found that individuals with higher BMI levels are more prone to LBP compared to those with normal or underweight BMI. A study conducted among patients revealed a progressive increase in the occurrence of

LBP with each BMI category, further highlighting this relationship. This study reported that 72.8% of patients who are morbidly obese experienced LBP (42). While some studies could not find the factors related to the development of an association between high BMI and LBP (43), others are showing that the interaction between BMI and LBP is more prominent in women compared to men (44). If the link between BMI and LBP is influenced by hormonal factors (45), it comes as no surprise that the strength of this interaction may be greater in females than in males.

2.2.2 Work-related factors

Job title

LBP has been found to be associated with various categories of healthcare providers (21,31,46), and research consistently indicates that nurses exhibit the highest prevalence of LBP (2,15,27,33). This could be caused by the demanding nature of nursing work, characterized by long hours of standing, frequent bending, lifting, and patient handling, which places significant strain on the lower back (2). In contrast, a study has shown that dentists may have LBP prevalence that is higher (46). The occupation of dentistry involves various risk factors that can contribute to musculoskeletal pain, particularly LBP (47). Dentists often face challenges such as prolonged periods of sitting or standing, repetitive motions, awkward postures during patient treatment, and the use of heavy dental equipment (48).

Numerous studies have shown a high prevalence of LBP among physicians (49), with findings indicating a substantial lifetime prevalence rate of 83.9% (50). Physicians are more likely to experience LBP and other types of musculoskeletal pain due to a number of factors such as repetitive twisting, bending, prolonged maintenance of awkward postures, and lifting heavy loads (51). Compared to other musculoskeletal problems, LBP is more common among medical professionals, according to numerous research (52).

Duration of job

The duration of time spent in a particular job or occupation seems to have a major role in the development or likelihood of experiencing LBP. As individuals accumulate more years of

work experience, they may encounter various occupational factors that contribute to LBP, such as repetitive tasks, poor ergonomics, or physically demanding activities (53). In contrast, a study revealed that workers with less than 5 years of working were more prone to experiencing back discomfort compared to those with 5 or more years of work experience (54). Employees with relatively shorter tenure or less work experience might generally exhibit a lack of awareness and proficiency regarding methods for hazard control and safety. Consequently, they are more susceptible to accidents and injuries at work.

Departments in Healthcare facilities

Among different medical specialities, the workplace, internal medicine, orthopaedics, and neurology have been identified as having the highest prevalence rates of LBP (19). The demanding nature of the work in these departments, which often involves prolonged periods of standing, patient handling, and exposure to physically challenging tasks, may contribute to the higher prevalence rates observed in these specialities (13). Additionally, orthopaedics and neurology professionals specifically deal with musculoskeletal and neurological conditions (55), respectively, which may involve increased exposure to LBP cases and potential occupational risks. Due to the scarcity of data on various departments, further exploration is necessary to fully understand the prevalence rates of LBP among HCWs in different medical specialities.

Nature of work in the healthcare facility

Research conducted worldwide suggests that the nature of work in healthcare facilities is linked to the occurrence of LBP among HCWs. Roles that involve strenuous physical work, such as patient handling, lifting, and prolonged standing, are known to elevate the likelihood of developing LBP (19). This has been supported by studies which have stated that nurses, who are often involved in direct patient care, have a prevalence of LBP that is higher compared to other healthcare professionals (56).

Job satisfaction

Job dissatisfaction and monotonous work are significant factors that lead to the development of LBP (57). However, job satisfaction and stress in the workplace have been consistently and

strongly linked with the onset of LBP compared to the direct psychosocial work characteristics themselves (58). In contrast to those findings, a study conducted in Turkey revealed evidence supporting that an intensified workload can be considered a factor for the development of LBP, however, there isn't much data to support the interaction between low job control and job dissatisfaction with LBP (59).

Work-related stress

The presence of work-related psychosocial stressors has been associated with an elevated risk of developing musculoskeletal disorders, including LBP (60). Factors including job demands, over-commitment at work, job control, and colleagues' social support are significant predictors of stress-related outcomes (61), whereas emotional exhaustion has been recognized as a potent predictor of work-related accidents in the healthcare workforce (62).

Occupational health training

Significant evidence has shown that training is the primary strategy for mitigating and preventing occupational LBP in healthcare organizations (63). This enhances the capacity for prevention by boosting knowledge about LBP prevention, individual physical capabilities, skills in work practices, and attitudes towards work (64). One study showed that involvement in training aimed at preventing LBP was indicative of one's capacity to prevent occupational LBP. Furthermore, nurses who had previously taken part in this training exhibited enhanced prevention capabilities (65).

2.2.3 Lifestyle factors

Physical activities

Studies have consistently shown that both excessive and insufficient physical exercise, are attributed to a heightened risk of LBP (66). Individuals engaged in excessive physical activity, such as heavy lifting, repetitive movements, or demanding work tasks, may be more susceptible to developing LBP due to the strain placed on their lower back (67). Conversely, individuals with insufficient physical activity or a sedentary lifestyle are also at an increased risk of having LBP (66). Prolonged periods of inactivity and sedentary behaviour, such as

engaging in minimal physical movement, can contribute to muscle weakness, poor posture, and reduced flexibility, all of which may contribute to the development of LBP (68).

Smoking

Smoking has been found to be associated with LBP. Both former smokers and current have been found to exhibit a higher LBP prevalence compared to individuals who have never smoked (69). However, it is crucial to remember that the strength of this association is relatively modest, suggesting that other factors may also lead to the development of LBP (70).

Alcohol

The use of alcohol has been attributed to the LBP prevalence, but this association is relatively modest and not uniformly observed across studies (71). The relationship between alcohol use and LBP seems to be most relevant in individuals with alcohol consumption and those experiencing complex and chronic LBP (72). It is essential to recognize that the association between alcohol use and LBP is complex and may be influenced by various confounding factors including lifestyle, overall health, and co-occurring behaviours (73,74).

2.2.4 Psychological factors

Fatigue

There is moderate evidence indicating that individuals experiencing fatigue are more likely to report higher levels of LBP intensity compared to those without fatigue. Additionally, there is also moderate evidence suggesting that individuals with fatigue are more prone to have higher levels of disability related to LBP compared to those without fatigue (75). Fatigue has been found to be associated with heightened pain during the pain episode and is further increased 24 hours after the pain has occurred (76). While studies on the association between LBP and fatigue are limited, there is a potential relationship between the two. Although conclusive evidence is lacking, there are indications that fatigue may have an impact on the experience and perception of LBP.

Depression

Consistently, there's been evidence pointing to a connection between low back pain and depression in adults through various observational studies. Research indicates that individuals with depression are around 60% more prone to developing back pain during their lifetime compared to those who are not affected by depression (77). A study unveiled that participants categorized as at-risk for depression displayed heightened odds of reporting LBP, particularly at the more severe levels of LBP (8).

Anxiety

Anxiety has evidently been found to be associated with LBP (78) and existing literature implies that anxiety often precedes the onset of chronic LBP (79). Research demonstrated that the concurrent presence of depression and anxiety was a substantial predictor of pain intensity among newly admitted hospital patients with LBP. Additionally, a pronounced positive correlation between depression and anxiety in these individuals was noted (80).

Stress

The level of perceived stress among individuals within distinct occupational categories has been highlighted as a factor leading to chronic LBP (60). Research affirmed that the extent of stress exhibited a noteworthy positive correlation with chronic LBP. Specifically, severe stress was linked to a 2.8 times higher likelihood of developing chronic LBP in comparison to the general population (81).

Sleep disturbance

LBP stands as a prevalent musculoskeletal problem, and its correlation with sleep disruption has also been documented. Earlier research has demonstrated that individuals suffering from LBP frequently express concerns about sleep disturbances, and those who experience sleep disruption tend to exhibit more intense LBP (82). The occurrence of sleep disruption among individuals with chronic LBP was documented to be around 50% to 60% (83). It was also demonstrated that 48.5% of participants experiencing LBP encountered sleep disturbances, despite the fact that the LBP wasn't exclusively chronic in nature (83).

Despite the extensive body of literature on LBP among HCWs globally and in various parts of Africa, there remains a critical gap in understanding the prevalence and risk factors of LBP among HCWs in Tanzania, specifically in the Nyamagana District. While several studies have highlighted the high prevalence of LBP in other regions and healthcare settings, little attention has been paid to the specific context of Tanzanian HCW, especially in public primary healthcare facilities. The lack of research in this area limits our ability to develop effective strategies for preventing and managing LBP within this population. This study aims to address this gap by investigating the prevalence of LBP and identifying the associated factors among HCWs in Nyamagana District. The findings will provide essential insights to inform targeted interventions, improve occupational safety, and promote the health and well-being of healthcare professionals, thereby enhancing the overall quality of patient care.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Study design

This study employed a cross-sectional design to collect data from healthcare workers who are working at primary healthcare facilities in the Nyamagana district.

3.2 Study area

Nyamagana District is situated in the Mwanza Region, Tanzania, and is one of its seven districts. It is geographically located at approximately 2° South latitude and 32° East longitude, covering a land area of 182.7 km2 (84). The district shares borders with Ilemela District to the north, Magu District to the east, Misungwi District to the south, and the Mwanza Bay of Lake Victoria to the west. As of the 2022 census, Nyamagana district has a population of 594,834 residents (85).

The healthcare needs of the population are catered to by a total of 155 health facilities within the district and among them, 22 health facilities are primary health facilities owned by the Government. Among those facilities owned by the Government, one is a district hospital, three are health centres, and eighteen health facilities are dispensaries (86) with a total of 499 government-employed healthcare workers.

3.3 Study population

The study population was healthcare workers who were permanently employed at primary healthcare facilities in Nyamagana district. This group encompassed approximately 499 individuals from different health cadres. Sampling was conducted to obtain the required sample size for the study.

3.4 Selection Criteria

3.4.1 Inclusion criteria

- Permanently employed healthcare workers who had worked more than 3 months at primary health facilities in Nyamagana district
- Healthcare workers who voluntarily were interested in participating in the study

3.4.2 Exclusion criteria

- Healthcare workers who had a previous history of low back surgery, pre-existing medical conditions or injuries that significantly affected their musculoskeletal system.
- Pregnant healthcare workers.

3.5 Sample size

The sample size was determined based on the Kish Leslie formula below (87), taking into consideration that the anticipated prevalence (P) of low back pain among healthcare workers was 73.6% (15).

$$S = \frac{Z^2 x\ P(1-P)}{e^2}$$

Where:

S=Sample size

P=Prevalence

e=Standard error

z=1.96 at 95% CI

e =5% acceptable margin of error

P= an anticipated prevalence of LBP of 73.6% (15).

$$S = \frac{1.96^2 x\ 0.736(1-0.736)}{0.05^2} = 299$$

We assumed a 10% non-response rate giving an adjusted sample size = desired sample size/ (1- Non-response rate)

Adjusted sample size $= 299/(\ 1 - 0.1)$ = 333

The sample size was **333** healthcare workers in Nyamagana district.

3.6 Sampling technique

The District Medical Officer's (DMO) office provided a list of all HCWs who were employed permanently and were working in Nyamagana District, which served as the sample frame. The HCWs were then grouped according to their health cadres and each HCW was assigned a unique ID in Microsoft Excel. A simple random selection of participants from each cadre based on a proportional sampling technique was obtained using an Open epi random number generator. Once the random numbers have been generated, the selection of the HCW corresponding to those numbers from the list was done and the selected participants were contacted for enrollment into the study. The number of HCWs that were selected from each cadre was obtained using the formula: (sample size/population size)*stratum size.

Table 1: Number of healthcare providers working at primary healthcare facilities in Nyamagana district

S/N	JOB TITLE	NUMBER	No. of HCW that was selected (333/499*X)
1	Medical Officers	21	14
2	Assistant Medical Officers	13	9
3	Dental Officer*	1	Not selected
4	Assistant Dental officer	1	1
5	Clinical Officers	69	46
6	Assistant Clinical Officers	9	6
7	Nursing Officers	13	9
8	Assistant Nursing Officers	94	63
9	Enrolled Nurses	181	121
10	Medical Attendants	41	27
11	Lab Technologists	14	9
12	Assistant Lab Technologists	7	5
13	Pharmacists	3	2
14	Pharmaceutical Technologists	15	10
15	Assistant Pharmaceutical Technologists	8	5
16	Radiologists	3	2
17	Nutritional officer	2	1
18	Optometrist	1	1
19	Physiotherapist	1	1
20	Dental Therapist	2	2
TOTAL		499	335

*The dental officer was not selected because he was out of the workplace during the study period

3.7 Variables

The dependent variable was low back pain which is categorical with only two possible responses that are either the presence of LBP (Yes) or not present (No). It was assessed using a NMQ which is a globally validated tool for assessing musculoskeletal disorders.

The independent variables were age, sex, marital status, BMI, health facility type, job title, department, nature of work in the HF, job satisfaction, occupational health training, depression, anxiety, stress, fatigue, sleep disturbance, smoking, alcohol and physical activity.

BMI was calculated using weight and height measurements in Kg/M^2. The BMI was classified as; $< 18.5\ Kg/M^2$ = underweight; 18.5 to 24.9 Kg/M^2 = normal; 25 to 29.9 Kg/M^2=overweight; $\geq 30\ Kg/M^2$ = obesity(88).

Health facility type (Dispensary, Health centre and Hospital)

Job title included;

-Clinicians (Medical Officers, Assistant Medical Officers, Dental officers, Assistant Dental Officers, Clinical Officers, Assistant Clinical Officers)

-Laboratory personnel (laboratory technicians and assistant laboratory technicians)

-Nurses (Nursing Officers, Assistant Nursing Officers, Enrolled Nurses, Medical Attendants)

-Pharmacy personnel (Pharmacist, pharmacy technicians, assistant pharmacy technicians)

-Other job title (radiologist, nutritional officer, optometrist and dental therapist)

Departments included; HIV Care and Treatment Centers (CTC), Laboratory, labour ward, Out Patient Department (OPD), pharmacy, postnatal ward, Reproductive and Child Health clinic (RCH) and other departments (theatre, male ward, female ward, paediatrics ward, dental unit, radiology, emergency department, traditional medicine and laundry).

The nature of work in the HF was assessed with a set of questions developed using a 5-point Likert scale probing on physical demanding, bending frequently, working conditions and physical environment satisfaction, working in awkward/cramped positions and workload control.

Job satisfaction was assessed using a 5-point Likert scale (*very satisfied, satisfied, neutral, dissatisfied and very dissatisfied*)

Occupational health training (Yes, No)

Depression, anxiety, stress, fatigue and sleep disturbance were assessed with questions developed using a 5-point Likert scale (*Always, often, sometimes, rarely and never*)

Smoking habit (Yes, No)

Alcohol intake (Yes, No)

Physical activity was assessed with a question developed using a 5-point Likert scale (*Every day, often, sometimes, rarely and never*)

3.8 Validity and reliability

A structured questionnaire partly adopted from NMQ was initially developed in English language and then translated into Swahili.

The questionnaire was pretested to 16 HCWs at Sekou Toure Regional Referral Hospital to verify its quality, reliability and validity. A question on the work-related factors reading “How often do you experience stress at work?” was removed due to the repetition of the same question in psychological factors. Internal reliability was then assessed using Cronbach’s alpha.

To ensure better comprehension and accurate communication of the responses, the participants were given the option to respond to the questionnaire in either Swahili or English, depending on their preference.

Two research assistants received one-day training, where they were familiarized with the study's objectives, data collection procedures, the questionnaire, and the ethical principles guiding this research.

3.9 Data collection

Data was collected using an interviewer-administered questionnaire that was developed based on Nordic Musculoskeletal Questionnaire (NMQ) (89) and known risk indicators for low back pain as described by Kwon (2006) (90). The standardized questionnaire included questions that collected information on demographic characteristics (Age, sex, marital status, BMI health facility type, job title, department and job duration/ years of experience), work-related factors (physical demanding, bending frequently, working condition and physical environment satisfaction, working in awkward/cramped position workload control, job satisfaction and occupational health training), lifestyle factors (smoking habit, alcohol intake habit and physical exercise), psychological factors (Depression, anxiety, stress, fatigue and sleep disturbance) and LBP. The following questions were used to measure LBP: 1 Are you currently experiencing low back pain? (Yes, No), 2 Have you experienced low back pain in the 12 months? (Yes, No) 3 Do you notice any improvement in your lower back pain when you are away from work or during days off? (Yes, No) 4 Have you sought medical treatment for your lower back pain? (Yes, No) and 5 How do you manage or cope with your lower back pain at work? (Taking pain medication, Modifying my posture during work, Taking short breaks to rest, Engaging in exercises or stretching, Using supportive devices or equipment, Seeking help from a healthcare provider or occupational health specialist).

Body Mass Index (BMI) was determined using the formula Kg/M^2, which involves calculating an individual's weight in kilograms divided by the square of their height in meters. For the measurement of height and weight, an analogue MED SEEUCO weighing scale was used. The researchers performed daily recalibration of this instrument prior to the start of the activities to ensure its accuracy and reliability. The BMI was classified as; < 18.5 kg/m^2 = underweight; 18.5 to 24.9 kg/m^2 = normal; 25 to 29.9 kg/m^2=overweight; $\geq$ 30 kg/m^2= obesity (88).

Responses from the interview and the measurements were recorded electronically through Kobo Collect and directly entered into the computer system.

3.10 Data analysis

Data was extracted from the Kobo collect tool, cleaned using MS Excel and then analyzed with Stata statistical software version 15.1.

The demographic variables were presented using frequencies and percentages for all categorical data, and median and Interquartile range (IQR) for continuous variables. For questions developed using a 5-point Likert scale, a new binary variable was created which collapsed those responses with *Always*, *Often* and *Sometimes* (as they were treated as YES) against *Rarely* and *Never* (treated as NO). Skewness-kurtosis was used to test for the normality of data. Fisher's exact and Pearson's chi-square was used for the comparison of categorical variables.

Bivariable analysis was conducted to identify associations between LBP and the factors of interest whereby the chi-square test was used to compare the prevalence of LBP between demographic, work-related, psychological and lifestyle factors. A multivariable analysis was conducted to identify the independent factors associated with LBP whereby Modified Poisson with robust error regression model adjusted for age, sex and BMI (potential confounders) was used for estimating Prevalence Ratio (PR) and 95% CI. Factors with a p-value of ≤ 0.05 were considered as significant.

3.11 Ethical consideration

Ethical clearance was sought from the institutional Ethical Review Board of the Muhimbili University of Health and Allied Sciences (MUHAS) research and publication committee with approval number MUHAS-REC-02-2024-2058. We also sought approval from the office of the Regional Medical Officer (RMO) in Mwanza, and that of the District Medical Officer (DMO) in Nyamagana District. Additionally, explicit permission to conduct this study was secured from the officers in charge of the respective healthcare facilities.

The purpose of the study was explained to the participants, and those who freely consented to participate provided written or verbal consent. A copy of the permission form, which includes contact details for study staff and Institutional Review Boards (IRBs) in case participants wanted to report any problems with their participation or request more information, was provided by the researcher and research assistants during the data collection process. The consent form was signed by the researcher and researcher assistants to attest to the participant's understanding of the process and their voluntary agreement to participate.

The data collected was treated privately and did not contain any participant identification. All collected data were entered into a computer with password protection accessible to only the researcher. Access to the data was limited to authorized personnel directly involved in this study. This study was expected to cause no harm than minimal risk physically or psychologically. Participants were treated with respect and dignity and their rights to privacy and confidentiality were observed.

CHAPTER FOUR

4.0 RESULTS

4.1 Socio-demographic characteristics of healthcare workers in Nyamagana District, Mwanza Region

There was a total of 334 participants in the study, of whom, 235 (70.36%) were female HCWs. Of the 334 participants, 149 (44.6%) were aged between 25 and 35 years and the median age was 36.5 years (IQR = 31, 44). Of those who participated, 140 (41.92%) were overweight, 243 (72.75%) were married and more than a half 220 (65.87%) were nurses. This information is summarized in the table below:

Table 2: Socio-demographic Characteristics of Health Care Workers in Nyamagana District, Mwanza Region

Variable	Frequency (n=334)	Percentage (%)
Age group		
25-35	149	**44.6**
36-45	119	35.6
>45	66	19.8
Sex		
Female	235	**70.4**
Male	99	29.6
BMI		
Normal	128	38.3
Overweight	140	**41.9**
Obese	66	19.8
Marital status		
Cohabiting	3	0.9
Divorced	4	1.2
Married	243	**72.8**
Separated	6	1.8
Single	66	19.8
Widowed	12	3.6
Job title		
Clinician*[1]	76	22.8
Lab personnel*[2]	14	4.2
Nurse*[3]	220	**65.9**
Pharmacy personnel*[4]	17	5.1
Other job title**	7	2.1

**Other job titles included radiologist, nutritional officer, optometrist physiotherapist and dental therapist. *[1]Clinicians (MO, AMO, DO, ADO, CO, ACO), *[2]Lab personnel (Lab tech and Assist. Lab tech), *[3]Nurse (NO, ANO, EN, MA), *[4]Pharmacy personnel (Pharmacist, Pharm tech and Assist. Pharm tech)

4.2 Prevalence rate of Low Back Pain among HCW

The point prevalence of LBP among HCWs in Nyamagana district was 40.12% (95% CI: 35%-45%) and the annual prevalence was 44% (95% CI: 39%- 49%) (See **Figure 1** below).

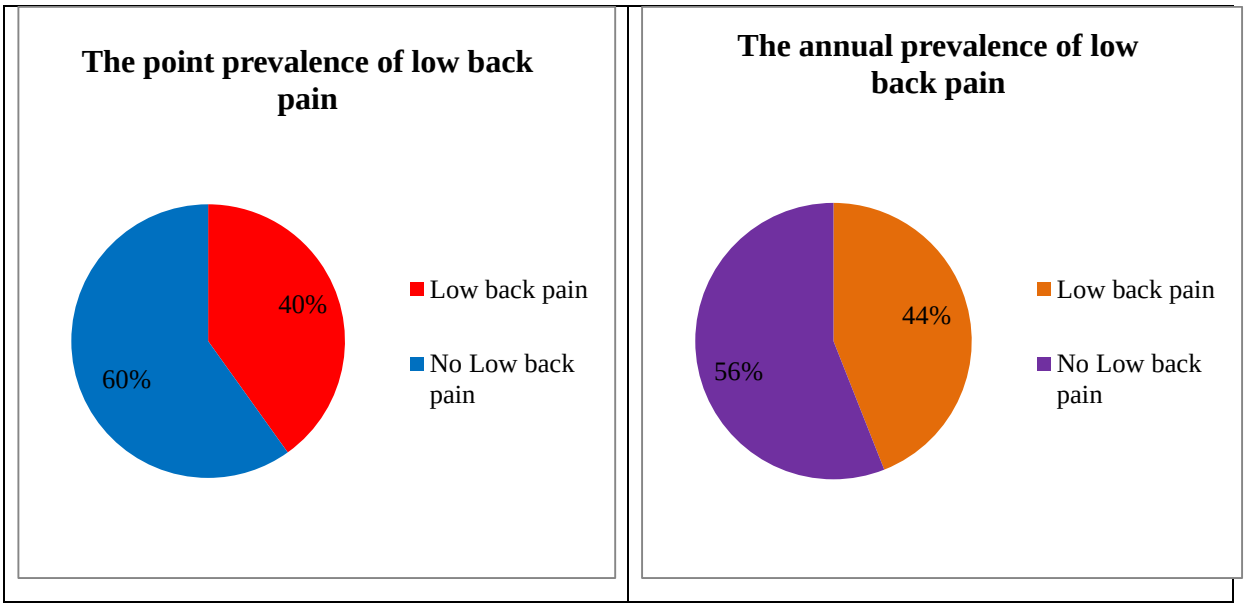


Figure 2: The point and annual prevalence of low back pain among health care workers of Nyamagana District

4.2.1 Prevalence of low back pain by demographic characteristics

From the 334 participants' data analyzed, the prevalence of LBP among female participants was 47.23% ($p<0.001$). The prevalence of LBP among HCWs aged 36-45 years and >45 years was 62 (52.10%) and 34 (51.52%) respectively ($p<0.001$). Moreover, 36 (54.55%) of the obese HCWs and 60 (42.86%) of the overweight HCWs had LBP ($p=0.003$). Additionally, nurses and clinicians had developed LBP with a prevalence of 102 (46.36%) and 26 (34.21%) respectively ($p<0.005$). HCWs working at the Post-natal ward, RCH and other departments* had a prevalence of 12 (66.67%), 32 (50.79%) and 25 (54.35%) respectively ($p=0.005$). This study also found that the prevalence of LBP among HCWs who had worked for Less than 10 years was 34 (21.79%) and those who had worked for 10 years and above had a prevalence of

100 (56.18%)(p<0.001). **Table 3** below provides detailed information on the prevalence rates across different demographic characteristics.

Table 3: The prevalence of low back pain among health care workers in Nyamagana District by demographic characteristics

Variable	Total	Low back pain n (%)		p-value (chi2)
		Yes	No	
	N=334	n=134	n=200	
Age				
25-35	149	38 (25.85)	111 (74.50)	
36-45	119	62 (52.10)	57 (47.90)	
>45	66	34 (51.52)	32 (48.48)	<0.001
Sex				
Female	235	111 (47.23)	124 (52.77)	
Male	99	23 (23.23)	76 (76.77)	<0.001
BMI				
Normal	128	38 (29.69)	90 (70.31)	
Overweight	140	60 (42.86)	80 (57.14)	
Obese	66	36 (54.55)	30 (45.45)	0.003
Marital status				
Cohabiting	3	0 (0.00)	3 (100.00)	
Divorced	4	2 (50.00)	2 (50.00)	
Married	243	110 (45.27)	133 (54.73)	
Separated	6	4 (66.67)	3 (33.33)	
Single	66	11 (16.67)	55 (83.33)	
Widowed	12	7 (58.33)	5 (41.67)	<0.001*
Job title				
Clinician	76	26 (34.21)	50 (65.79)	

Lab personnel	14	3 (21.43)	11 (78.57)	
Nurse	220	102 (46.36)	118 (53.64)	
Pharmacy personnel	17	2 (11.76)	15 (88.24)	
Other job titles	7	1 (14.29)	6 (85.71)	0.005*
Health facility type				
Dispensary	97	41 (42.27)	56 (57.73)	
Health center	109	34 (31.19)	75 (68.81)	
Hospital	128	59 (46.09)	69 (53.91)	0.058
Department				
CTC	34	10 (29.41)	24 (70.59)	
Laboratory	16	6 (37.50)	10 (62.50)	
Labour ward	33	13 (39.39)	20 (60.61)	
OPD	99	30 (30.30)	69 (69.70)	
Pharmacy	25	6 (24.00)	19 (76.00)	
Postnatal ward	18	12 (66.67)	6 (33.33)	
RCH	63	32 (50.79)	31 (49.21)	
Other departments***	46	25 (54.35)	21 (45.65)	0.005
Job duration (Years)				
Less than 10 years	156	34 (21.79)	122 (78.21)	
10 years and above	178	100 (56.18)	78 (43.82)	<0.001

***Other departments included theatre, male ward, female ward, paediatrics ward, dental unit, radiology, emergency department, traditional medicine and laundry, * Fisher's exact

4.2.2 Prevalence of low back pain by work-related factors

LBP among HCWs who did not receive support from their supervisors was 36 (54.55%) (p=0.008). On the other hand, LBP among HCWs with physically demanding jobs, bending frequently and those who were working in awkward or cramped positions was 25 (51.02%), 36 (48.00%) and 3 (50.00%) respectively but this was not statistically significant. **Table 4** below details this information.

Table 4: The prevalence of low back pain among health care workers in Nyamagana District by their work-related factors

Variable	Total	Low back pain n (%)		p-value
		Yes	No	
	N=334	n=134	n=200	
Physically demanding job				
Yes	49	25 (51.02)	24 (48.98)	
No	285	109 (38.25)	176 (61.75)	0.092
Bending frequently				
Yes	75	36 (48.00)	39 (52.00)	
No	259	98 (37.84)	161 (62.16)	0.114
Working in Awkward or cramped positions				
Yes	6	3 (50.00)	3 (50.00)	
No	328	131 (39.94)	197 (60.06)	0.687*
Job satisfaction				
Yes	313	123 (39.30)	190 (60.70)	
No	21	11 (52.38)	10 (47.62)	0.236
Working conditions and physical environment satisfaction				
Yes	140	48 (34.29)	92 (65.71)	
No	194	86 (44.33)	108 (55.67)	0.065
Workload control				
Complete control	182	71 (39.01)	111 (60.99)	
Limited control	152	63 (41.45)	89 (58.55)	0.651
Supervisor's support				
Yes	268	98 (36.57)	170 (63.43)	
No	66	36 (54.55)	30 (45.45)	0.008
Workplace occupational health training				
Yes	124	55 (44.35)	69 (55.65)	
No	210	79 (37.62)	131 (62.38)	0.225

* Fisher's exact

4.2.3 Prevalence of low back pain by psychological factors

Among the psychological factors that were assessed, it was found that LBP among HCWs who felt fatigue was 61 (52.59%) (p=0.001). Additionally, LBP among HCWs with stress, depression, sleep disturbance and those who felt anxiety was 11 (57.89%), 8 (57.14%), 6 (60.00%) and 5 (71.43%) respectively but these were not statistically significant. **Table 5** below shows the details.

Table 5: The prevalence of low back pain among health care workers in Nyamagana District by psychological factors

Variable	Total	Low back pain n (%)		p-value
		Yes	No	
	N=334	n=134	n=200	
Stress				
Yes	19	11 (57.89)	8 (42.11)	
No	315	123 (39.05)	192 (60.95)	0.104
Depression				
Yes	14	8 (57.14)	6 (42.86)	
No	320	126 (39.38)	194 (60.62)	0.184
Sleep disturbance				
Yes	10	6 (60.00)	4 (40.00)	
No	324	128 (39.51)	196 (60.49)	0.208*
Feel fatigued				
Yes	116	61 (52.59)	55 (47.41)	
No	218	73 (33.49)	145 (66.51)	0.001
Feel anxiety				
Yes	7	5 (71.43)	2 (28.57)	
No	327	129 (39.45)	198 (60.55)	0.122*

* Fisher's exact

4.2.4 Prevalence of low back pain by lifestyle factors

LBP among HCWs who do not smoke, drink alcohol or do physical exercise was 134 (40.48%), 103 (41.20%) and 87 (41.23%) respectively but these were not statistically significant (see **Table 6**).

Table 6: The prevalence of low back pain among health care workers in Nyamagana District by lifestyle factors

Variable	Total	Low back pain n (%)		p-value
		Yes	No	
	N=334	n=134	n=200	
Smoking habit				
Yes	3	0 (0.00)	3 (100.00)	
No	331	134 (40.48)	197 (59.52)	0.277*
Alcohol drinking				
Yes	84	31 (36.90)	53 (63.10)	
No	250	103 (41.20)	147 (58.80)	0.487
Physical exercise				
Yes	123	47 (38.21)	76 (61.79)	
No	211	87 (41.23)	124 (58.77)	0.587

* Fisher's exact

4.3 The factors associated with LBP among HCW

4.3.1 Demographic factors associated with LBP

The risk of developing LBP was increasing significantly with age 36-45 years (aPR 1.19, 95% CI: 1.09-1.29) and over 45 years (aPR 1.19, 95% CI: 1.09-1.31). Our study revealed that being a female was associated with a higher risk of developing LBP (aPR 1.16, 95% CI: 1.07-1.25). Moreover, the study shows that HCWs who were obese were more likely to develop LBP (aPR 1.10, 95% CI: 1.00-1.22). Furthermore, HCWs who were cohabiting and those who were single were less likely to develop LBP (aPR 0.76, 95% CI: 0.70-0.83) and (aPR 0.88, 95% CI: 0.80-0.97) respectively. In this study, we found that HCWs working at the hospital level health facility were more likely to develop LBP (aPR 1.12, 95% CI: 1.03-1.21) and also HCWs who were working at postnatal ward, RCH and other departments* were more likely to develop LBP (aPR 1.32, 95% CI: 1.10-1.58), (aPR 1.17, 95% CI: 1.01-1.36) and (aPR 1.25, 95% CI:

1.08-1.46) respectively. Furthermore, our study found that HCWs who had worked for 10 years and above were more likely to develop LBP (aPR 1.22, 95% CI: 1.11-1.34). **Table 7** below summarizes this information.

Table 7: The demographic factors associated with low back pain among health care workers in Nyamagana District

Variable	Total N=334	Crude Analysis cPR (95% CI)	P	Adjusted Analysis aPR (95% CI)	P
Age (Years)					
25-35	149	**Ref**		**Ref**	
36-45	119	1.21 (1.11-1.31)	<0.001	1.19 (1.09-1.29)	<0.001
>45	66	1.20 (1.10-1.33)	<0.001	1.19 (1.09-1. 31)	<0.001
BMI (Kg/M$^{2)}$					
Normal	128	**Ref**		**Ref**	
Overweight	140	1.10 (1.01-1.20)	0.024	1.07 (0.99-1.16)	0.102
Obese	66	1.19 (1.08-1.31)	0.001	1.10 (1.00-1.22)	0.050
Sex					
Male	99	**Ref**		**Ref**	
Female	235	1.20 (1.10-1.30)	<0.001	1.16 (1.07-1.25)	<0.001
Marital status					
Cohabiting	3	0.69 (0.66-0.72)	<0.001	0.76 (0.70-0.83)	<0.001
Divorced	4	1.03 (0.74-1.44)	0.849	0.93 (0.67-1.29)	0.659
Married	243	**Ref**		**Ref**	
Separated	6	1.15 (0.91-1.45)	0.243	1.14 (0.89-1.46)	0.310
Single	66	0.80 (0.74-0.88)	<0.001	0.88 (0.80-0.97)	0.012
Widowed	12	1.09 (0.91-1.31)	0.353	1.01 (0.84-1.21)	0.899
Job title					
Clinician	76	**Ref**		**Ref**	
Lab personnel	14	0.90 (0.74-1.10)	0.313	0.89 (0.74-1.07)	0.224
Nurse	220	1.09 (0.99-1.20)	0.063	1.03 (0.94-1.12)	0.540
Pharmacy personnel	17	0.83 (0.71-0.98)	0.024	0.82 (0.70-0.95)	0.010
Other job titles	7	0.85 (0.67-1.08)	0.191	0.85 (0.66-1.08)	0.182
Health Facility type					

Dispensary	97	1.08 (0.99-1.19)	0.098	1.08 (0.98-1.18)	0.115
Health center	109	**Ref**		**Ref**	
Hospital	128	1.11 (1.02-1.22)	0.018	1.12 (1.03-1.21)	0.010
Departments					
CTC	34	1.04 (0.87-1.25)	0.641	1.02 (0.87-1.21)	0.773
Laboratory	16	1.11 (0.89-1.38)	0.356	1.11 (0.92-1.35)	0.276
Labour ward	33	1.12 (0.94-1.35)	0.204	1.16 (0.99-1.37)	0.072
OPD	99	1.05 (0.90-1.22)	0.523	1.07 (0.93-1.23)	0.324
Others departments***	25	1.25 (1.06-1.47)	0.009	1.25 (1.08-1.46)	0.004
Pharmacy	46	**Ref**		**Ref**	
Postnatal ward	18	1.34 (1.11-1.62)	0.002	1.32 (1.10-1.58)	0.003
RCH	63	1.22 (1.04-1.42)	0.015	1.17 (1.01-1.36)	0.040
Job duration					
10 years and above	178	1.28 (1.19-1.38)	<0.001	1.22 (1.11-1.34)	<0.001
Less than 10 years	156	**Ref**		**Ref**	

***Other departments included theatre, male ward, female ward, paediatrics ward, dental unit, radiology, emergency department, traditional medicine and laundry. Adjusted for Age, Sex and BMI

4.3.2 Work-related factors associated with LBP

HCWs who had physically demanding jobs at the workplace were more likely to have LBP (aPR 1.12, 95% CI: 1.01-1.23). Moreover, HCWs who did not receive support from their supervisors were more likely to develop LBP (aPR 1.13, 95% CI: 1.03-1.22). **Table 8** below shows the details.

Table 8: The work-related factors associated with low back pain among health care workers in Nyamagana District

Variable	Total N=334	Crude Analysis cPR (95% CI)	P	Adjusted Analysis aPR (95% CI)	P
Physical demanding					
Yes	49	1.09 (0.99-1.21)	0.088	1.12 (1.01-1.23)	0.026
No	285	**Ref**		**Ref**	
Bending frequently					
Yes	75	1.07 (0.98-1.17)	0.112	1.08 (0.99-1.17)	0.090
No	259	**Ref**		**Ref**	
Awkward or cramped positions					
No	328	**Ref**		**Ref**	
Yes	6	1.07 (0.81-1.40)	0.614	1.12 (0.85-1.49)	0.418
Job satisfaction					
No	21	1.09 (0.95-1.27)	0.227	1.14 (0.99-1.32)	0.073
Yes	313	**Ref**		**Ref**	
Working conditions and physical environment satisfaction					
No	194	1.07 (0.99-1.16)	0.063	1.06 (0.99-1.14)	0.122
Yes	140	**Ref**		**Ref**	
Workload control					
Complete control	182	**Ref**		**Ref**	
Limited control	152	1.02 (0.94-1.10)	0.651	1.01 (0.94-1.09)	0.741
Supervisor support					
No	66	1.13 (1.04-1.24)	0.006	1.13 (1.03-1.22)	0.006
Yes	268	**Ref**		**Ref**	
Workplace occupational health training					
No	210	**Ref**		**Ref**	
Yes	124	1.05 (0.97-1.13)	0.225	1.01 (0.94-1.09)	0.823

Adjusted for Age, Sex and BMI

4.3.2 Psychological factors associated with LBP

This study shows that HCWs who felt fatigued and those with stress were more likely to develop LBP (aPR 1.13, 95% CI: 1.05-1.22) and (aPR 1.15, 95% CI: 1.00-1.32) respectively. Other psychological factors which were assessed were not significantly associated with LBP. **Table 9** below details this information.

Table 9: The psychological factors associated with low back pain among health care workers in Nyamagana District

	Total	**Crude Analysis**		**Adjusted Analysis**	
Variable	**N=334**	**cPR (95% CI)**	**P**	**aPR (95% CI)**	**P**
Stress					
No	315	**Ref**		**Ref**	
Yes	19	1.14 (0.98-1.31)	0.088	1.15 (1.00-1.32)	0.049
Depression					
No	320	**Ref**		**Ref**	
Yes	14	1.13 (0.95-1.34)	0.166	1.11 (0.94-1.31)	0.218
Sleep disturbance					
No	324	**Ref**		**Ref**	
Yes	10	1.15 (0.94-1.39)	0.166	1.13 (0.95-1.33)	0.166
Feel fatigued					
Yes	116	1.14 (1.06-1.23)	0.001	1.13 (1.05-1.22)	0.001
No	218	**Ref**		**Ref**	
Feel anxiety					
Yes	7	1.23 (1.01-1.50)	0.042	1.17 (0.98-1.40)	0.080
No	327	**Ref**		**Ref**	

Adjusted for Age, Sex and BMI

4.3.2 Lifestyle factors associated with LBP

Our study shows that smoking habit had a protective effect on LBP (aPR 0.79, 95%, CI: 0.71-0.88). Alcohol drinking and physical exercise were not significantly associated with LBP (see **Table 10** below).

Table 10: The lifestyle factors associated with low back pain among health care workers in Nyamagana District

	Total	**Crude Analysis**		**Adjusted Analysis**	
Variable	**N=334**	**cPR (95% CI)**	**P**	**aPR (95% CI)**	**P**
Smoking habit					
No	331	**Ref**		**Ref**	
Yes	3	0.71 (0.69-0.74)	<0.001	0.79 (0.71-0.88)	<0.001
Alcohol drinking					
No	250	**Ref**		**Ref**	
Yes	84	0.97 (0.89-1.06)	0.487	1.00 (0.92-1.08)	0.979
Physical exercise					
Yes	123	**Ref**		**Ref**	
No	211	1.02 (0.95-1.10)	0.587	0.96 (0.89-1.04)	0.353

Adjusted for Age, Sex and BMI

CHAPTER FIVE

5.0 DISCUSSION

This study aimed to determine the prevalence of LBP and the factors associated with LBP among healthcare workers at the primary healthcare facilities of Nyamagana District. The findings of this study have demonstrated a higher prevalence of LBP (point: 40%, annual: 44%) among HCWs. The current study found that LBP increases with age and it was high among nurses, female participants and obese individuals. It was also found that higher age groups, females, working at hospital level HF, post natal ward, RCH, and other departments, work experience of 10 years and above, physically demanding tasks, lack of supervisors' support, fatigue and stress were the factors associated with increased risk of LBP. This study shows that pharmacy personnel and smoking habits were factors associated with reduced risk of developing LBP.

5.1 Prevalence of LBP

The current study found that the point prevalence of LBP was higher compared with that from the study done in Nigeria which was reported to be 30% in nurses (29). However, this estimate was lower than the reported prevalence from studies conducted in Tanzania, South Africa, Ethiopia, Tunisia, Malaysia and Pakistan studies (15,30–33). Moreover, we reported an annual prevalence of 44% among HCWs, which differs from the one reported by the study done in a systematic review in 2021 (19) and similar results reported from Turkey and Thailand (23,28). These differences can be attributed to varying occupational demands, ergonomic practices, healthcare system resources, cultural attitudes towards pain reporting, and demographic differences among healthcare workers (91).

The high prevalence of LBP among healthcare workers in Nyamagana District indicates a significant impact on workforce productivity and workplace health. Targeted ergonomic interventions, supervisor support, and preventive strategies are essential to reduce LBP risks, particularly among vulnerable groups like older, female, and obese workers.

5.2 Demographic factors associated with LBP

This study reveals that the likelihood of developing LBP increases with age. Other studies have reported similar results (2,18,33). Older individuals generally have less muscle strength, flexibility, and resilience, which possibly risks them to back injuries and pain (92). Moreover, degenerative changes in the spine, such as disc wear and tear, decreased muscle elasticity, and reduced bone density which occur with ageing could account for increasing back pain with age (93).

The occurrence of LBP can be associated with sex. Our study found that female HCWs were more likely to develop LBP compared to males. Similar findings have been reported by studies conducted in other areas (38,39). Studies have linked female hormonal fluctuation and menstruation as a possible reason for these results (45). Our study findings differ from a study that was conducted in Canada that reported the opposite trend, suggesting a higher likeliness of LBP in males (40). While the reason behind these findings is not fully understood, the involvement of men in manual labour that leads to physical strains has been linked as a possible factor.

Our study found that being obese was a risk factor for developing low back pain (LBP). Other studies show similar results to our findings (42–44). The high risk in obese individuals may be due to increased mechanical stress on the spine or lower physical activity levels. Furthermore, greater mechanical stress on the spine due to excess weight in overweight and obese individuals could possibly lead to spinal degeneration and eventually contribute to LBP (94).

While studies are showing varying percentages on the influence of marital status on LBP, this study shows that HCWs who were cohabiting and those who were single were less likely to develop LBP. This could be attributed to the fact that these individuals may have more time and flexibility to engage in physical activities, exercise, and self-care routines that strengthen their back muscles and improve overall fitness (95). In contrast to our findings, studies are showing that married individuals have a higher risk of LBP compared to those who are

unmarried (20). This could be due to more physical strain associated with household responsibilities and family obligations among married couples.

This study highlights several demographic factors associated with LBP among HCWs, with important implications for workplace health strategies. These findings imply that targeted ergonomic, lifestyle, and health interventions are essential for reducing LBP risk, particularly among older, female, and obese HCWs, while also considering the impact of marital status and lifestyle on LBP prevention.

5.3 Work-related factors associated with LBP

Pharmacy personnel were found to be less likely to develop LBP in our study. These results differ from other research which have reported more likelihood in nurses compared to other job titles(2,15,27,33). This could be attributed to the demanding nature of nursing work, characterized by long hours of standing, frequent bending, lifting, and patient handling, which places significant strain on the lower back (2). Our study also reports a higher risk in nurses but this was insignificant. On the other hand, pharmacy personnel could possibly be at reduced risk of developing LBP compared to other HCWs since they are less involved in patient handling and physically demanding tasks due to the nature of their work.

The findings show that HCWs working at the hospital-level health facility were more likely to develop LBP compared to those working at health centres. Although there is little knowledge of the relationship between LBP and health facility type, studies conducted at hospital level have revealed a high prevalence of LBP (15,19,24,29–31,50,51,53,56,96–98). This could be attributed to the fact that hospitals tend to handle more complex and severe cases, requiring healthcare workers to perform physically demanding procedures more frequently, contributing to a higher likelihood of low back pain.

This study shed light on the revelation that HCWs who were working at the postnatal ward, RCH and other departments which included theatre, male ward, female ward, paediatrics ward, dental unit, radiology, emergency department, traditional medicine and laundry all combined were more likely to develop LBP. These findings differ from the findings of a

systematic review conducted to explore LBP and related risk factors in healthcare providers at hospitals(19). This study shows that internal medicine, orthopaedics and neurology departments were more likely to develop LBP. These differences can be attributed to physically demanding tasks such as lifting, carrying, and repositioning patients, including mothers and newborns.

Work experience is also a factor that has been found to be associated with LBP among HCWs. In this study, HCWs who had worked for 10 years and above were more likely to develop LBP. These findings are in agreement with the findings of a study conducted by Ovayolu et al indicating that nurses who had worked more than 10 years were more likely to develop LBP (59). This could possibly be due to more cumulative physical strain and more repetitive tasks that expose HCW to LBP.

This research shows that HCWs who are exposed to physically demanding tasks are more likely to have LBP compared to those whose tasks are not physically demanding. These findings are in agreement with several other studies which have reported similar results (19,30,56). These tasks usually involve heavy lifting and repetitive movements that strain the back muscles and spine (93). Eventually, these lead to continuous physical exertion that could possibly lead to LBP.

Healthcare workers who lack support from their supervisors are more likely to develop low back pain, aligning with other studies that highlight the drawbacks of lack of managerial support (99,100). Supervisor support can include promoting ergonomic practices, ensuring adequate rest breaks, and providing proper lifting equipment, which helps reduce physical strain and prevent injuries. Lack of support also contributes to higher stress levels, poor compliance with safety protocols, and decreased job satisfaction (101), all of which play a role in causing low back pain.

This research indicates that HCWs performing physically demanding tasks, particularly in hospitals and wards like postnatal, RCH, and others, are at a higher risk of developing LBP. Pharmacy personnel, less involved in such tasks, are less likely to develop LBP. Long work experience (10+ years) and lack of supervisor support further increase the risk, emphasizing

the importance of ergonomic interventions and managerial support to reduce physical strain and LBP among HCWs.

5.4 Psychological factors associated with LBP

This study found that HCWs who felt fatigued were more likely to develop LBP. These results are similar to studies conducted by Manning et al and Snekkevik et al (102,103). This could possibly be due to muscle weakness and increased endurance, leading to less effective spinal support and poor posture which could lead to LBP. According to science, fatigue could be linked with both metabolic and structural lesions that disrupt the normal function of structures related to the physiology of pain (104).

The research data in the present study showed an increased likelihood of LBP among healthcare workers with stress. These findings confirm the results of other previous studies (60,81) which have consistently identified stress as a significant risk factor for LBP. The literature points out that stress can cause muscle tension (105), leading to increased strain on the back muscles and spine. Additionally, stress often results in inactivity, as individuals may avoid physical activity due to displeasure, lack of motivation and mental exhaustion (106), leading to weakened back muscles and poorer overall physical condition. Moreover, stress can also cause changes in posture (107), as stressed individuals might adopt tense, hunched, or otherwise maladaptive postures that exacerbate pain in the back.

This study highlights that healthcare workers experiencing fatigue and stress are more likely to develop LBP. Fatigue may weaken muscles and disrupt posture, reducing spinal support. Stress, known to cause muscle tension and inactivity, weakens back muscles and leads to poor posture, further increasing the risk of LBP. These findings emphasize the importance of addressing psychological factors like stress and fatigue to help prevent LBP in healthcare workers.

5.5 Lifestyle factors associated with LBP

The current study shows that smoking had a protective effect on low back pain (LBP), a finding that contradicts much of the existing literature which typically associates smoking with an increased risk of LBP (69,70). One possible explanation for this unexpected result could be due to the presence of few HCWs who had a smoking habit (3/334) and none of the smokers had an outcome of interest which could rather affect a true protective relationship. Moreover, it could also be conceivable that smokers may have different pain perceptions or reporting behaviours owing to a suggestion that nicotine through its excitatory effect, may alter the perception and threshold for pain (108). On the other hand, smoking habit has been associated with LBP and it has been hypothesized that both nicotine presence in the intervertebral discs and the reduced solute exchange are responsible for the degeneration of the disc due to tobacco smoking (109).

5.6 Limitations

This was a cross-sectional research design and, therefore, could not imply causation of LBP. Moreover, this study was limited to only HCWs permanently employed by the government, limiting our study to only public-owned primary healthcare facilities which are approximately 14% of the total health facilities in Nyamagana District. Due to this, it is possible that the estimates provided by this research underreport the prevalence of back pain and the magnitude of association of some of the independent variables with LBP.

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

More than a third of HCWs working at primary healthcare facilities of Nyamagana District experience LBP. Factors associated with increased risk of LBP include higher age groups, females, obesity, physically demanding tasks, lack of support from supervisors, fatigue and stress.

6.2 Recommendations

Health authorities of Nyamagana District are recommended to implement targeted ergonomic interventions including training on proper body mechanics, especially for roles involving heavy lifting and patient handling. We also recommend health facility in-charges to establish regular physical fitness programs and stress management workshops for their HCWs to help reduce fatigue and stress. Health authorities of Nyamagana need to encourage and train supervisors including health facilities in charge on safe work practices, leadership and communication skills, stress management and mental health awareness, resource management and allocation, policy and procedure enforcement. These will help them to foster support for their colleagues, reducing the risk of LBP and ensuring a healthier, more supportive work environment.

REFERENCES

1. Oude Hengel KM, Visser B, Sluiter JK. The prevalence and incidence of musculoskeletal symptoms among hospital physicians: a systematic review. Int Arch Occup Environ Health. 2011 Feb;84(2):115-9. https://doi.10.1007/s00420-010-0565-8.

2. Mohamed Moussa MM, El-Ezaby HH, El-Mowafy RI. Low back pain and coping strategies' among nurses in Port Said City, Egypt. J Nurs Educ Pract. 2015;5(7). http://dx.doi.org/10.5430/jnep.v5n7p55

3. Pain Classifications and Causes: Nerve Pain, Muscle Pain, and More. [cited 2024 Feb 8]. https://www.webmd.com/pain-management/pain-types-and-classifications

4. Bontrup C, Taylor WR, Fliesser M, Visscher R, Green T, Wippert PM, et al. Low back pain and its relationship with sitting behaviour among sedentary office workers. Appl Ergon. 2019;81(January):102894. https://doi.org/10.1016/j.apergo.2019.102894

5. Mahdavi SB, Riahi R, Vahdatpour B, Kelishadi R. Association between sedentary behavior and low back pain; A systematic review and meta-analysis. Heal Promot Perspect. 2021;11(4):393–410. https://doi.org/10.34172/hpp.2021.50

6. Al-Otaibi ST. Prevention of occupational Back Pain. J Family Community Med. 2015 May-Aug;22(2):73-7. https://doi: 10.4103/2230-8229.155370.

7. Corrêa LA, Mathieson S, Meziat-Filho NAM, Reis FJ, Ferreira AS, Nogueira LAC. Which psychosocial factors are related to severe pain and functional limitation in patients with low back pain?: Psychosocial factors related to severe low back pain. Braz J Phys Ther. 2022 May-Jun;26(3):100413. https://doi: 10.1016/j.bjpt.2022.100413.

8. Robertson D, Kumbhare D, Nolet P, Srbely J, Newton G. Associations between low back pain and depression and somatization in a Canadian emerging adult population. J Can Chiropr Assoc. 2017;61(2):96–105. PMID: 28928493

9. Wong AYL, Karppinen J, Samartzis D. Low back pain in older adults: risk factors, management options and future directions. Scoliosis Spinal Disord. 2017 Apr 18;12:14. https://doi: 10.1186/s13013-017-0121-3.

10. Alnaami I, Awadalla NJ, Alkhairy M, Alburidy S, Alqarni A, Algarni A, Alshehri R, Amrah B, Alasmari M, Mahfouz AA. Prevalence and factors associated with low back pain among health care workers in southwestern Saudi Arabia. BMC Musculoskelet Disord. 2019 Feb 8;20(1):56. https://doi: 10.1186/s12891-019-2431-5.

11. Chen S, Chen M, Wu X, Lin S, Tao C, Cao H, Shao Z, Xiao G. Global, regional and national burden of low back pain 1990-2019: A systematic analysis of the Global Burden of Disease study 2019. J Orthop Translat. 2021 Sep 10;32:49-58. https://doi: 10.1016/j.jot.2021.07.005.

12. GBD 2021 Low Back Pain Collaborators. Global, regional, and national burden of low back pain, 1990-2020, its attributable risk factors, and projections to 2050: a systematic analysis of the Global Burden of Disease Study 2021. Lancet Rheumatol. 2023 May 22;5(6):e316-e329. https://doi: 10.1016/S2665-9913(23)00098-X.

13. Jegnie M, Afework M. Prevalence of Self-Reported Work-Related Lower Back Pain and Its Associated Factors in Ethiopia: A Systematic Review and Meta-Analysis. J Environ Public Health. 2021 Sep 23;2021:6633271. https://doi: 10.1155/2021/6633271.

14. Morris LD, Daniels KJ, Ganguli B, Louw QA. An update on the prevalence of low back pain in Africa: a systematic review and meta-analyses. BMC Musculoskelet Disord. 2018 Jun 21;19(1):196. https://doi: 10.1186/s12891-018-2075-x.

15. Work-related low back pain among clinical nurses in Tanzania - CORE Reader. https://core.ac.uk/reader/58913540

16. Garg A, Kapellusch JM. Long-term efficacy of an ergonomics program that includes patient-handling devices on reducing musculoskeletal injuries to nursing personnel. Hum Factors. 2012 Aug;54(4):608-25. https://doi: 10.1177/0018720812438614.

17. Tatsumi M, Mkoba EM, Suzuki Y, Kajiwara Y, Zeidan H, Harada K, Bitoh T, Nishida Y, Nakai K, Shimoura K, Aoyama T. Risk factors of low back pain and the relationship with sagittal vertebral alignment in Tanzania. BMC Musculoskelet Disord. 2019 Dec 4;20(1):584. https://doi: 10.1186/s12891-019-2953-x.

18. Jia N, Zhang M, Zhang H, Ling R, Liu Y, Li G, et al. Prevalence and risk factors analysis for low back pain among occupational groups in key industries of China. BMC Public Health. 2022;22(1):1–10. https://doi.org/10.1186/s12889-022-13730-8

19. Rezaei B, Mousavi E, Heshmati B, Asadi S. Low back pain and its related risk factors in health care providers at hospitals: A systematic review. Ann Med Surg. 2021;70(September):102903. https://doi.org/10.1016/j.amsu.2021.102903

20. Ganesan S, Acharya AS, Chauhan R, Acharya S. Prevalence and Risk Factors for Low Back Pain in 1,355 Young Adults: A Cross-Sectional Study. Asian Spine J. 2017 Aug;11(4):610-617. https://doi: 10.4184/asj.2017.11.4.610.

21. Al Amer HS. Low back pain prevalence and risk factors among health workers in Saudi Arabia: A systematic review and meta-analysis. J Occup Health. 2020 Jan;62(1):e12155. https://doi: 10.1002/1348-9585.12155.

22. Mehrdad R, Shams-Hosseini NS, Aghdaei S, Yousefian M. Prevalence of low back pain in health care workers and comparison with other occupational categories in Iran: A systematic review. Iran J Med Sci. 2016;41(6):467–78. PMCID: PMC5106561.

23. Şimşek Ş, Yağcı N, Şenol H. Prevalence of and risk factors for low back pain among healthcare workers in Denizli. Agri. 2017 Apr;29(2):71-78. https://doi: 10.5505/agri.2017.32549.

24. Mukhtad, Amal & Mohamed, Huda. (2018). Lower Back Pain among Health Care Workers in Operating Room at Al- Fateh Children's Hospital: Prevalence and Risk Factors. 1-11. https://doi: 10.9734/AJRNH/2018/43644.

25. Alizadeh R, Shariat A, Hakakzadeh A, Selk-Ghaffari M, Damavandi P, Honarpishe R, et al. A comprehensive screening protocol to identify incidence of lower back pain in military office workers. J Pain Manag. 2020;13(1):35–40.

26. Fatoye F, Gebrye T, Ryan CG, Useh U, Mbada C. Global and regional estimates of clinical and economic burden of low back pain in high-income countries: a systematic review and meta-analysis. Front Public Health. 2023 Jun 9;11:1098100. https://doi: 10.3389/fpubh.2023.1098100.

27. Cheung K, Szeto G, Lai GKB, Ching SSY. Prevalence of and Factors Associated with Work-Related Musculoskeletal Symptoms in Nursing Assistants Working in Nursing Homes. Int J Environ Res Public Health. 2018 Feb 4;15(2):265. https://doi: 10.3390/ijerph15020265.

28. Kientchockwiwat K, Tangcheewinsirikul S. Low Back Pain Prevalence and Associated Factors among Medical Students. Vajira Med J J Urban Med. 2022 Oct 31 ;66(5):321–30. https://he02.tci-thaijo.org/index.php/VMED/article/view/259078

29. Ijabadeniyi OA, Fasae JK. Prevalence of low back pain among nurses and the effects on job performance in tertiary health institutions in Ondo State, Nigeria. Vol. 18, International Journal of Africa Nursing Sciences. 2023. https://doi.org/10.1016/j.ijans.2023.100560.

30. Dlungwane T, Voce A, Knight S. Prevalence and factors associated with low back pain among nurses at a regional hospital in KwaZulu-Natal, South Africa. Health SA. 2018 May 29;23:1082. https://doi: 10.4102/hsag.v23i0.1082.

31. Negash NA, Tadele A, Jember Ferede A. Prevalence and Associated Factors of Low Back Pain Among Healthcare Professionals at University of Gondar Comprehensive and Specialized Hospital, Northwest Ethiopia: Cross-Sectional Study. J Pain Res. 2022 May 25;15:1543-1552. https://doi: 10.2147/JPR.S351987.

32. Ahmed, Sana & Jamali, Tanzil & Bazmi, Shabnam & Abbas, Aamir. (2019). Frequency and Severity of Low Back Pain among Healthcare Providers and Associated Factors in a Tertiary Care, Public Hospital in Karachi. https://doi: 10.4172/2329-6879.1000285.

33. Boughattas W, Maalel O El, Maoua M, Bougmiza I, Kalboussi H, Brahem A, et al. Low Back Pain among Nurses: Prevalence, and Occupational Risk Factors. Occup Dis Environ Med. 2017;05(01):26–37. https://doi: 10.4236/odem.2017.51003

34. Tariq RA, George JS, Ampat G, Toney-Butler TJ. Back Safety. StatPearls. 2023 Jul 22; https://www.ncbi.nlm.nih.gov/books/NBK519066/

35. Low back pain: https://www.who.int/news-room/fact-sheets/detail/low-back-pain

36. Balagué F, Pellisé F. Adolescent idiopathic scoliosis and back pain. Scoliosis Spinal Disord: http://dx.doi.org/10.1186/s13013-016-0086-7

37. Dixit R. Low Back Pain. In: Kelley and Firestein's Textbook of Rheumatology: Volumes 1-2, Tenth Edition. Elsevier; 2016. p. 696–716.

38. Bento TPF, Genebra CVDS, Maciel NM, Cornelio GP, Simeão SFAP, Vitta A. Low back pain and some associated factors: is there any difference between genders? Braz J Phys Ther. 2020 Jan-Feb;24(1):79-87. https://doi: 10.1016/j.bjpt.2019.01.012.

39. Bener A, Dafeeah EE, Alnaqbi K, Falah O, Aljuhaisi T, Sadeeq A, Khan S, Schlogl J. An epidemiologic analysis of low back pain in primary care: a hot humid country and global comparison. J Prim Care Community Health. 2013 Jul 1;4(3):220-7. https://doi: 10.1177/2150131913479385.

40. Beaudet N, Courteau J, Sarret P, Vanasse A. Prevalence of claims-based recurrent low back pain in a Canadian population: a secondary analysis of an administrative database. BMC Musculoskelet Disord. 2013 Apr 29;14:151. https://doi: 10.1186/1471-2474-14-151.

41. Meints & Edwards 2017. Evaluating Psychosocial Contributions to Chronic Pain Outcomes. Physiol Behav: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6067990/

42. Su CA, Kusin DJ, Li SQ, Ahn UM, Ahn NU. The Association Between Body Mass Index and the Prevalence, Severity, and Frequency of Low Back Pain: Data From the Osteoarthritis Initiative. Spine (Phila Pa 1976). 2018 Jun 15;43(12):848-852. https://doi: 10.1097/BRS.0000000000002601.

43. Thiono, Jeskry & Suryadinata, Neneng. (2023). Association Between Body Mass Index and Low Back Pain Among Students at the Faculty of Medicine, Pelita Harapan University. Medicinus. 11. 48. https://doi: 10.19166/med.v11i2.7527.

44. Chou L, Brady SRE, Urquhart DM, Teichtahl AJ, Cicuttini FM, Pasco JA, Brennan-Olsen SL, Wluka AE. The Association Between Obesity and Low Back Pain and Disability Is Affected by Mood Disorders: A Population-Based, Cross-Sectional Study of Men. Medicine (Baltimore). 2016 Apr;95(15):e3367. https://doi: 10.1097/MD.0000000000003367.

45. Wáng YX, Wáng JQ, Káplár Z. Increased low back pain prevalence in females than in males after menopause age: evidences based on synthetic literature review. Quant Imaging Med Surg. 2016 Apr;6(2):199-206. https://doi: 10.21037/qims.2016.04.06.

46. Çınar-Medeni Ö, Elbasan B, Duzgun I. Low back pain prevalence in healthcare professionals and identification of factors affecting low back pain. J Back Musculoskelet Rehabil. 2017;30(3):451-459. https://doi: 10.3233/BMR-160571.

47. Gaowgzeh RA, Chevidikunnan MF, Al Saif A, El-Gendy S, Karrouf G, Al Senany S. Prevalence of and risk factors for low back pain among dentists. J Phys Ther Sci. 2015 Sep;27(9):2803-6. https://doi: 10.1589/jpts.27.2803.

48. De Sio S, Traversini V, Rinaldo F, Colasanti V, Buomprisco G, Perri R, Mormone F, La Torre G, Guerra F. Ergonomic risk and preventive measures of musculoskeletal disorders in the dentistry environment: an umbrella review. PeerJ. 2018 Jan 15;6:e4154.

https://doi: 10.7717/peerj.4154.

49. Al-Ruwaili B, Khalil T. Prevalence and Associated Factors of Low Back Pain Among Physicians Working at King Salman Armed Forces Hospital, Tabuk, Saudi Arabia. Open Access Maced J Med Sci. 2019 Aug 31;7(17):2807-2813. https://doi: 10.3889/oamjms.2019.787.

50. Almalki, Mohammad1; Alkhudhayri, Mohammed H.1; Batarfi, Ahmad A.1,2; Alrumaihi, Shorowk K.1; Alshehri, Shaker H.2; Aleissa, Sami I.1,2; Alkenani, Nader S.1,2,. Prevalence of low back pain among medical practitioners in a tertiary care hospital in Riyadh. Saudi Journal of Sports Medicine 16(3):p 205-209, Sep–Dec 2016. | https://doi: 10.4103/1319-6308.187556

51. Alsultan A, Alahmed S, Alzahrani A, Alzahrani F, Masuadi E. Comparison of musculoskeletal pain prevalence between medical and surgical specialty residents in a major hospital in Riyadh, Saudi Arabia. J Musculoskelet Surg Res 2018;2:161-166. https://doi: 10.4103/jmsr.jmsr_36_18

52. Pellissier B, Sarhan FR, Telliez F. Work-Related, Non-Specific Low Back Pain among Physiotherapists in France: Prevalence and Biomechanical and Psychosocial Risk Factors, as a Function of Practice Pattern. Int J Environ Res Public Health. 2023 Feb 28;20(5):4343. https://doi: 10.3390/ijerph20054343.

53. M Emmanuel N, Ezhilarasu P. Low Back Pain among Nurses in a Tertiary Hospital, South India. J Osteoporos Phys Act. 2016;04(01):3–5. https://doi: 10.4172/2329-9509.1000161

54. Mekonnen TH. Work-Related Factors Associated with Low Back Pain Among Nurse Professionals in East and West Wollega Zones, Western Ethiopia, 2017: A Cross-Sectional Study. Pain Ther. 2019;8(2):239–47. https://doi.org/10.1007/s40122-019-0129-x

55. Mahmoud H, Ebid A, Alghamdi M, Ibrahim A, Almoosa A. Prevalence of Musculoskeletal, Neurological and Physical Disorder After COVID-19 in Saudi Arabia: A Cross Sectional Study. F1000Res. 2023 Sep 13;11:463. https://doi: 10.12688/f1000research.109007.3.

56. Almaghrabi A, Alsharif F. Prevalence of Low Back Pain and Associated Risk Factors among Nurses at King Abdulaziz University Hospital. Int J Environ Res Public Health. 2021 Feb 7;18(4):1567. https://doi: 10.3390/ijerph18041567.

57. Burdorf A, Sorock G. Positive and negative evidence of risk factors for back disorders. Scand J Work Environ Health. 1997 Aug;23(4):243-56. https://doi: 10.5271/sjweh.217.

58. Ratinaud MC, Chamoux A, Glace B, Coudeyre E. Job satisfaction evaluation in low back pain: A literature review and tools appraisal. Ann Phys Rehabil Med. 2013;56(6):465–81. http://dx.doi.org/10.1016/j.rehab.2013.06.006

59. Ovayolu O, Ovayolu N, Genc M, Col-Araz N. Frequency and severity of low back pain in nurses working in intensive care units and influential factors. Pak J Med Sci. 2014 Jan;30(1):70-6. https://doi: 10.12669/pjms.301.3455.

60. Vinstrup J, Jakobsen MD, Andersen LL. Perceived Stress and Low-Back Pain Among Healthcare Workers: A Multi-Center Prospective Cohort Study. Front Public Health. 2020 Aug 11;8:297. https://doi: 10.3389/fpubh.2020.00297.

61. Adriaenssens J, Hamelink A, Bogaert PV. Predictors of occupational stress and well-being in First-Line Nurse Managers: A cross-sectional survey study. Int J Nurs Stud. 2017 Aug;73:85-92. https://doi: 10.1016/j.ijnurstu.2017.05.007.

62. Zadow AJ, Dollard MF, Mclinton SS, Lawrence P, Tuckey MR. Psychosocial safety climate, emotional exhaustion, and work injuries in healthcare workplaces. Stress Health. 2017 Dec;33(5):558-569. https://doi: 10.1002/smi.2740.

63. Ziam S, Laroche E, Lakhal S, Alderson M, Gagné C. Application of MSD prevention practices by nursing staff working in healthcare settings. Int J Ind Ergon. 2020;77(April). https://doi.org/10.1016/j.ergon.2020.102959

64. Stevens ML, Boyle E, Hartvigsen J, Mansell G, Søgaard K, Jørgensen MB, et al. Mechanisms for reducing low back pain: a mediation analysis of a multifaceted intervention in workers in elderly care. Int Arch Occup Environ Health. 2019;92(1):49–58. http://dx.doi.org/10.1007/s00420-018-1350-3

65. Liu Q, Liu X, Lin H, Sun Y, Geng L, Lyu Y, Wang M. Occupational low back pain prevention capacity of nurses in China: A multicenter cross-sectional study. Front Public Health. 2023 Mar 16;11:1103325. https://doi: 10.3389/fpubh.2023.1103325.

66. Inactivity and Low Back Pain - Physiopedia. https://www.physio-pedia.com/Inactivity_and_Low_Back_Pain

67. Fares MY, Fares J, Salhab HA, Khachfe HH, Bdeir A, Fares Y. Low Back Pain Among Weightlifting Adolescents and Young Adults. Cureus. 2020 Jul 11;12(7):e9127. https://doi: 10.7759/cureus.9127.

68. Alsufiany MB, Lohman EB, Daher NS, Gang GR, Shallan AI, Jaber HM. Non-specific chronic low back pain and physical activity: A comparison of postural control and hip muscle isometric strength: A cross-sectional study. Medicine (Baltimore). 2020 Jan;99(5):e18544. https://doi: 10.1097/MD.0000000000018544.

69. Yang QH, Zhang YH, Du SH, Wang YC, Wang XQ. Association Between Smoking and Pain, Functional Disability, Anxiety and Depression in Patients With Chronic Low Back Pain. Int J Public Health. 2023 Mar 7;68:1605583. https://doi: 10.3389/ijph.2023.1605583.

70. Dionne CE, Laurin D, Desrosiers T, Abdous B, Sage NL, Frenette J, Mondor M. The Association Between Self-Reported Cigarette Smoking and Spinal Pain is Not Explained by Serum Cotinine Levels. Ann Epidemiol. 2022 Mar;67:35-42. https://doi:

10.1016/j.annepidem.2021.12.006.

71. Alcohol Use and Lower Back Pain | Alcohol Addiction Treatment https://thearbor.com/blog/alcohol-use-and-lower-back-pain/

72. Ferreira PH, Pinheiro MB, Machado GC, Ferreira ML. Is alcohol intake associated with low back pain? A systematic review of observational studies. Man Ther. 2013;18(3):183–90. http://dx.doi.org/10.1016/j.math.2012.10.007

73. Zale EL, Maisto SA, Ditre JW. Interrelations between pain and alcohol: An integrative review. Clin Psychol Rev. 2015 Apr;37:57-71. https://doi: 10.1016/j.cpr.2015.02.005.

74. Yeung EW, Lee MR, McDowell Y, Sher KJ, Gizer IR. The Association Between Alcohol Consumption and Pain Interference in a Nationally Representative Sample: The Moderating Roles of Gender and Alcohol Use Disorder Symptomatology. Alcohol Clin Exp Res. 2020 Mar;44(3):645-659. https://doi: 10.1111/acer.14282.

75. Perry M, Dean S, Devan H. The relationship between chronic low back pain and fatigue: a systematic review. Phys Ther Rev. 2016;21(3–6):173–83. http://dx.doi.org/10.1080/10833196.2016.1264665

76. Yamada K, Adams H, Ellis T, Clark R, Sully C, Lariviere C, et al. The temporal relation between pain and fatigue in individuals receiving treatment for chronic musculoskeletal pain. BMC Musculoskelet Disord. 2022;23(1):1–10. https://doi.org/10.1186/s12891-022-05162-7

77. Pinheiro MB, Ferreira ML, Refshauge K, Maher CG, Ordoñana JR, Andrade TB, et al. Symptoms of depression as a prognostic factor for low back pain: A systematic review. Spine J. 2016;16(1):105–16. http://dx.doi.org/10.1016/j.spinee.2015.10.037

78. Jiang Y, Wang Y, Wang R, Zhang X, Wang X. Differences in pain, disability, and psychological function in low back pain patients with and without anxiety. Front Physiol. 2022 Nov 3;13:906461. https://doi: 10.3389/fphys.2022.906461.

79. Hu Y, Yang Z, Li Y, Xu Y, Zhou X, Guo N. Anxiety Symptoms and Associated Factors Among Chronic Low Back Pain Patients in China: A Cross-Sectional Study. Front Public Health. 2022 May 4;10:878865. https://doi: 10.3389/fpubh.2022.878865.

80. Ranger TA, Cicuttini FM, Jensen TS, Manniche C, Heritier S, Urquhart DM. Catastrophization, fear of movement, anxiety, and depression are associated with persistent, severe low back pain and disability. Spine J. 2020 Jun;20(6):857-865. https://doi: 10.1016/j.spinee.2020.02.002.

81. Choi S, Nah S, Jang HD, Moon JE, Han S. Association between chronic low back pain and degree of stress: a nationwide cross-sectional study. Sci Rep. 2021;11(1):1–7. https://doi.org/10.1038/s41598-021-94001-1

82. Luo G, Yao Y, Tao J, Wang T, Yan M. Causal association of sleep disturbances and low back pain: A bidirectional two-sample Mendelian randomization study. Front Neurosci. 2022 Dec 2;16:1074605. https://doi: 10.3389/fnins.2022.1074605.

83. Yabe Y, Hagiwara Y, Sugawara Y, Tsuji I. Low back pain is associated with sleep disturbance: a 3-year longitudinal study after the Great East Japan Earthquake. BMC Musculoskelet Disord. 2022;23(1):1–8. https://doi.org/10.1186/s12891-022-06106-x

84. Monkbot. Nyamagana district. In: wikipedia. 2020. https://en.wikipedia.org/wiki/Nyamagana_District

85. NBS | National Statistics Office - Beginning. https://www.nbs.go.tz/

86. HFR-PORTAL. Vol. 31, Public Health. p. 132. https://hfrs.moh.go.tz/web/index.php?r=portal%2Fadvanced-search

87. Pourhoseingholi MA, Vahedi M, Rahimzadeh M. Sample size calculation in medical studies. Gastroenterol Hepatol Bed Bench. 2013 Winter;6(1):14-7. PMCID: PMC4017493.

88. Weir CB, Jan A. BMI Classification Percentile And Cut Off Points. In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. https://www.ncbi.nlm.nih.gov/books/NBK541070/

89. López-Aragón L, López-Liria R, Callejón-Ferre Á-J, Gómez-Galán M. Applications of the Standardized Nordic Questionnaire: A Review. *Sustainability*. 2017; 9(9):1514. https://doi.org/10.3390/su9091514

90. Kwon MA, Shim WS, Kim MH, Gwak MS, Hahm TS, Kim GS, Kim CS, Choi YH, Park JH, Cho HS, Kim TH. A correlation between low back pain and associated factors: a study involving 772 patients who had undergone general physical examination. J Korean Med Sci. 2006 Dec;21(6):1086-91. https://doi: 10.3346/jkms.2006.21.6.1086.

91. Russo F, Papalia GF, Vadalà G, Fontana L, Iavicoli S, Papalia R, Denaro V. The Effects of Workplace Interventions on Low Back Pain in Workers: A Systematic Review and Meta-Analysis. Int J Environ Res Public Health. 2021 Nov 30;18(23):12614. https://doi: 10.3390/ijerph182312614.

92. Sandler RD, Sui X, Church TS, Fritz SL, Beattie PF, Blair SN. Are flexibility and muscle-strengthening activities associated with a higher risk of developing low back pain? J Sci Med Sport. 2014 Jul;17(4):361-5. https://doi: 10.1016/j.jsams.2013.07.016.

93. Rustenburg CME, Emanuel KS, Peeters M, Lems WF, Vergroesen PA, Smit TH. Osteoarthritis and intervertebral disc degeneration: Quite different, quite similar. JOR Spine. 2018 Oct 19;1(4):e1033. https://doi: 10.1002/jsp2.1033.

94. Sheng B, Feng C, Zhang D, Spitler H, Shi L. Associations between Obesity and Spinal Diseases: A Medical Expenditure Panel Study Analysis. Int J Environ Res Public Health. 2017 Feb 13;14(2):183. https://doi: 10.3390/ijerph14020183.

95. Malm C, Jakobsson J, Isaksson A. Physical Activity and Sports-Real Health Benefits: A Review with Insight into the Public Health of Sweden. Sports (Basel). 2019 May 23;7(5):127. https://doi: 10.3390/sports7050127.

96. Olivier, Benita & Mudzi, Witness & Ntsiea, Veronica & Becker, Piet. (2010). Association between psychological stress and low back pain among district hospital employees in Gauteng, South Africa. South African Journal of Physiotherapy. 66. 17-21. https://doi: 10.4102/sajp.v66i2.63.

97. Landry MD, Raman SR, Sulway C, Golightly YM, Hamdan E. Prevalence and risk factors associated with low back pain among health care providers in a Kuwait hospital. Spine (Phila Pa 1976). 2008 Mar 1;33(5):539-45. https://doi: 10.1097/BRS.0b013e3181657df7.

98. Naude B, Mudzi W, Mamabolo M V, Becker PJ. Low back pain among hospital employees in Gauteng, South Africa: Point prevalence and associated factors. Occup Heal South Africa. 2009;15(3):24–30.

99. Jaffar NAT, Rahman MNA. Review on risk factors related to lower back disorders at workplace. IOP Conf Ser Mater Sci Eng. 2017;226(1). https://doi: 10.1088/1757-899X/226/1/012035

100. Kristman VL, Shaw WS, Reguly P, Williams-Whitt K, Soklaridis S, Loisel P. Supervisor and Organizational Factors Associated with Supervisor Support of Job Accommodations for Low Back Injured Workers. J Occup Rehabil. 2017 Mar;27(1):115-127. https://doi: 10.1007/s10926-016-9638-1.

101. Hoboubi N, Choobineh A, Kamari Ghanavati F, Keshavarzi S, Akbar Hosseini A. The Impact of Job Stress and Job Satisfaction on Workforce Productivity in an Iranian Petrochemical Industry. Saf Health Work. 2017;8(1):67–71. http://dx.doi.org/10.1016/j.shaw.2016.07.002

102. Snekkevik H, Eriksen HR, Tangen T, Chalder T, Reme SE. Fatigue and depression in sick-listed chronic low back pain patients. Pain Med. 2014 Jul;15(7):1163-70. https://doi: 10.1111/pme.12435.

103. Manning K, Rogers AH, Shepherd JM, Matoska C, Ditre JW, Garey L, Kauffman BY, Zvolensky MJ. Fatigue Severity among Adults with Chronic Low Back Pain: Relations to Opioid Use and Hazardous Alcohol Use. Fatigue. 2021;9(3):148-158. https://doi: 10.1080/21641846.2021.1966984.

104. Salvetti Mde G, Pimenta CA, Braga PE, McGillion M. Prevalence of fatigue and associated factors in chronic low back pain patients. Rev Lat Am Enfermagem. 2013 Jan-Feb;21 Spec No:12-9. English, Portuguese. https://doi: 10.1590/s0104-11692013000700003.

105. Zieliński G, Ginszt M, Zawadka M, Rutkowska K, Podstawka Z, Szkutnik J, Majcher P, Gawda P. The Relationship between Stress and Masticatory Muscle Activity in Female Students. J Clin Med. 2021 Aug 4;10(16):3459. https://doi: 10.3390/jcm10163459.

106. Stults-Kolehmainen MA, Sinha R. The effects of stress on physical activity and exercise. Sports Med. 2014 Jan;44(1):81-121. https://doi: 10.1007/s40279-013-0090-5.

107. Coco M, Buscemi A, Pennisi E, Cavallari P, Papotto G, Papotto GMF, Perciavalle V, Di Corrado D, Perciavalle V. Postural Control and Stress Exposure in Young Men: Changes in Cortisol Awakening Response and Blood Lactate. Int J Environ Res Public Health. 2020 Oct 2;17(19):7222. https://doi: 10.3390/ijerph17197222.

108. Green BN, Johnson CD, Snodgrass J, Smith M, Dunn AS. Association Between Smoking and Back Pain in a Cross-Section of Adult Americans. Cureus. 2016 Sep 26;8(9):e806. https://doi: 10.7759/cureus.806.

109. Elmasry S, Asfour S, de Rivero Vaccari JP, Travascio F. Effects of Tobacco Smoking on the Degeneration of the Intervertebral Disc: A Finite Element Study. PLoS One. 2015 Aug 24;10(8):e0136137. https://doi: 10.1371/journal.pone.0136137.

APPENDICES

Appendix I: Questionnaire

Section 1: General information

1. ID/Code……
2. What is your age (years)?
3. What is your gender?
4. What is your marital status?
5. Health facility type…….
6. What is your job title?
7. What is your department/unit?
8. How long have you worked in your current job (years)?

Section 2: Anthropometric measurements

9. Weight…….. (Kg)
10. Height……..(M)

Section 3: Low back pain

11. Are you currently experiencing low back pain?
    - Yes
    - No
12. Have you experienced low back pain in the past 12 months?
    - Yes
    - No

13. If you answered "Yes" to the previous question, please indicate the duration of your low back pain:
    - Less than one week
    - One to four weeks
    - One to three months
    - More than three months
14. How would you rate the intensity of your low back pain on a scale of 0 to 10?

    0 means 'No Pain'

    1 means 'Minimal Pain'

    2 means 'Mild Pain'

    3 means 'Discomforting Pain'

    4 means 'Moderate Pain'

    5 means 'Distressing Pain'

    6 means 'Intense Pain'

    7 means 'Very Intense Pain'

    8 means 'Severe Pain'

    9 means 'Very Severe Pain'

    10 means 'Worst Pain Imaginable'

    [ ] 0 [ ] 1 [ ] 2 [ ] 3 [ ] 4 [ ] 5 [ ] 6 [ ] 7 [ ] 8 [ ] 9 [ ] 10

15. Do you notice any improvement in your low back pain when you are away from work or during days off? Please select the option that applies:
    - Yes, the pain improves during time off work.
    - No, the pain remains the same during time off work.
16. Have you sought medical treatment for your low back pain?
    - Yes
    - No

17. How do you manage or cope with your lower back pain at work? Please select all applicable options:
    - Taking pain medication
    - Modifying my posture during work
    - Taking short breaks to rest
    - Engaging in exercises or stretching
    - Using supportive devices or equipment
    - Seeking help from a healthcare provider or occupational health specialist

Section 4: Work-related factors

18. How physically demanding is your job?
    - Not at all demanding
    - Slightly demanding
    - Moderately demanding
    - Very demanding
    - Extremely demanding
19. How often do you perform heavy lifting or bending at work?
    - Never
    - Rarely
    - Sometimes
    - Often
    - Always
20. How often do you have to work in awkward or cramped positions?
    - Never
    - Rarely
    - Sometimes
    - Often
    - Always

21. How satisfied are you with your current job?

    - Very Dissatisfied
    - Dissatisfied
    - Neutral
    - Satisfied
    - Very Satisfied

22. How satisfied are you with the working conditions and the physical environment of your workplace?

    - Very Dissatisfied
    - Dissatisfied
    - Neutral
    - Satisfied
    - Very Satisfied

23. How much control do you have over your workload?

    - Very little control
    - Limited control
    - Moderate control
    - Considerable control
    - Complete control

24. How would you rate the support you receive from your supervisor?

    - No support
    - Little support
    - Moderate support
    - Substantial support
    - Very supportive

25. Have you received any occupational health training related to workplace ergonomics, body mechanics, or injury prevention during your healthcare career?
    - Yes
    - No

Section 5: Psychological factors

26. How often have you felt that you were stressed or unable to control the important things in your life?
    - Never
    - Rarely
    - Sometimes
    - Often
    - Always

27. How often have you experienced a lack of interest or pleasure in activities you used to enjoy or felt depressed?
    - Never
    - Rarely
    - Sometimes
    - Often
    - Always

28. How often do you have difficulty falling asleep or staying asleep?
    - Never
    - Rarely
    - Sometimes
    - Often
    - Always

29. How often do you feel fatigued or burned out?
    - Never
    - Rarely
    - Sometimes
    - Often
    - Always

30. How often have you felt nervous, anxious, or on edge?
    - Never
    - Rarely
    - Sometimes
    - Often
    - Always

Section 6: Lifestyle factors

31. Do you smoke?
    - Yes
    - No
32. Do you drink alcohol?
    - Yes
    - No
33. How often do you engage in physical activity outside of work?
    - Never
    - Rarely (1-2 days a week)
    - Sometimes (3-4 days a week)
    - Often (5-6 days a week)
    - Every day

Appendix II: Hojaji

Sehemu ya 1: Taarifa ya jumla

1. Utambulisho/Msimbo wa mshiriki……
2. Umri (miaka)……..
3. Jinsia……..
4. Hali ya ndoa……
5. Aina ya kituo cha huduma ya Afya unachofanyia kazi……...
6. Taaluma yako ya Afya……
7. Idara/kitengo unachofanya kazi…….
8. Je, umefanya kazi kwa muda gani mpaka sasa (miaka)…….

Sehemu ya 2: Vipimo vya anthropometric

9. Uzito ……..(Kg)
10. Urefu ……..(M)

Sehemu ya 3: Maumivu ya mgongo

11. Je, kwa sasa unakabiliwa na maumivu ya mgongo?
    - Ndiyo
    - Hapana
12. Je, umepata maumivu ya mgongo katika kipindi cha miezi 12 iliyopita?
    - Ndiyo
    - Hapana

13. Ikiwa ulijibu "Ndiyo" katika swali la 12, tafadhali onyesha muda wa maumivu yako ya mgongo:
    - Chini ya wiki moja
    - Wiki moja hadi nne
    - Mwezi mmoja hadi mitatu
    - Zaidi ya miezi mitatu

14. Je, unaweza kukadiriaje ukubwa wa maumivu yako ya mgongo kwa kipimo cha 0 hadi 10?

    0 inamaanisha 'Hakuna Maumivu'

    1 ina maana 'Maumivu kidogo sana'

    2 ina maana 'Maumivu kidogo'

    3 ina maana 'Maumivu ya Kusumbua'

    4 ina maana 'Maumivu ya wastani'

    5 ina maana 'Maumivu ya Kufadhaisha'

    6 ina maana 'Maumivu makali'

    7 ina maana 'Maumivu makali sana'

    8 ina maana 'Maumivu mabaya'

    9 ina maana 'Maumivu mabaya sana'

    10 inamaanisha 'Maumivu Mabaya Zaidi Yanayoweza Kufikiriwa'

    [ ] 0 [ ] 1 [ ] 2 [ ] 3 [ ] 4 [ ] 5 [ ] 6 [ ] 7 [ ] 8 [ ] 9 [ ] 10

15. Je, unapata nafuu yoyote katika maumivu yako ya mgongo unapokuwa mbali na kazi au wakati wa siku za kupumzika? Tafadhali chagua chaguo sahihi:

    - Ndiyo, nafuu inakuwepo wakati wa mapumziko ya kazi.
    - Hapana, maumivu yanabaki vile vile wakati wa kutoka kazini.

16. Je, umetafuta matibabu kwa ajili ya maumivu yako ya mgongo?

    - Ndiyo
    - Hapana

17. Je, unawezaje kukabiliana na maumivu ya mgongo ukiwa kazini?

    - Kutumia dawa za maumivu
    - Kurekebisha mkao wangu wakati wa kazi
    - Kuchukua mapumziko mafupi ili kupumzika
    - Kujihusisha na mazoezi au kujinyoosha
    - Kutumia vifaa vinavyosaidia kuzuia maumivu
    - Kutafuta ushauri kutoka kwa mhudumu wa afya au mtaalamu wa afya ya kazini

Sehemu ya 4: Mambo yanayohusiana na kazi

18. Kazi yako ni ngumu kiasi gani?
    - Sio ngumu hata kidogo
    - Ngumu kidogo
    - Ngumu kiasi
    - Ngumu sana
    - Ngumu kupitiliza

19. Je, ni mara ngapi huwa unanyanyua vitu/mzigo mzito au kuinama sana ukiwa kazini?

- Kamwe sifanyi
- Nadra
- Mara mojamoja
- Mara nyingi
- Kila mara

20. Je, ni mara ngapi unafanya kazi ukiwa katika mikao isiyo ya kawaida?

- Kamwe sifanyi
- Nadra
- Mara mojamoja
- Mara nyingi
- Kila mara

21. Je, umeridhika kwa kiasi gani na kazi yako ya sasa?

- Sijaridhika kabisa
- Sijaridhika
- Wastani
- Nimeridhika
- Nimeridhika Sana

22. Je, umeridhishwa kwa kiasi gani na hali ya kazi yako pamoja na mazingira halisi ya kazini?

    - Sijaridhika kabisa
    - Sijaridhika
    - Wastani
    - Nimeridhika
    - Nimeridhika Sana

23. Je, una udhibiti kiasi gani juu ya uzito wa kazi yako?

    - Udhibiti mdogo sana
    - Udhibiti mdogo
    - Udhibiti wa wastani
    - Udhibiti mkubwa
    - Udhibiti mkubwa sana

24. Je, unaweza kutathmini vipi msaada unaoupokea kutoka kwa msimamizi wako kazini?

    - Hakuna msaada
    - Msaada mdogo
    - Msaada wa wastani
    - Msaada mkubwa
    - Msaada mkubwa sana

25. Je, umepata mafunzo yoyote ya afya ya kazini yanayohusiana na kuzuia majeraha au ajali wakati wa kazi yako ya afya?

    - Ndiyo
    - Hapana

Sehemu ya 5: Sababu za kisaikolojia

26. Ni mara ngapi umehisi kwamba ulikuwa na vikwazo au hauwezi kudhibiti mambo muhimu maishani mwako?

    - Kamwe sijahisi
    - Nadra
    - Mara mojamoja
    - Mara nyingi
    - Kila mara

27. Ni mara ngapi umehisi huzuni au kutovutiwa/Kutofurahishwa na shughuli ulizozoea kufurahia awali?

    - Kamwe sijahisi
    - Nadra
    - Mara mojamoja
    - Mara nyingi
    - Kila mara

28. Je, ni mara ngapi unapata shida ya kukosa usingizi?

- Kamwe sikosi usingizi
- Nadra
- Mara mojamoja
- Mara nyingi
- Kila mara

29. Ni mara ngapi unahisi uchovu uliopitiliza au msongomoto?

- Kamwe sijahisi
- Nadra
- Mara mojamoja
- Mara nyingi
- Kila mara

30. Ni mara ngapi umehisi woga, wasiwasi, au hasira?

- Kamwe sijahisi
- Nadra
- Mara mojamoja
- Mara nyingi
- Kila mara

Sehemu ya 6: Mtindo wa maisha

31. Je, unavuta sigara?

    - Ndiyo
    - Hapana

32. Je, unatumia kilevi chochote?

    - Ndiyo
    - Hapana

33. Je, ni mara ngapi unafanya mazoezi ya kimwili nje ya muda wa kazi?

    - Kamwe sifanyi
    - Mara chache (siku 1-2 kwa wiki)
    - Mara mojamoja (siku 3-4 kwa wiki)
    - Mara nyingi (siku 5-6 kwa wiki)
    - Kila siku

Appendix III: Informed Consent

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES, DIRECTORATE OF RESEARCH & PUBLICATIONS

ID-NO ……

Consent to participate in this study

Hello, my name is James N. Allan I am working on research with the objective of assessing the prevalence of low back pain and its associated factors among healthcare workers in Nyamagana District, Mwanza Region.

Purpose of study:

The purpose of this study is to collect information about the prevalence and factors associated with low back pain among healthcare workers in Nyamagana District in Mwanza Region. We invite you to participate in this study because you are a healthcare provider working in one of these areas. If you choose to participate, you will be given a questionnaire to complete that has questions relating to low back pain. The questionnaire will take approximately 20 minutes to complete, and we will collect only non-identifying information such as your age and gender. Your Height and Weight measurements will also be taken because they will provide important information about your BMI.

Confidentiality: I assure you that all the information collected from you will be kept confidential. Only the research team will have access to this information. We will not include any identifying information in the records of the information you provide us.

Risk: We do not expect any harm to happen to you as a result of participating in this study.

Right to withdraw and alternatives:

It is voluntary for you to participate in this study. You can choose not to participate in this

study and refusal will not involve any penalty or loss of any benefits.

Benefits:

The results from this study will help to raise awareness of low back pain among healthcare workers and establish a baseline for future studies. The study will also identify the possible factors associated with low back pain and provide recommendations for addressing them. Ultimately, this will improve the well-being of healthcare providers and enhance the quality of care provided to clients.

Who to contact

If you ever have questions about this study; please contact the principal investigator; James N. Allan-0766270202 email: j.allan84@yahoo.com. If you ever have questions about your rights as a participant you may call **Prof. Bruno Sunguya**; Chairperson of college research and publication communities; P.O.BOX 65001, Dar es Salaam Tel +255685217272

I_____ have read/understood the contents in this form. My questions have been answered; I agree to participate in this study.

Signature of participant_____

Signature of investigator_____

Date of signed consent_____

Appendix IV: Fomu Ya Ridhaa

CHUO KIKUU CHA AFYA NA SAYANSI SHIRIKISHI MUHIMBILI

Namba ya utambulisho……

Ridhaa ya kushiriki katika utafiti huu.

Habari, jina langu ni James N. Allan, nafanya utafiti wenye lengo la kutathmini ukubwa na sababu za **"maumivu ya mgongo"** kwa watoa huduma za afya katika Wilaya ya Nyamagana Mkoa wa Mwanza.

Malengo ya utafiti:

Lengo la utafiti huu ni kukusanya taarifa kuhusu ukubwa wa tatizo na sababu zinazosababisha **"maumivu ya mgongo"** kazini kwa watoa huduma za afya katika Wilaya ya Nyamagana. Tunakualika kushiriki katika utafiti huu kwa sababu wewe ni mtoa huduma za afya anayefanya kazi katika maeneo haya na tunathamini mchango wako mkubwa. Ikiwa utachagua kushiriki, utapewa karatasi yenye maswali yanayohusiana na **"maumivu ya mgongo"**. Maswali haya hayatachukua zaidi ya dakika 20 kukamilika, na tutakusanya taarifa tu zisizo na utambulisho kama umri wako na jinsia. Pia tutachukua vipimo vya uzito na urefu wako ili kupata uwiano.

Usiri:

Nakuhakikishia kwamba taarifa zote zitakazo kusanywa kutoka kwako zitakuwa ni siri, ni watu wanaofanya kazi katika utafiti huu tu ndiyo wanaweza kuziona taarifa hizi. Hatutaweka taarifa yoyote ya utambulisho kwenye kumbukumbu za taarifa utakazotupa.

Madhara:

Hatutarajii madhara yoyote kutokana na kushiriki katika utafiti huu.

Haki ya kujitoa na njia mbadala:

Ni hiari yako kushiriki katika utafiti huu. Unaweza kuchagua kutoshiriki katika utafiti huu, na kukataa kutoshiriki haitakuletea adhabu, madhara au kupoteza faida yoyote kwa namna yoyote ile

Faida:

Matokeo yatatumika kuongeza ufahamu juu ya tatizo la **"maumivu ya mgongo"** kwa watoa huduma za afya. Pia utafiti huu utawezesha kutambua sababu zinazoweza kuhusishwa na **"maumivu ya mgongo"** kwa watoa huduma za afya na kutoa mapendekezo jinsi ya kukabiliana na tatizo hili mahali pa kazi, hivyo matokeo haya yatasaidia kuimarisha afya kwa watoa huduma za afya na ubora wa huduma wanazotoa.

Watu wa kuwasiliana nao.

Kama una maswali katika utafiti huu, unaweza kuwasiliana na mratibu mkuu wa utafiti

James N. Allan kwa simu namba-0766270202 au barua pepe: j.allan84@yahoo.com. Kama utakuwa na maswali yoyote kuhusu haki zako kama mshiriki unaweza kufanya mawasiliano na Prof. **Bruno Sunguya** ambaye ni Mwenyekiti wa kamati ya chuo ya utafiti na machapisho, S.L.P 65001 Dar es Salaam, simu namba +255685217272.

Sahihi

Mimi_____nimesoma/nimeilewa

hii fomu, maswali yangu yamejibiwa. Nakubali kushiriki katika utafiti huu.

Sahihi ya mshiriki_____

Sahihi ya mtafiti_____

Tarehe ya makubaliano_____

Appendix V: Approval for ethical clearance

UNITED REPUBLIC OF TANZANIA

MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

OFFICE OF THE DIRECTOR – RESEARCH, PUBLICATIONS AND INNOVATION

Ref. No.DA.282/298/01.C/2088 Date: 26/02/2024

MUHAS-REC-02-2024-2058
JAMES NJOROGE ALLAN
MUHAS

RE: APPROVAL FOR ETHICAL CLEARANCE FOR A STUDY TITLED: PREVALENCE AND FACTORS ASSOCIATED WITH LOW BACK PAIN AMONG HEALTH CARE WORKERS IN NYAMAGANA DISTRICT, MWANZA

Reference is made to the above heading,

I am pleased to inform you that the Chairman has on behalf of the University Senate, approved ethical clearance of the above-mentioned study, on recommendations of the Senate Research and Publications Committee meeting accordance with MUHAS research policy and Tanzania regulations governing human and animal subjects research.

APPROVAL DATE: 26/02/2024
EXPIRATION DATE OF APPROVAL: 26/02/2025

STUDY DESCRIPTION:
Purpose:

The purpose of this observational cross sectional study is to determine the prevalence of low back pain and the associated factors among healthcare workers in Nyamagana district, Mwanza region.

The approved protocol and procedures for this study is attached and stamped with this letter, and can be found in the link provided: https://irb.muhas.ac.tz/storage/Certificates/Certificate%20-%2014554.pdf and in the MUHAS archives.

The PI is required to:

1. Submit bi-annual progress reports and final report upon completion of the study.
2. Report to the IRB any unanticipated problem involving risks to subjects or others including adverse events where applicable.
3. Apply for renewal of approval of ethical clearance one (1) month prior its expiration if the study is not completed at the end of this ethical approval. You may not continue with any research activity beyond the expiration date without the approval of the IRB. Failure to receive approval for continuation before the expiration date will result in automatic termination of the approval for this study on the expiration date.
4. Obtain IRB amendment (s) approval for any changes to any aspect of this study before they can be implemented.
5. Data security is ultimately the responsibility of the investigator.
6. Apply for and obtain Data Transfer Agreement (DTA) from NIMR if data will be transferred to a foreign country.
7. Apply for and obtain Material Transfer Agreement (MTA) from NIMR, if research materials (samples) will be shipped to a foreign country.
8. Apply for and obtain permission to publish the results from National Institute for Medical Research. The application should be before submitting to a publisher and not concurrently through the email publications@nimr.or.tz.
9. Any researcher, who contravenes or fail to comply with these conditions, shall be guilty of an offence and shall be liable on conviction to a fine as per NIMR Act No. 23 of 1979, PART III section 10 (2)
10. The PI is required to ensure that the findings of the study are disseminated to relevant stake holders.
11. PI is required to be versed with necessary laws and regulatory policies that govern research in Tanzania. Some guidance is available on our website https://drp.muhas.ac.tz/.

DIRECTOR Research, Publications & Innovations Box 65001

Dr. Nahya Salim Masoud,
CHAIRPERSON, MUHAS RESEARCH AND ETHICS COMMITTEE

Appendix VI: Introduction letter

UNITED REPUBLIC OF TANZANIA
MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY
MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES
OFFICE OF THE DIRECTOR – POSTGRADUATE STUDIES

In reply quote;
Ref. No. HD/MUH/T.839/2022 14th March, 2024

REGIONAL ADMINISTRATIVE SECRETARY,
P.O.BOX 119,
MWANZA.

RE: INTRODUCTION LETTER OF JAMES NJOROGE ALLAN

We would like to inform you that the carrier of this letter is James Njoroge Allan with registration number HD/MUH/T.839/2022 a student in the School of Public Health and Social Sciences at Muhimbili University of Health and Allied Science (MUHAS), pursuing MSc. Applied Epidemiology.

As part of his studies, he will be doing an elective research titled **"PREVALENCE AND FACTORS ASSOCIATED WITH LOW BACK PAIN AMONG HEALTH CARE WORKERS IN NYAMAGANA DISTRICT,MWANZA".**

The Ethical Clearance for doing the said research has been given by the University.

Kindly request your assistance and cooperation to our student.

Yours Sincerely,

Ms. Victoria Mwanilwa
For: DIRECTOR, POSTGRADUATE STUDIES

cc: James Njoroge Allan

9 United Nations Road; Upanga West; P.O. Box 65001, Dar Es Salaam: Tel. G/Line: +255-22-2150302/6; Ext. 1015; Direct Line:+255-22-2151378;Telefax:+255-22-2150465;E-mail:dpgs@muhas.ac.tz;Web:https://www.muhas.ac.tz

UNITED REPUBLIC OF TANZANIA
PRESIDENT'S OFFICE
REGIONAL ADMINISTRATIVE AND LOCAL GOVERNMENT AUTHORITIES

MWANZA REGION:

"REGCOM"
Phone: 028-2501037/2500686
Fax: 028-2541242/2501057
Email: ras.mwanza@tamisemi.go.tz

REGIONAL COMMISSIONER'S OFFICE,
Regional Drive road,
P. O. Box 119
33180 NYAMAGANA, MWANZA

Please reply to:

Ref. No. GB.47/333/01 03rd April, 2024

The City Director,
P. O. Box 1333,
MWANZA

Re: **INTRODUCTION OF JAMES NJOROGE ALLAN**

Please reference to the above subject.

2. James Njoroge Allan is a student at Muhimbili University of Health and Allied Sciences (MUHAS), pursuing a MSc. Applied Epidemiology. One of requirements of his studies is to undertake a research.

3. This student is expected to carry out a research titled **"Prevalence and factors associated with low back pain among health care workers in Nyamagana District, Mwanza".**

4. You are requested to give him necessary support to ensure the study is successfully done. The ethical clearance for this research is valid for three months from the date of letter.

5. Thank you for your good cooperation.

Dr. Silas Wambura
For: **REGIONAL ADMINISTRATIVE SECRETARY**
MWANZA

Copy to: James Njoroge Allan
MUHAS,
P. O. Box 65001,
DAR ES SALAAM

THE UNITED REPUBLIC OF TANZANIA

PRESIDENTS OFFICE REGIONAL
ADMINISTRATION AND LOCAL GOVERNMENT

In reply, please quote

REF. NO.AT/II VOL II **05/04/2024**

Principal
MUHAS
P.O.BOX. 65001,
DAR ES SALAAM

RE: RESEARCH PLACEMENT FOR JAMES NJOROGE ALLAN

Please refer to the heading above in reference to your letter dated on 28th March. 2024 with reference number GB.47/333/01

Kindly be informed that placement request for the above-named student is hereby honored and agreed for research title **Prevalence and factors associated with low back pain among health care workers in Nyamagana District.**

Upon receiving this letter, you should report to the medical **Officer In charges at the health facilities which you will visit for further instruction for**. Your permission starts from 5th April. 2024 to 10th May.2024.

I wish you good luck.

Maida Kibona

For: CITY MEDICAL OFFICER OF HEALTH
MWANZA CITY

CITY MEDICAL OFFICER OF HEALTH
MWANZA

Appendix VII: Digital Receipt

turnitin

Digital Receipt

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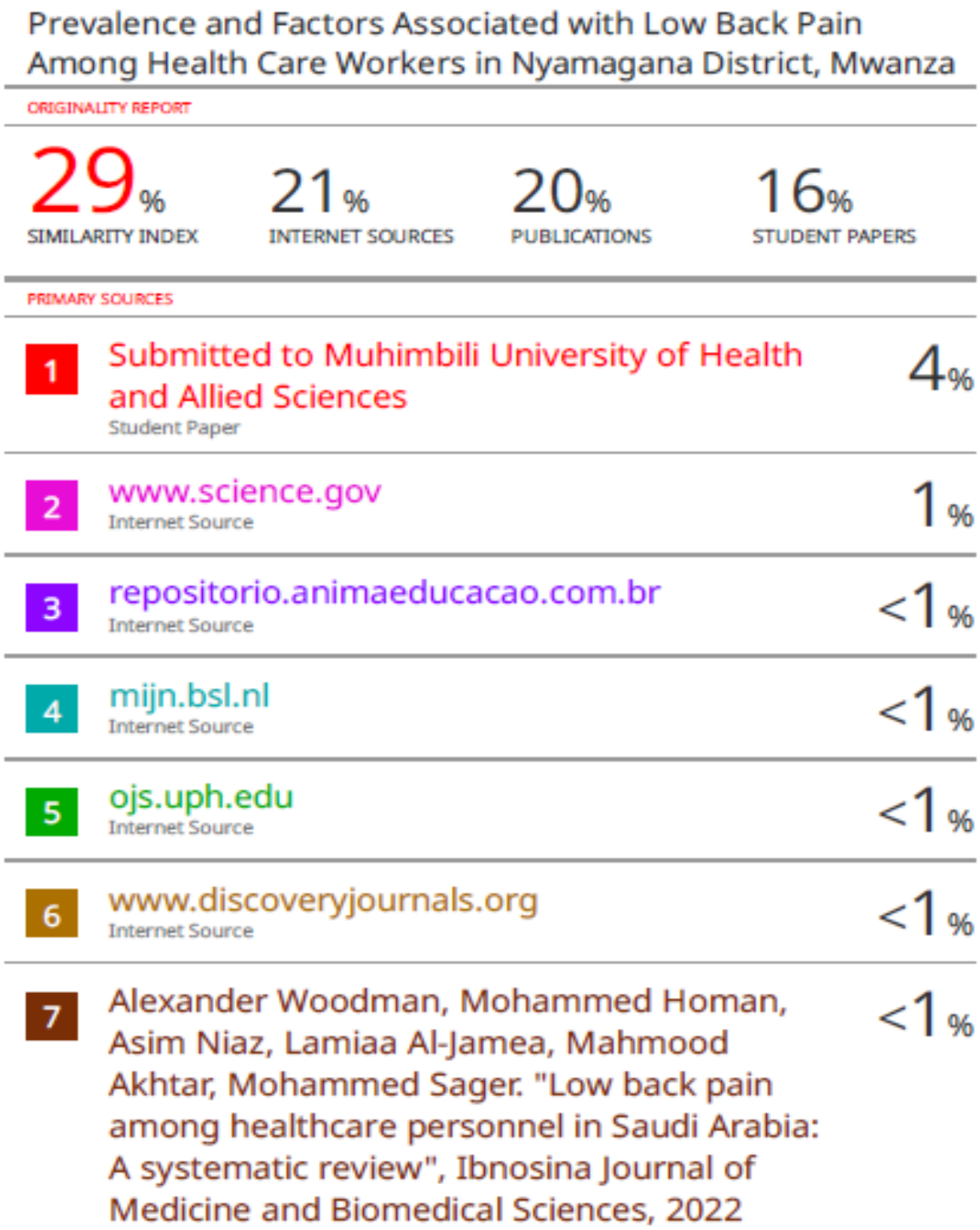
Submission author:	James Allan
Assignment title:	Dissertation Reports
Submission title:	Prevalence and Factors Associated with Low Back Pain Amon...
File name:	DISSERTATION_REPORT-JAMES_ALLAN_-Final_draft.docx
File size:	873.79K
Page count:	75
Word count:	16,692
Character count:	93,482
Submission date:	27-Jun-2024 05:02PM (UTC+0300)
Submission ID:	2409417440



PREVALENCE AND FACTORS ASSOCIATED WITH LOW BACK PAIN AMONG HEALTH CARE WORKERS IN NYAMAGANA DISTRICT, MWANZA

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Appendix VIII: Plagiarism report



Prevalence and Factors Associated with Low Back Pain Among Health Care Workers in Nyamagana District, Mwanza

ORIGINALITY REPORT

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7	Alexander Woodman, Mohammed Homan, Asim Niaz, Lamiaa Al-Jamea, Mahmood Akhtar, Mohammed Sager. "Low back pain among healthcare personnel in Saudi Arabia: A systematic review", Ibnosina Journal of Medicine and Biomedical Sciences, 2022	<1%