PREVALENCE AND ASSOCIATED RISK FACTORS OF MUSCULOSKELETAL DISORDERS AMONG NURSES IN A TERTIARY HOSPITAL IN BOTSWANA

By

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DECLARATION

I, Kagiso Kgakge, hereby declare that the work on which this dissertation is based, prevalence and associated risk factors of musculoskeletal disorders among nurses in a tertiary hospital in Botswana, is original (except where acknowledgements are indicated) and that neither the whole work nor any part of it has been, is being, or shall be submitted for another degree at this or any other university, institution for tertiary education or examining body.

K.Kgakge 10 - 02 - 2018
Signature Date
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ABSTRACT

Background: It is evident that healthcare professionals are in constant exposure to occupational hazards such as musculoskeletal injuries as they discharge their professional duties. The risks of work related musculoskeletal disorders are high among various healthcare professions, particularly in the nursing profession and little is known among nurses in Botswana. Risk and safety analysis is recommended as one method to diminish the risk of exposure to occupational injuries. Training and induction on health and safety has been reported to be most efficient and effective method for the prevention of injuries. In order to minimize injuries in the nursing profession, it is important to document the extent of the problem including the prevalence of such injuries as well as identification of the associated risk factors in the workplace.

Study Aim: The aim of the study was to determine the prevalence and investigate the associated risk factors of musculoskeletal disorders among nurses in a tertiary hospital in Botswana.

Methods: A cross sectional survey was undertaken among healthcare professionals working in different wards of Princess Marina Hospital, Botswana over a period of three months. Questionnaires were used to collect data on prevalence and associated risk of musculoskeletal disorders among nurses. Data was entered into Microsoft Excel spread sheet, cleaned, coded and imported into STATA software version 13 for descriptive and inferential statistical analysis. Descriptive statistics were used to calculate, interpret and present data. Univariate and multivariate logistic regression was used to test the association between categorical variables. All factors having a p-value of less than 0.05 were considered significant.

Results: Of the 245 healthcare professional recruited, a total of 220 participants completed the questionnaire (90% response rate). The 12- month period prevalence of MSD at any body region was 91%. The most common affected body site was low back with 68.6%. Significant risk factors identified in this study were working while injured (OR=4.5, 95% CI=1.68-12.17, p=0.003 and the length of employment OR= (0.2, 95% CI=0.055-0.76, p=0.02).
Conclusion and recommendations:

This study has shown that there is a high prevalence of musculoskeletal disorders among Botswana nurses, with low back being the most reported. Middle aged nurses are the most affected by MSD. There is need for education programmes and training to help prevent MSD among nurses, hence increase efficiency in patient care.
ACRONYMS AND ABBREVIATIONS

A&E – Accident and Emergency

BMI – Body Mass Index

EU-OSHA – European Agency for Safety and Health at Work

HSE – Health and Safety Executive

ICU – Intensive Care Unit

LBP – Low Back Pain

MSD – Musculoskeletal Disorders

OBGY – Obstetrics and Gynaecology

OPD – Out Patient Department

PMH – Princess Marina Hospital

WHO – World Health Organisation

WMSD - Work-related musculoskeletal disorders
TABLE OF CONTENTS

DECLARATION............................................................................................................. i
ACKNOWLEDGEMENTS ............................................................................................ ii
ABSTRACT .................................................................................................................. iii
ACRONYMS AND ABBREVIATIONS.......................................................................... v
TABLE OF CONTENTS .............................................................................................. vi
LIST OF TABLES ........................................................................................................ ix
LIST OF FIGURES ....................................................................................................... x
CHAPTER 1 ................................................................................................................. 1
STUDY BACKGROUND .............................................................................................. 1
  1.1 Introduction ..................................................................................................... 1
  1.2 Problem statement .......................................................................................... 2
  1.3 Study aim ........................................................................................................ 3
  1.4 Research question .......................................................................................... 4
  1.5 Objectives ....................................................................................................... 4
  1.6 Study significance .......................................................................................... 4
  1.7 Conclusion ...................................................................................................... 5
CHAPTER 2 ................................................................................................................. 6
LITERATURE REVIEW ................................................................................................ 6
  2.1 Introduction ..................................................................................................... 6
  2.2 MSDs as occupational health problems ........................................................ 6
  2.3 Prevalence of MSD among nurses worldwide ............................................. 7
  2.4 Associated risk factors for MSDs in nursing profession ......................... 9
     2.4.1 Physical factors ...................................................................................... 9
     2.4.2 Psychosocial factors ............................................................................. 9
     2.4.3 Causes of occupational stress amongst nurses ............................... 10
LIST OF TABLES

Table 4.1: Demographic characteristics of participant……………………………………30
Table 4.2: Prevalence and experiences relating to MSD………………………………32
Table 4.3: Occupational risk factors associated with MSD among nurses…………33
Table 4.4: Response of participants on experiences related to having an MSD……………………………………………………………………………………………………33
Table 4.5: Response of participants on the site in which they experienced MSD pain……………………………………………………………………………………………………34
Table 4.6: Frequency of stress as reported by participants…………………………34
Table 4.7: Relationship between risk factors and MSD pain……………………………35
Table 4.8: Multivariate logistic regression………………………………………………37
LIST OF FIGURES

Figure 4.1: Distribution of nurses in various departments…………………………….31
CHAPTER 1
STUDY BACKGROUND

1.1 Introduction

The term musculoskeletal disorders (MSD) means injuries and disorders that happen in relation to work, affecting the muscles, tendons, ligaments, joints, peripheral nerves, and supporting blood vessels with consequent pain and discomfort. Injuries associated with MSD include disc prolapse, spinal disc degeneration, muscle tears and spinal fractures (Smith & Leggat, 2004; Karsh, 2006; Tinubu et al, 2010; Klubmann et al, 2012).

Work-related Musculoskeletal disorders (WMSD) can be sub-divided into body regions of the back, upper limb and lower limb disorders. Hence, the classification of MSD illness types World Health Organisation; WHO (2003) states that WMDs are multifactorial, meaning that there are a number of risk factors contributing to the development of MSD. They develop over time due to the repetitive and demanding working conditions. These disorders may range from pain, numbness, aches, stiffness and burning sensation. They can be episodic or chronic and can result to more serious medical conditions requiring time off work and even medical treatment (Erick & Smith, 2014).

MSDs pose a major public health problem worldwide and represent a major occupational problem among the working population, especially the healthcare workers including the nurses. According to global statistics it is estimated that 2million people die annually due to work related injuries or illnesses, while there are 160 million new cases of work related illnesses each year including for example, musculoskeletal disorders (Smith et al, 2004; Taghinejad et al, 2016).

Nursing is a professionally demanding job and nurses are prone to develop MSDs. Nursing professionals have been ranked as the most affected by MSDs because of their direct handling of patients on daily basis (Tinubu et al, 2010; Freimann et al, 2013). MSDs in the workplace have a huge impact on employee health and work performance and are emerging as a growing problem in the health profession. According to Yasobant and Rajkumar (2014) MSD are responsible for morbidity in any
working populations, and are regarded as one of the leading occupational problems with increasing compensation and health costs, reduced productivity due to sick leaves, lowering quality of life and economic toll on the individuals, organisation and society as a whole.

Nurses are an important part of the healthcare system because they bridge the gap between doctors and patients. They coordinate most of the activities hence they are at high risk of developing MSD (Rathore et al, 2017). A number of factors have been associated with development of MSD amongst nurses. These include physical factors like manual lifting or transferring of patients from the bed or floor, bathing patients and dressing them, long standing hours especially in operating theatres. Psychosocial and personal factors like stress, anxiety, depression, low social support, frequent low moods and body size variability are also important predictors in the development of this condition. Furthermore organisational structures like poor work ergonomics, long working hour-shifts, poor job satisfaction, shortage of staff, poor working conditions, poor job organisation and improper work design also lead to MSDs amongst nurses (Tinubu et al, 2010).

Among all the professions, nurses have a relatively high prevalence of MSD and reasons are thought to be the heavy workloads and lack of awareness about MSD. Injury can occur at any region of the musculoskeletal region, and Low Back Pain (LBP) is one of the most prevalent MSD among nursing profession because of the frequent lifting of patients (Alexopoulos et al, 2006; Yeung at el, 2005).

1.2 Problem statement

Studies conducted by Wiitavaara et al (2007) report that MSD are a health risk factor among the healthcare professionals globally, especially among the nursing professionals. Furthermore the Bureau of Labour Statistics ranked nursing among other occupations with the highest frequency of suffering from MSD with annual reported prevalence ranging from 40%-85%. Hence, if left unattended they may negatively affect the healthcare workforce due to increased morbidity and burnouts caused by the consequences of MSD. Although measures have been put in place to minimize the risks of acquiring MSD by nurses, the problem still abounds. This
problem normally leads to long term sick leaves and absenteeism from work (Erick & Smith, 2014; Freinmann et al, 2013; Tinubu et al, 2010). Measures put in place include the use of electronic beds, employment of supportive staff to help in with extra duties and implementation of occupational health and safety policies to curb MSDs.

In order to further address the problem, documented evidence on the prevalence and associated risk factors of MSD needs to be available in order to design sound strategies to tackle the disorder particularly in Botswana. A study done in this country to determine the prevalence of MSD amongst teachers showed an MSD prevalence of 83.3% (Erick and Smith, 2014). However, to date no studies have reported the occurrence of different musculoskeletal complaints amongst nurses in Botswana. Thus, the prevalence, reporting and statistics relevant to MSD among Botswana nurses in public hospitals remains largely unknown. Therefore, this study is designed to bridge that information gap.

A referral hospital was chosen for this study because of the nature of the services it offers and the population that it services. Botswana’s health system is facing a crippling shortage of health workers in particular the nurses. This is evidenced by the continuing dependence of Botswana government on expatriate medical staff from among others China and Cuba. Botswana health personnel have revealed that the nurse to patient ratio is 1:30 instead of the internationally accepted standard of 1:10. With this shortage, MSD worsen the situation because it results in more sick leaves and absenteeism. Therefore, this study also determined the number of lost days from work. Furthermore, early retirements and resignations are prevailing, as many nurses have been leaving their jobs from government hospitals in search of better working environments at the private hospitals and even migrate to United Kingdom for greener pastures.

1.3 Study aim

The aim of the study was to determine the prevalence and investigate the associated risk factors of musculoskeletal disorders among nurses in a tertiary hospital in Botswana.
1.4 Research question

The research questions for this study are as follows:

(i) What is the prevalence of musculoskeletal disorders amongst nurses in a tertiary hospital in Botswana?

(ii) What are the associated risk factors associated with musculoskeletal disorders amongst nurses in Botswana?

1.5 Objectives

The research objectives of this study were the following;

(i) To investigate the prevalence of musculoskeletal disorders amongst nurses in Botswana.

(ii) To determine associated risk factors of musculoskeletal disorders amongst nurses in Botswana.

1.6 Study significance

Health planning requires a sound and evidence based knowledge of the situation at hand, and as such prevalence and associated risk factors of MSD needs to be determined. It is hoped that this study will provide an opportunity to the healthcare planners and hospital managers to understand the dangers of MSD and on how best they can be prevented.

Currently there is no information relating to this study in Botswana. Therefore, findings and recommendations from this study are likely to influence policy makers to implement proper strategies to mitigate the problem like use of patient lifting devices, lifting teams, training of unit managers and nurses on ergonomic issues. Findings from this study will also advocate for the need to implement preventative programmes or subsequent reinforcement of prevention strategies. This will ultimately improve the health of the nurses who will in turn render improved quality health services to the patients.
1.7 Conclusion

This chapter has introduced the topic of prevalence and associated risk factors of musculoskeletal disorders amongst nurses in a tertiary hospital in Botswana. The study aims, the research questions, the objectives of the study, and the significance of the study are also discussed. The next chapter will discuss the literature review of the study.
2.1 Introduction

According to Degu & Yigzaw (2006), literature review is very important as it prevents duplication of work that has been done before, identify gaps and help us to compare our own ideas with existing ones. This chapter, therefore, focuses the discussion on studies relating to MSD amongst nurses. The scope of this review includes the prevalence of MSD, types of MSD and associated risk factors of MSD.

2.2 MSDs as occupational health problems

The term Musculoskeletal Disorders (MSD) means injuries and disorders that happen in relation to work affecting the muscles, tendons, ligaments, joints, peripheral nerves, and supporting blood vessels with consequent pain and discomfort. Injuries associated with MSDs include disc prolapse, spinal disc degeneration, muscle tears and spinal fractures (Smith & Leggat, 2004; Karsh, 2006; Tinubu et al, 2010; Klubmann et al, 2012). If these injuries occur as a result of work activity, they are termed “Work-related Musculoskeletal Disorders” (WMSD). Musculoskeletal disorders can be sub-divided into body regions of the back, upper limb and lower limb disorders, hence the classification of MSD illness type.

The recognition that work may adversely affect health is not new. Epidemiologic research attests strong evidence of association between MSD and certain work-related physical factors when there is high level of exposure like repetitive lifting of heavy objects and extreme awkward postures (Putz-Anderson, 1988). Physical exposures are associated with MSD when they are intense, prolonged and when workers are simultaneously exposed to risk factors. According WHO, development of MSD is multifactorial and covers physical, work organisational, individual, psychosocial and sociocultural. Hence, there is controversy surrounding the development of MSD because of the multiple and individual factors which are relatively
important. It is, therefore, important that MSD studies establish factors that are positively or negatively associated with the development of MSD.

MSDs take time to develop, hence they can go unrecognized. Although some efforts have been made in workplaces, like organizational modifications, engineering design change and working training programs, MSDs still persist and account for a large number of human suffering due to worker impairment, often leading to permanent, partial or total disability. This results, subsequently, in poor quality of life amongst the nurses. The development of MSDs in the nursing population has a substantial impact in the absence from work and work restrictions by employees. This leads to poor work delivery to the patients due to the fact that sick leaves and resignations leave few nurses to cover a high burden of work to execute. Economic burden also prevails because of lost work days and loss of millions of money due to compensation (Attar, 2014; Madiba et al, 2013; McCauley Bush, 2011; Nunes, 2009).

2.3 Prevalence of MSD among nurses worldwide

The prevalence of MSD is very high among nurses worldwide, with the Lower Back Pain (LBP) being the most prevalent. Studies that have been conducted among nurses in relation to MSD indicate that the high prevalence of MSD in nurses is aggravated by the nature of the work that they do. Repetitive manual handling and over exertion causes some injury to the spinal disc, hence development of backache. In short, it is the improper handling of patients that leads to the development of LBP. MSD is common among the nursing population worldwide with a frequency of approximately 40-90%. These statistics are not surprising because nurses are exposed to continuous physical demands and musculoskeletal strains (Tinubu et al 2010; Freimann et al, 2013; Attar, 2014).

Despite the high global prevalence of general disability of musculoskeletal disorders in Sub Saharan Africa, very few studies have been conducted to determine the prevalence and causes of MSD amongst nurses. In South Africa, based on one cross-sectional study, the prevalence of MSD among nurses working in Intensive Care Units (ICU), was 84% (Madiba et al, 2013). Findings from this study indicated that LBP was
the most prevalent MSD. In the same trend, findings from conducted in Nigeria, Uganda and Saudi Arabia respectively, were generally consistent with the study conducted by Madiba et al (2013), as they reported a prevalence rate ranging from 70-80%, with LBP being the most common MSD (Tinubu et al, 2010; Munabi et al, 2014; Attar, 2014).

Similar studies were done in Estonia and Taiwanese nurses respectively, with the aim of finding out the risk factors for musculoskeletal disorders, found a high prevalence of musculoskeletal amongst nurses as 84% and 58.7% respectively. Both studies state LBP as the most common MSD affecting nurses among all populations because of its significant association with stressful physical activities (Freimann et al, 2013, Chung et al, 2013). Furthermore, Raithatha and Mishra (2016); Smith et al (2005) reported 89.2% and 70% prevalence rate in India and Korea of MSD among nurses, figures generally consistent with other previous studies.

Conversely, Amin et al (2014) conducted a study among nurses in a public hospital in Malaysia, to examine the relationship between psychosocial work factors and risk factors of WRMSD among nurses, had contrasting results from the former researchers, as their findings found the neck to be the most commonly reported region of pain (48.9%) and LBP being the least (35.3%) reported MSD.

Furthermore, similar findings were reported by Rathore et al (2017) in Pakistan who investigated prevalence and perceptions of MSD among hospital nurses; results showed that LBP was low as 34% and possible reasons for this was that nurses in Pakistan work short shifts of 6-8 hours per day. This could have been contributed by the fact that Pakistani women, including nurses, do not report problems like pain or discomfort and tend to suffer in silence. Additionally, nurses in Pakistan do not lift or transfer patients, especially male patients because this aspect of direct care is often handed over to male nursing assistants, hence the higher prevalence of MSD among nursing aides as compared to registered nurses (Tezel, 2005; Fonseca & Fernandes, 2010).
2.4 Associated risk factors for MSDs in nursing profession

A risk factor is any source or situation with the potential to cause injury or lead to the development of a disease (Nunes & McCauley Bush, 2012). Literature shows that there is a strong correlation between the incidence of MSD and the working conditions, particularly the physical risk factors associated with jobs such as awkward postures, high repetition, excessive force and static work. Besides physical factors, psychosocial factors like stress, job dissatisfaction, lack of social support and time pressures together with personal factors like age, gender and weight, highly contribute to the onset of MSD (Nunes & Bush, 2011).

2.4.1 Physical factors

The physical risk factors are a subset of work related hazards that include environment and biomechanical activities. Overall, findings from MSD studies identified lifting and transferring patients in and out of bed, lifting patients from the floor, pushing occupied beds, lifting and carrying heavy equipment, constrained postures, forceful movements, long standing hours, over-exertion on the back muscle, as contributory factors to MSDs (McCauley Bush, 2011; Nunes, 2009). Reportedly, most nurses have poor knowledge of ergonomics, hence high prevalence of MSDs.

In a study conducted to investigate association between shift working and musculoskeletal symptoms, findings indicated that shift working was one of the health-related risk factors causing MSDs. Normally, there are few nurses in a night shift and they have to carry out all the duties including lifting of patients. Moreover, working on night shifts results in sleep disturbance and deprivation, which can lead to muscle sprain. The study also reported that theatre nurses had high numbers of LBP at 60% due to long standing periods. Furthermore, shift working nurses have poor behavioural health including smoking, drug consumption, alcohol abuse, low physical activity and adverse pregnancy outcomes (Arsalani et al, 2014; Attarchi et al, 2014; Attar, 2014).

2.4.2 Psychosocial factors

Psychosocial risk factors are non-biomechanical risk factors related with work. Hagberg et al (1995) reports that work related psychosocial risk factors refer to individual subjective perceptions of the organisation and are related to work content
like work load, work control and work monotony. They often carry emotional value and have the potential to cause physical or psychological damage on the nurse's health. They can also be the objective aspects of how the work is organized, supervised and carried out. According to Martino (2001), occupational stress is defined as the harmful physical and emotional response that occurs when the requirements of the job do not match the capabilities and needs of the worker.

2.4.3 Causes of occupational stress amongst nurses

Occupational stress is defined as the harmful physical and emotional response that occurs when the requirements of the job do not match the capabilities and needs of workers. According to Freimann et al (2013) and Nunes (2009) the following factors contribute hugely to the development of MSD amongst nurses:

- Nurses are predisposed to high emotional strain because of caring for large numbers of patients who may be critically ill.
- Pressures from staff shortage.
- Low job satisfaction.
- Lack of support from work.
- Time pressures.
- Management style, interpersonal relationships at work and organisational culture.
- Dealing with faulty or no machines to execute their duties.
- Too many responsibilities
- Lack of career development

This means that, if these factors are not well managed, can lead to high levels of stress and ultimately lead to serious deterioration of mental and physical health. In most cases, psychosocial factors alone do not cause MSDs. However, together with physical factors, they increase the risk of acquiring injuries. Given that stress cannot be eliminated from a workplace, the contributory factors of stress on nurses can be minimised.
2.5 Demographic factors relating to MSD

A risk factor is any source or situation with the potential to cause injury or lead to the development of a disease (Nunes and McCauley Bush, 2012 and Karsh, 2006). These risk factors are divided into physical factors, psychosocial factors and individual factors.

2.5.1 Age

Age has been described as one of the factors that can lead to MSD. Prevalence of MSD increases as people enter their working years. Functional capability of adults tend to go down as they age, in relation to MSD ageing result in reduction in joint mobility, decrease in muscular strength and the slowing of reaction and movement times hence increased rates of MSD. According to the researcher’s observation young aged nurses are likely to have high incidences of MSD because when they start working they have little knowledge and very inexperienced in handling of patients hence higher risk of MSD, whilst older nurses tend to move away from the aspects of direct handling of patients to administrative roles (Holmstrom & Engholm, 2003).

2.5.2 Gender

Being a woman increases chances of developing MSDs. Some literature evaluated whether men and women who do similar repetitive work task differ in terms of MSDs complaints (Fonsenca & Fernandes, 2010; Rathore et al, 2017). Women showed substantially higher prevalence than men. For example, 36% of males complained of neck/shoulder as compared to 61% of females. At the same time, 34% males had elbow/hands pain as compared to 55% of females. Women also deal with strong hormonal changes during pregnancy and menopause that make them more likely to suffer from MSDs (Nordander et al, 2008). Another possible reason might be that females are the majority in the nursing population (Fabunmi et al, 2008). On the other hand, Fonsenca and Fernandes (2010) states that females have an extra role of home and child care hence more females are more affected by MSD than males.
2.5.3 Anthropometry

Weight, height, body mass index (BMI) and obesity, have all been identified as risk factors to the development of MSD. According to LeBlanc and Cestia (2011), the relationship between BMI and MSD has been suggested to be related to increased fatty tissue within the carpal canal or to increased hydrostatic pressure throughout the carpal canal in obese people. If too much pressure or overload is exerted in the spine, this may result in structural damage to the lumbar area hence backache. An association between obesity and MSD has been reported by Daraiseh et al (2010) and De Souza et al (2010) indicating that too much strain can result in disc herniation with subsequent pain.

2.5.4 Being married and having children

In a study conducted in Uganda by Munabi (2014) results showed that being a female who is married and having children had a significant impact on the development of MSD as compared to their male counterparts. In his findings, females were twice likely to report MSD in different body regions as compared to male nurses. On the other hand, Raithatha (2016), states that married nurses who have children are likely to have higher incidence of MSD because they tend to have greater amount of workload such as domestic work at home. Therefore, the double work burden for women increases the physical and psychological demands for them and hence, their increased risk of acquiring MSDs.

2.6 Lifestyle characteristics relating to MSD

Incidence of MSD can be increased by some lifestyle characteristics like smoking and lack of physical activity.
2.6.1 Smoking

Finkelstein (1995) presents evidence that positive smoking history is related to low-back pain, sciatica, or intervertebral herniated disc. Furthermore, Nunes and McCauley Bush (2012) observed that the prevalence of back pain increased with the number of pack-years of cigarette smoking and with the heaviest smoking level. An explanation behind this relationship is that coughing increases the abdominal pressure and intra-discal pressure and puts strain on the spine. Another risk possibility is that nicotine found in cigarettes causes diminished blood flow to vulnerable tissues resulting in micro-fractures.

2.6.2 Lack of physical activity

According to Bush (2011), epidemiological evidence exists for the relationship between back injuries and weak back strength in job tasks though there are mixed results on the relationship between physical activity and MSD. Physical activity may cause injury, at the same time lack of physical activity may increase susceptibility to injury and after injury the threshold for further injury is reduced (Bush, 2011). It is therefore very important to maintain a consistent physical active lifestyle as it improves musculoskeletal fitness. According to the researcher’s own observation, nurses spend most of their time at work. This hugely contributes to lack of physical activity in this profession.

2.7 Consequences of MSD

Almost all MSD studies states that WMSD is the major cause of morbidity in the healthcare profession especially among the nurses. The consequent LBP together with burnouts, result in absenteeism and sick leaves in the nursing populations. Depending on the level of an individual pain, one can be booked sick off to take some rest at home. If the condition is more severe or chronic, it can result in termination of work (Guzman et al, 2010). With this, reduced productivity normally prevails as this negatively impact on the remaining staff members who have to work more extra due to staff shortage hence poor nursing quality care. Furthermore, MSD account for the
largest burden of all injuries in health-care occupations, with increasing compensation and health costs, increased number of lost days, and lowering quality of life.

2.8 Conclusion

This literature review chapter has covered the discussion on prevalence of MSD and associated risk factors amongst nurses, which presents a substantial global health burden. The literature has established that LBP is the most prevalent MSD found among nurses because of direct handling of patients on daily basis. Therefore reducing negative risk factors and enhancing positive factors can possibly reduce the prevalence of MSD among the nursing population.
CHAPTER 3
RESEARCH METHODOLOGY

3.1 Introduction

This chapter discusses the procedures followed to conduct the study. It describes the study design, study setting, study population, inclusion and exclusion criteria, sample size as well as the sampling procedure. The chapter also discusses the data collection process, validation as well as minimising bias in the quality of data collected. Data analysis and ethical considerations are also discussed.

3.2 Study design

A descriptive cross-sectional quantitative study was conducted among health care professionals as participants at Princess Marina Hospital. This design is appropriate for this study because of its ability to provide snapshot events at a specific time period.

3.3 Study setting and population

The study was conducted at Princess Marina Hospital (PMH) in Botswana. It is located in the capital city of Botswana, Gaborone in the South East region. It is the largest referral hospital in the country with a bed capacity of just over five hundred (500). It offers a wide range of services to the nation. Patients are commonly referred from smaller district hospitals and outreach clinics for specialized or complicated care. Furthermore PMH is the main teaching hospital in the country. PMH consist of accident and emergency unit, Intensive Care Unit (ICU), surgical wards, Medical wards, Theatres, Obstetrics and Gynaecology unit (OBGY), orthopaedics, out-patient unit (OPD), oncology, spinals rehabilitative unit, paediatrics, and dental unit.

Princess Marina Hospital consists of five hundred and twenty nine (529) male and female nurses. The population consists of masters, degree, and diploma holders in
nursing profession, who offer medical, surgical, preventative, curative and rehabilitative services. Therefore, the sampling frame for the study was drawn from nurses working in different wards of Princess Marina Hospital.

3.4 Inclusion criteria

Participants recruited into the study included nurses working in Princess Marina Hospital for a period of 12 months or more of service, and were available during data collection, consented and participated in the study. Reason for this inclusion criterion is because MSD is cumulative and develops over time; hence after a year of service one is eligible to acquire MSD.

3.5 Exclusion criteria

Nurses working in Princess Marina Hospital and were less than 12 months in service did not participate in the study. Reason for this exclusion criterion is because in the first year they are still newly employed and undergoing orientation hence minimal chances of acquiring MSD.

3.6 Sample and sampling technique

According to Princess Marina Hospital database, the total number of nurses is 529. Therefore, a sample size calculator (Raosoft) was used to calculate the sample size at 5% margin of error, 95% confidence level, 50% response distribution. This gave a total of 223 nurses. A 10% buffer of participants was included in the sample as contingency to cover for possible low response rate of participants making the sample size 245.

Participants were recruited from all nurses working in Princess Marina Hospital. Simple random sampling technique was used to get the sample. The researcher conducted a lottery method in which participants picked a number written “1” to be included in the study and “2” for non-inclusion. This was done on different days of Mondays, Wednesdays and Fridays until a desired number was reached.
3.7 Data collection instrument and procedure

Data was collected using English self-administered structured questionnaires (see appendix 2). The data collection tool which is a semi structured questionnaire consisted of three major sections.

**Section A** consisted of demographic data such as (age, gender, marital status), the participants answered by ticking in the applicable box and filling the blank space given.

**Section B** asked questions on prevalence of musculoskeletal disorders

**Section C** asked questions on associated risk factors of musculoskeletal disorders. Question 12 in this section was open-ended, reason being that the researcher wanted to explore the opinions of participants and to allow them to answer freely in their own words.

3.8 Recruitment strategy

Prior to conducting the study permission was requested from the heads of departments of the study setting verbally. After permission was given by head of departments, an outline of the study was presented to the nurses during morning report and they were informed that participation was voluntary. The nurses were then approached individually, where all the necessary study details were explained to them and were requested to be study participants. The student (principal investigator) and the research assistant had access to the study participants during off peak hours and therefore did not compromise patient care during the data collection process.

Individuals agreeing to participate were allowed to ask questions and clear any misconceptions with the principal investigator, before being given consent form (Appendix 1) to read and sign. Study participants were given the questionnaires at their respective departments to complete on their own during their spare time. When participants were able to complete the questionnaire during the visit, the research assistant collected the survey back the same day. If they were not able to complete the questionnaire during the visit, they were collected the following day. The data was collected for three months from June to August 2017. This period was sufficient for the collection of all the dispensed questionnaires.
3.9 Data analysis

Data was checked and verified by the researcher for completeness, captured on Microsoft excel, cleaned and imported to STATA software for further analysis. Descriptive summary statistics such as frequency distribution mean and percentage calculation was used for most of the variables. Data was summarized and presented in form of figures and tables. Inferential statistics were performed on desirable variables. Univariate and multivariate logistic regression were used to determine the strength of association between variables such as association between demographic and associated risk factors. Variables with p-value less than 0.05 were considered statistically significant and were put into multivariate logistic regression to test the strength of association between contributing factors.

3.10 Validity and reliability

Validity was ensured by adapting the tool from previously validated questionnaires in previous publications on similar research. Face and content validity of the data collection tool was ensured by getting it reviewed by the supervisor and senior researchers in the school of public health. Reliability was increased by the researcher establishing rapport and trust with respondents and ensuring confidentiality of their information. Furthermore, reliability was ensured by adequate training of the research assistants on proper administration of the tool and to understand the objectives of the study, in order to obtain reliable results.

3.11 Bias

Recall bias was minimised by asking questions that require reasonable recall period, and for this study it was 12 months. Non-response bias was also reduced by increasing sample size by 10%. Leading questions were avoided. Selection bias was addressed by using simple random sampling technique for eligible participants (Degu & Yigzaw, 2006). Furthermore, anonymity and confidentiality were ensured so that participants give correct answers hence minimising information bias.
3.12 Ethical considerations

Ethical standards for conducting the study were addressed through the following measures:

3.12.1 Institutional approval

To gain entrance to the study setting and to the study population, the researcher first obtained ethical clearance from School Research Ethics Committee (SREC) and Sefako Makgatho Health Science University Research Ethics Committee (SMUREC) and the Project reference number (SMUREC/H/59/2017:PG) (see Appendix 3). After obtaining ethical clearance a letter requesting permission was sought from Ministry of Health – Health Research and Development Committee in Botswana (Reference number: HPDME 13/18/1 XI) (see Appendix 4). Furthermore, permission to proceed with the study was obtained from Princess Marina Research and Ethics Committee (Reference number: PMH 5/79(321-1-2017) (see Appendix 5).

3.12.2 Informed consent

Written informed consent was obtained from participants at the commencement of the study. Participants were informed about the aim and objectives of the study. Sufficient time after explaining the scope of the research was allowed for each participant to decide whether or not to participate in this study.

3.12.3 Confidentiality

Measures towards ensuring confidentiality and anonymity were explained to participants. Participants were informed that they were not expected to write their names when completing the questionnaires, which were to be handled only by the researcher. They were further informed that during the write up of the research findings, their identity would not be reflected in the discussion.

3.12.4 Inducement to participate

No payment was offered to the participants as a way of motivating them to become part of the study. This was also a hospital based-study with health care workers on duty and, hence, there was no need give the participants transport money.
### 3.13 Conclusion

This chapter has given a summary on the research design, study setting and site, sampling target, data collection methods, and analysis plan. Ethical considerations relating to data collection are also described in detail. The next chapter will be on presentation and interpretation of the results.
4.1 Introduction

This chapter presents the results of the study in descriptive and inferential forms. The results are presented in detail starting with the socio demographic profile of the participants followed by general descriptive findings as per objective, such as data on MSD prevalence, factors associated with MSDS and relationship between variables. The results were drawn from a total of two hundred and twenty (220) nurses.

4.2 Demographic characteristics of participants

The population in this study that met the study criteria comprised 529 nurses. Among these, 245 were successfully approached to participate; but only 220 gave consent to participate in the study, giving a response rate of 90%.

Table 4.1 details the demographic characteristics of the study participants. Results showed that the study participants were predominantly female (n=165, 75%) followed by males (n=55, 25%). The minimum age of participants in this study was 18 and maximum was 59 years of age, with mean age of 35.2 (SD 8.5). The results showed that majority of the respondents (n=125, 56.8%) were aged between 20-34 years. The highest number of participants were single (n=121, 55%), then married (n=89, 40%), followed by divorced (n=6, 3%) and lastly widowed (n=4, 2%). Majority of the participants reported that they had children (n=177, 80%) and (n=43, 20%) did not have children. Findings from this study showed that majority (n=126, 57.3%) of the nurses had less than 5 years of working experience.
Table 4.1: Demographic characteristics of participants (n=220)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (in years)</td>
<td>20-34</td>
<td>125</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td>35-44</td>
<td>60</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>45-54</td>
<td>28</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>&gt;54</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Gender</td>
<td>Female</td>
<td>165</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>55</td>
<td>25</td>
</tr>
<tr>
<td>Marital status</td>
<td>Single</td>
<td>121</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td>Married</td>
<td>89</td>
<td>40.5</td>
</tr>
<tr>
<td></td>
<td>Divorced</td>
<td>6</td>
<td>2.7</td>
</tr>
<tr>
<td></td>
<td>Widowed</td>
<td>4</td>
<td>1.8</td>
</tr>
<tr>
<td>Having children</td>
<td>No</td>
<td>43</td>
<td>19.5</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>177</td>
<td>80.5</td>
</tr>
<tr>
<td>Number of children</td>
<td>0</td>
<td>43</td>
<td>19.5</td>
</tr>
<tr>
<td></td>
<td>1-2</td>
<td>134</td>
<td>61</td>
</tr>
<tr>
<td></td>
<td>3-4</td>
<td>43</td>
<td>19.5</td>
</tr>
<tr>
<td>Employment category</td>
<td>&lt;5 years</td>
<td>126</td>
<td>57.3</td>
</tr>
<tr>
<td></td>
<td>5-10 years</td>
<td>64</td>
<td>29.1</td>
</tr>
<tr>
<td></td>
<td>&gt;10 years</td>
<td>30</td>
<td>13.6</td>
</tr>
</tbody>
</table>
Figure 4.1 shows the different departments in which the nurses worked. Results revealed that a higher proportion of nurses were from the critical care departments (62, 28.2%) and few respondents were noted at OPD (n=4, 1.8%).

![Figure: 4.1 Distribution of nurses in various departments](image)

### 4.3 The prevalence of MSDs

Table 4.2: indicates the prevalence of pain experienced by the study participants and details of responses to experiences relating to MSD. Results showed that a higher number of nurses reported having MSD pain in the past 12 months that lasted 3 days or more (200, 90.9%). Furthermore, a high number of them reported that MSD pain started in the first four years of their career (n=125, 56.8%). The study found out that majority (n=87, 39.5%) of the nurses experienced MSD pain that lasted for at least, 5 days. A high number of participants took sick leaves due to MSD pain, with majority taking 4 days.
Table 4.2: Prevalence and experiences relating to MSD

<table>
<thead>
<tr>
<th>Factor</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have you had MSD pain?</td>
<td>200</td>
<td>90.91</td>
</tr>
<tr>
<td>When did MSD start?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>no pain experienced</td>
<td>18</td>
<td>8.2</td>
</tr>
<tr>
<td>1-4 years ago</td>
<td>125</td>
<td>56.8</td>
</tr>
<tr>
<td>5-10 years ago</td>
<td>58</td>
<td>26.4</td>
</tr>
<tr>
<td>&gt;10 years ago</td>
<td>19</td>
<td>5.45</td>
</tr>
<tr>
<td>Duration of pain in days</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-5 days</td>
<td>87</td>
<td>39.5</td>
</tr>
<tr>
<td>6-10 days</td>
<td>60</td>
<td>27.3</td>
</tr>
<tr>
<td>11-15 days</td>
<td>33</td>
<td>15</td>
</tr>
<tr>
<td>&gt;15 days</td>
<td>40</td>
<td>18.2</td>
</tr>
<tr>
<td>Category of sick-leave taken</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No sick leave</td>
<td>89</td>
<td>40.5</td>
</tr>
<tr>
<td>1-4 days</td>
<td>78</td>
<td>35.4</td>
</tr>
<tr>
<td>&gt;4 days</td>
<td>53</td>
<td>24.1</td>
</tr>
</tbody>
</table>

Table 4.3 shows that twelve items were used to assess risk factors associated with MSD. Majority of the nurses indicated that they performed the same task repeatedly (n=207, 94.1%). Results also showed that more than two thirds of the respondents worked on night shifts (n=158, 71.8%). When asked if they performed manual orthopaedic work, a high proportion of respondents did not (n=140, 63.6%) and only (n=80, 36.4%) did. Majority of the nurses indicated that they did not take tea breaks (n=152, 69.4%), and lunch breaks (n=181, 82.3%). Assessment on working posture revealed that most of the nurses performed their work while standing (n=195, 88.6%), bending (n=89, 40.5%) whilst few nurses executed their duties while sitting (n=19, 8.6%). A high number of participants also revealed that they lifted patients from the beds (n=206, 93.6%) as well as from the floors (n=147, 66.8%). Almost all the nurses
perceived their work to be stressful (98.2%, n=215). Results also show that majority of the nurses in this study (n=154, 70%) worked whilst injured.

Table 4.3: Occupational risk factors associated with MSD among nurses

<table>
<thead>
<tr>
<th>Factor</th>
<th>Y</th>
<th>%</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Same task repeatedly</td>
<td>207</td>
<td>94.1</td>
<td>13</td>
<td>5.9</td>
</tr>
<tr>
<td>Work on night shift</td>
<td>158</td>
<td>71.8</td>
<td>62</td>
<td>28.2</td>
</tr>
<tr>
<td>Orthopaedic work</td>
<td>80</td>
<td>36.4</td>
<td>140</td>
<td>63.6</td>
</tr>
<tr>
<td>Always take tea break</td>
<td>67</td>
<td>30.6</td>
<td>152</td>
<td>69.4</td>
</tr>
<tr>
<td>Always take lunch</td>
<td>39</td>
<td>17.7</td>
<td>181</td>
<td>82.3</td>
</tr>
<tr>
<td>Standing while working</td>
<td>195</td>
<td>88.6</td>
<td>25</td>
<td>11.4</td>
</tr>
<tr>
<td>Sitting while working</td>
<td>19</td>
<td>8.6</td>
<td>201</td>
<td>91.4</td>
</tr>
<tr>
<td>Bending while working</td>
<td>89</td>
<td>40.5</td>
<td>131</td>
<td>59.6</td>
</tr>
<tr>
<td>Lifting patients from bed</td>
<td>206</td>
<td>93.6</td>
<td>14</td>
<td>6.4</td>
</tr>
<tr>
<td>Lifting patients from floors</td>
<td>147</td>
<td>66.8</td>
<td>73</td>
<td>33.2</td>
</tr>
<tr>
<td>Working while injured</td>
<td>154</td>
<td>70</td>
<td>66</td>
<td>30</td>
</tr>
</tbody>
</table>

Table 4.4 details the responses to experiences relating to MSD. Findings revealed that majority of the nurses started having MSD pain during their nursing career (197, 89.5%). Results of this study also show that a high number (n=134, 60.9%) of participants sought treatment for MSD pain. Over 50% of the nurses reportedly took sick leave due to MSD (n=128, 58.2%). When asked if they were moved to a different ward because of MSD pain, a high proportion of them were not (n=199, 90.5%). The findings from this study also show that (n=178, 80.9%) of the participants were not trained on ergonomics. Of the 220 participants, (n=135, 61.4%) considered quitting work because of MSD pain. Almost all (n=215, 98.2%) participants reported their work as stressful.
Table 4.4: Responses of participants on experiences related to having an MSD

<table>
<thead>
<tr>
<th>Factor</th>
<th>Yes</th>
<th>%</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain started in nursing career</td>
<td>197</td>
<td>89.5</td>
<td>23</td>
<td>10.5</td>
</tr>
<tr>
<td>Sought treatment for MSD</td>
<td>134</td>
<td>60.9</td>
<td>86</td>
<td>39.1</td>
</tr>
<tr>
<td>Sick leave due to MSD pain</td>
<td>128</td>
<td>58.2</td>
<td>92</td>
<td>41.8</td>
</tr>
<tr>
<td>Changed work due to MSDs</td>
<td>21</td>
<td>9.5</td>
<td>199</td>
<td>90.5</td>
</tr>
<tr>
<td>Attended ergonomic training</td>
<td>42</td>
<td>19.1</td>
<td>178</td>
<td>80.9</td>
</tr>
<tr>
<td>Considered quitting work due to MSDs</td>
<td>135</td>
<td>61.4</td>
<td>85</td>
<td>38.6</td>
</tr>
<tr>
<td>Perceived work as stressful</td>
<td>215</td>
<td>98.17</td>
<td>5</td>
<td>1.8</td>
</tr>
</tbody>
</table>

Table 4.5 indicates the body location/site in which the participants felt MSD pain the most. The most reported MSDs were low back pain (n=151, 68.6%), seconded by shoulder pain (n=81, 36.8%) and the least reported was elbow MSD pain (n=8, 3.6%).

Table 4.5: Response of participants on the site in which they experienced MSD pain

<table>
<thead>
<tr>
<th>Anatomical site</th>
<th>Yes</th>
<th>%</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neck</td>
<td>33</td>
<td>15</td>
<td>187</td>
<td>85</td>
</tr>
<tr>
<td>Shoulder</td>
<td>81</td>
<td>36.8</td>
<td>139</td>
<td>63.2</td>
</tr>
<tr>
<td>Upper Back</td>
<td>72</td>
<td>32.7</td>
<td>148</td>
<td>67.3</td>
</tr>
<tr>
<td>Elbow</td>
<td>8</td>
<td>3.6</td>
<td>212</td>
<td>96.4</td>
</tr>
<tr>
<td>Wrist</td>
<td>18</td>
<td>8.2</td>
<td>202</td>
<td>91.8</td>
</tr>
<tr>
<td>Low Back</td>
<td>151</td>
<td>68.6</td>
<td>69</td>
<td>31.4</td>
</tr>
<tr>
<td>Hip</td>
<td>24</td>
<td>10.9</td>
<td>196</td>
<td>89.1</td>
</tr>
<tr>
<td>Knees</td>
<td>32</td>
<td>14.5</td>
<td>188</td>
<td>85.5</td>
</tr>
<tr>
<td>Ankle</td>
<td>51</td>
<td>23.2</td>
<td>169</td>
<td>76.8</td>
</tr>
</tbody>
</table>

Table 4.6 details responses of participants on why they felt that their work was stressful. A high number of participants reported work overload (n=69, 31.4%), and
lack of support by management (n=39, 17.7%) as the major causes. The least reported stressful factor was lack of equipment (n=20, 9.1%).

Table 4.6: Frequency of stress as reported by participants (n=220)

<table>
<thead>
<tr>
<th>Reasons why work is stressful</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shortage of staff</td>
<td>33</td>
<td>15.0</td>
</tr>
<tr>
<td>Work overload</td>
<td>69</td>
<td>31.4</td>
</tr>
<tr>
<td>High patient nurse ratio</td>
<td>28</td>
<td>12.7</td>
</tr>
<tr>
<td>Lack of support by management</td>
<td>39</td>
<td>17.7</td>
</tr>
<tr>
<td>Poor working conditions</td>
<td>31</td>
<td>14.1</td>
</tr>
<tr>
<td>Lack of equipment</td>
<td>20</td>
<td>9.1</td>
</tr>
</tbody>
</table>

4.4 Association between risk factors and MSD pain

For this analysis, the bivariate and multivariate logistic regression was used to test the strength of association between demographic, prevalence, associated risk factors and MSD pain. The MSD pain was a good variable for the presence or experience of MSD by the participants. A p-value of less than 0.05 (p< 0.05) indicates that there was a significant association between the two factors.

Data analysis using univariate logistic regression showed an association between age and MSD pain, (OR= 0.28, 95% CI=0.09-0.88, P=0.03). The study results also show association employment category (OR=0.5, 95% CI=0.29-0.95, P=0.03). Furthermore, nurses who worked while injured were 4 times at risk of developing MSD pain than those who worked un-injured (OR=4.1, 95% CI=1.57–10.5, P=0.004). The rest of the variables did not show any significant association with MSD pain as their P-values were greater than 0.05.
Table 4.7: Relationship between risk factors and MSD pain

<table>
<thead>
<tr>
<th>Factor</th>
<th>Odds ratios</th>
<th>95% Confidence Interval</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-34years (Ref)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35-44years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>45-54years</td>
<td>0.28</td>
<td>0.092-0.88</td>
<td>0.029</td>
</tr>
<tr>
<td>&gt;54years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female 1 (Ref)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>1.99</td>
<td>0.56-7.07</td>
<td>0.287</td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single Ref</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>0.80</td>
<td>0.31-2.06</td>
<td>0.645</td>
</tr>
<tr>
<td>Widowed</td>
<td>0.27</td>
<td>0.03-2.84</td>
<td>0.276</td>
</tr>
<tr>
<td>Divorced</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Having children</td>
<td>1.42</td>
<td>0.49-4.15</td>
<td>0.521</td>
</tr>
<tr>
<td>Number of children</td>
<td>1.0</td>
<td>0.48-2.09</td>
<td>1.000</td>
</tr>
<tr>
<td>Employment category</td>
<td>.53</td>
<td>.3-.95</td>
<td>0.033</td>
</tr>
<tr>
<td>Perform same task</td>
<td>3.36</td>
<td>.84 - 13.3</td>
<td>0.086</td>
</tr>
<tr>
<td>Work 12 hourly shift</td>
<td>1.10</td>
<td>0.40 - 3.01</td>
<td>0.85</td>
</tr>
<tr>
<td>Orthopaedic tech.</td>
<td>1.37</td>
<td>.50 -3.72</td>
<td>0.536</td>
</tr>
<tr>
<td>Work 12 hourly shift</td>
<td>1.10</td>
<td>0.40 - 3.01</td>
<td>0.85</td>
</tr>
<tr>
<td>Activity</td>
<td>Mean (SD)</td>
<td>Confidence Interval</td>
<td>p-value</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-----------</td>
<td>---------------------</td>
<td>---------</td>
</tr>
<tr>
<td>Orthopaedic tech.</td>
<td>1.37</td>
<td>.50 -3.71</td>
<td>0.536</td>
</tr>
<tr>
<td>Tea break</td>
<td>1.36</td>
<td>.47 - 3.90</td>
<td>0.570</td>
</tr>
<tr>
<td>Lunch break</td>
<td>.85</td>
<td>.27 - 2.69</td>
<td>0.780</td>
</tr>
<tr>
<td>Posture maintained</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standing</td>
<td>1.43</td>
<td>.39 - 5.3</td>
<td>0.593</td>
</tr>
<tr>
<td>Sitting</td>
<td>.84</td>
<td>.18 - 3.91</td>
<td>0.820</td>
</tr>
<tr>
<td>Bending</td>
<td>2.95</td>
<td>.95 - 9.16</td>
<td>0.060</td>
</tr>
<tr>
<td>Lift from beds</td>
<td>3.02</td>
<td>.77-11.92</td>
<td>0.112</td>
</tr>
<tr>
<td>Lift from floors</td>
<td>1.12</td>
<td>.42-2.87</td>
<td>0.856</td>
</tr>
<tr>
<td>Patients handled daily</td>
<td>.80</td>
<td>.44-1.48</td>
<td>0.483</td>
</tr>
<tr>
<td>Work while injured</td>
<td>4.06</td>
<td>1.57 - 10.46</td>
<td>0.004</td>
</tr>
</tbody>
</table>
Following further analysis by multivariate logistic regression on significant risk factors to development of MSD pain, working while injured became a significant risk factor as nurses were now about 5 times more likely to develop MSD (OR=4.52, 95% CI= 1.68-12.2, P=0.03) and length of employment also became a risk factor to MSD (OR=0.2, 95% CI=0.06-0.76, p=0.018). Age category was no longer a risk factor to development of MSD (OR=2.73, 95% CI=0.82-9.07, p=0.099) following the adjustment of the OR.

**Table 4.8: Multivariate logistic regression**

<table>
<thead>
<tr>
<th>Factor</th>
<th>Odds ratios</th>
<th>95% confidence interval</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Woking while injured</td>
<td>4.52</td>
<td>1.68-12.17</td>
<td>0.003</td>
</tr>
<tr>
<td>Employment category</td>
<td>0.21</td>
<td>0.05-0.76</td>
<td>0.018</td>
</tr>
<tr>
<td>Age category</td>
<td>2.74</td>
<td>0.83-9.07</td>
<td>0.099</td>
</tr>
</tbody>
</table>

**4.5 Conclusion**

This chapter has discussed the research results including demographic characteristics of the research participants, prevalence and associated risk factors of MSD. The chapter further discussed the association between demographic and associated risk factors as well as multivariate logistic regression of other important variables.
CHAPTER 5
DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter discusses the findings in line with the current literature related to the study. This study investigated the factors contributing to occupational injuries in a tertiary hospital in Botswana. The study focused on determining the prevalence and investigating the associated risk factors of musculoskeletal disorders amongst nurses in a tertiary hospital in Botswana. In this chapter, the findings, conclusions as well as recommendations are discussed.

5.2 Demographic characteristics

All the participants in this study were nurses working on a full time basis. The sample showed that majority of the sample who participated in the study were in the middle aged category and this finding is similar to that reported in other studies (Munabi et al, 2014; Tinubu et al, 2010). The findings also revealed that majority of the participants were female nurses and this is due to the fact that nursing is still a predominantly female occupation (Yasobant and Rajkumar 2014; Madiba et al, 2013).

The findings, based on the 220 participants, showed that a high number of respondents were single. These results are different from those reported in previous studies (Yasobant and Rajkumar, 2014), where majority of the participants were married. A high percentage of the participants indicated that they had children. Childbearing can be strenuous to the body systems, especially the spine, where most MSDs originate. The number of children one have, has been shown to predict one’s acquisition of MSD (Raithatha and Mishra, 2016).

Most of the participants in this study were from critical care department (theatres, ICU, A&E) especially theatres; this could be due to the fact that there are three sub-sections of theatres in PMH; namely main, minor and gynaecology operating theatres hence
more staff in those units. Thus, having a high response rate from these departments was purely due to task distribution with the healthcare facility. The researcher has observed that high number of workers from these units tend to have MSD pain because nurses in this areas stand for long hours due to long operations performed and working in awkward postures.

5.3 Prevalence of MSDs in the study participants

In this study, the overall self-reported 12-month period prevalence of MSD at any body site from this study was above 90%. These finding is comparable to reports from other previous studies which were done among South African nurses (Madiba et al, 2013), Saudi Arabian nurses (Attar, 2014), Nigerian nurses (Tinubu et al, 2010), Ugandan nurses 8 (Munabi et al, 2014), Indian nurses (Raithatha and Mishra, 2016), and Estonian nurses (Freimann et al, 2013), showing an MSD prevalence of over 80%. However, contrary to these findings, one study in Taiwan reported a lower prevalence of MSDs (less than 60%) among the Taiwanese nurses (Chung et al, 2013). This discrepancy could have arisen due the difference in methodological design and samples. The Taiwanese study was a comparative study on MSD incidence, which involved both nurses and non-nurses professionals.

The high prevalence of MSD among the nurses, particularly in this study, is worrisome as it may mean that the healthcare facility control measures against the risks of acquiring MSD remain critical. This is also of grave concern because MSDs are the major contributing factors for early exit from work and represent the most common cause of absenteeism among healthcare workers (Chung et al, 2013). At the same time, these statistics are not surprising because nurses are exposed to continuous physical demands and musculoskeletal strains (Tinubu et al, 2010; Freimann et al, 2013; Attar, 2014).

The participants responses, on the specific body site in which they experienced MSD pain the most, showed that LBP was the most prevalent (nearly 70%) amongst the participants. The findings are consistent with findings from previous studies conducted amongst nurses (Attar 2014; Attarchi et al, 2014; Arsalani et al, 2014; Madiba et al,
which showed that LBP is the most prevalent MSD among the study participants. According to the researcher’s knowledge hospitals in Botswana do not have bedside lifting equipment, hence nurses perform manual lifting of patients; and this has been found in other studies to be a predictor for LBP (Attar 2014; Rathore et al, 2017).

Furthermore, the high prevalence of LBP in this study may possibly be due to long standing hours, high work overload and lack of ergonomic training for nurses as reported by the participants. Contrary to these findings, LBP prevalence in Pakistani nurses was found to be as low as 34%. The possible reasons for this low prevalence could be attributed to short working shifts (6-8 hours) per day and that nurses there do not manually lift or transfer patients as this direct care is often handed over to their nursing assistants (Rathore et al, 2014).

Majority of the respondents (90%) indicated that MSD pain started during their nursing career, this could possibly be due to the fact that younger nurses do not know or lack experience on handling and lifting of patients when they started working. This is further affirmed by the fact that most of the nurses in this study acquired MSD during the first four years of their career. Additionally, the study findings showed that over 80% of the participants had not been trained on ergonomics. Most often, nurses have poor knowledge on ergonomics and this problem is further aggravated by lack of training which predisposes these workers to higher risk of injuries, leading to high prevalence of MSDs (Nunes and Bush, 2011; Tinubu et al, 2010).

The current study findings show that over 60% of the study participants either sought, or received treatment from a health professional to relieve MSD pain. The study also found that over half of the respondents took sick leave due to MSD. Similar findings have been reported in literature, where, for example, consequent LBP together with burnouts resulted in absenteeism and sick leaves in the nursing populations (Guzman et al, 2010). Depending on the level of an individual pain, one can be booked sick off to take some rest at home. If the condition became severe or chronic, it could result in
termination of work and this would result in more shortage of staff. The high prevalence of MSD in this current study is responsible for the prevailing low quality health services as these injuries are not only borne by the individual workers but also the employer because of reduced productivity due to increased sick leaves.

5.4 Risk factors associated with MDSs among the study participants

Musculoskeletal pain has been associated with some work task performed by healthcare workers. This study investigated eleven suspected factors to determine the tasks associated with MSD pain. When these factors are not well managed, they can lead to high levels of stress and ultimately lead to serious deterioration of mental and physical health.

Almost all of the participants reportedly performed the same task repeatedly. Doing the same work repeatedly was a highly significant risk factor for developing MSD pain. Most of the respondents also indicated that they worked on night shifts. Shift working is one among the risk factors of health-related problems causing MSD (Arsalani et al, 2014; Attarchi et al, 2014). Performing manual orthopaedic work was found to be done only by few nurses (about 30%). This could possibly be that there are orthopaedic technicians in the hospital who performed that task. The study has also found out that majority of the participants are not rested during the course of their work to take their tea and lunch breaks, although this was not a significant risk factor. Results indicated that less than half of the participants took tea and lunch breaks. This is due to the fact that PMH is the biggest referral hospital in Botswana with a prevailing shortage of staff, while nursing a high number of patients. Thus, breaks are not so much affordable.

Working posture is also one of the tasks that contribute to MSD pain, majority of the participants (89%) indicated that they perform their duties standing while (41%) bending. According to Chung at el (2013) and Moreira at el (2014), nursing tasks involves heavy physical labour and standing with the trunk in a bent or twisted position which are major source of back MSD pain. Most of the participants reported that they manually lifted patients from beds and floors. These findings are consistent with those
reported by Tinubu et al (2010) in Nigeria where 51% of the healthcare workers indicated that they lifted and transferred patients manually.

This current study found a significant association between MSD and nurses who worked while injured. This significant factor was the major responsible risk for the high prevalence of MSDs in this study. Again, this could be contributed by acute shortage of staff in the facility, forcing those that are still injured to continue working. However, the results are inconsistent with other previous studies which did not find any significant association between MSD and pain (Chung et al, 2013; Munabi et al, 2014; Tinubu et al, 2010). It is not clear why there is such an inconsistency. More studies are required to fully understand this inconsistent relationship.

Almost all of the participants in this study perceived their work to be stressful. Similar findings were reported in a study done by Madiba et al, (2013) where 97% of the participants found their work to be stressful. Occupational stress has been identified as a risk for development of MSD. In this study, a third of the participants reportedly experienced work overload as the major source of stress in their nursing profession. These findings concur with Madiba et al (2013) whose study also reflected work overload as a risk factor for MSD. Furthermore, lack of support by management, poor working conditions, shortage of staff, high patient to nurse ratio, and lack of equipment were reported amongst the factors causing stress among the respondents. Occupational stress is highly noted amongst the nurses because of the nature of the work that they did (Martino & Musri, 2001). In this study, logistic regression analysis showed an association between age and MSD pain. These findings are in agreement with studies by Munabi et al, (2014); Chung et al, (2013) which showed association between MSD and age.

Furthermore there was no statistical difference among males and females in reporting MSD. However, one report in Nigeria Munabi et al, (2014) indicated that females were more likely to report MSD than males, a finding that was inconsistent with this current study findings. According to Raithatha and Mishra (2016), females are prone to MSD
due to extra duties of taking care of their families hence the number of children is a predictor for MSD, however this study found out that in Botswana majority of women had two children. Limited or no studies have been done to corroborate the role of this predictor, and this calls for more studies in this niche area to be carried out in future.

This current study found an association between newer employees, who had a higher prevalence of MSD pain than the employees in the older employment categories. This is possible because newly employed nurses tend to suffer more from MSD as they lack experience and knowledge on ergonomics and MSD. Also, the older nurses tend to move away from direct handling of patients to perform managerial duties.

5.5 Limitations of the study

It is plausible that a number of limitations could have influenced the results obtained. The current study was limited to;

- This study reports only the findings at Princess Marina Hospital therefore the study results may not be generalized in Botswana hospitals. Being a national hospital, we would expect PMH to receive relatively more and sick patients than other hospitals. Thus, the interpretation of these findings should be interpreted carefully based on these considerations.
- The findings from this study are from one hospital with a small population size, thus the findings may not be adequately generalized to all hospitals in the country.
- The study focussed only on the nursing profession and excluded other healthcare workers, therefore findings from this study cannot be generalised to the rest of the healthcare workers in Princess Marina Hospital.
5.6 Recommendations

Based on the findings in this study, the following recommendations are suggested;

- **Physical activity:** Physical therapy is one method which can be used to reduce MSD pain. The health facility should provide a training/gym facility for health workers for regular exercises as it will help them to be active and improve their body postures.

- **Safe ergonomic practice:** The hospital should establish an Ergonomics committee which will facilitate training on safe lifting programs as there is strong evidence that effective reductions in injuries can be obtained by ergonomic interventions. In order to achieve this, team participation of workers and managers is required. Implementation of group lifting strategies for heavy patients, draw sheet lifting and rolling sheets to be exercised as well as equipment and or task redesign. Furthermore portable hoists, easy slides and other patient transfer assistive devices, should be availed.

- **Organizational modifications:** The hospital to address the critical shortage of staff through workplace re-structuring by recruitment of more human resource as this will help in reducing work overload experienced by health workers. Staff retention initiatives like better working conditions, job satisfaction, opportunities to further studies and good staff-management relations should be deployed to retain the few nurses we have in the country as well as to motivate experienced nurses to stay. The experienced nurses play a major role in the education and training of young nurses, as this current study has shown a high prevalence of MSD among young nurses than older ones.

- **Risk assessment:** Risk and safety analysis/assessment review to be conducted in the work area to assess any area that might predispose employees to injuries. This will help identify risk factors in the workplace which affect individuals and remove them, or rather reduce the impact. Botswana health system should develop a culture, where staff members report all
occupational injuries to reduce incidents; this can be achieved by formation of occupational health teams to improve safety.

5.7 Conclusion

The study has shown that musculoskeletal disorders affect all the nursing professionals at PMH, with the most commonly affected site being the lower back. Significant work place risk factors identified were working while injured, those who sought treatment for MSD pain, those who had intentions of quitting their job and the duration of pain. A procedure for risk assessment must be implemented to prompt a periodical assessment of potential risks. Ministry of Health and hospitals should create a culture of safe working environments for the nurses.
REFERENCES


APPENDICES

APPENDIX 1: CONSENT FORM

SEFAKO MAKGATHO HEALTH SCIENCE UNIVERSITY ENGLISH CONSENT FORM

Statement concerning participation in a Research Project

Name of Project Study: Prevalence, types and associated risk factors of musculoskeletal disorders amongst nurses in a tertiary hospital in Botswana

I have read the information on the aims and objectives of the proposed study and was provided the opportunity to ask questions and given adequate time to rethink the issue. The aim and objectives of the study are sufficiently clear to me. I have not been pressurized to participate in any way.

I am aware that this material may be used in scientific publications which will be electronically available throughout the world. I consent to this provided that my name is not revealed.

I understand that participation in this Study is completely voluntary and that I may withdraw from it at any time and without supplying reasons.

I know that this Study has been approved by the Medunsa Research Ethics Committee (MREC), University of Limpopo (Medunsa Campus). I am fully aware that the results of this Study will be used for scientific purposes and may be published. I agree to this, provided my privacy is guaranteed.

I hereby give consent to participate in this Study

Signature of participant  ………………………..  Date……………………..

Statement by the Researcher

I provided written information regarding this Study
I agree to answer any future questions concerning the Study as best as I am able.

I will adhere to the approved protocol.

Name of Researcher _________ Signature ________ Date _______ Place_______
APPENDIX 2

QUESTIONNAIRE TOOL (ENGLISH)

Prevalence and associated risk factors of musculoskeletal disorders amongst nurses in a tertiary hospital in Botswana

Instructions: Confidentiality of your responses has been ensured by making this questionnaire anonymous. Answer each question by ticking ✔ a response you agree with or think most appropriate.

Section A: Demographic questions

1. Age

2. Sex

   Male

   Female

3. Marital Status

   Single

   Married

   Divorced

   Widowed

4. Do you have children?
5. If you answered yes to the above question; how many children do you have?

6. For how long have you been employed as a nurse?

7. In which ward/unit do you work?

SECTION B: Prevalence of musculoskeletal disorders.

Have you had musculoskeletal pain in the past 12 months that lasted for 3 days or more? (Musculoskeletal disorders/injuries are described or felt as pain, numbness, aching, stiffness and burning sensation in a defined area over a set period of time).

1. 

2. In which body location/site have you experienced musculoskeletal pain most? (You can tick more than 1)
<table>
<thead>
<tr>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper back</td>
</tr>
<tr>
<td>Elbow</td>
</tr>
<tr>
<td>Wrist</td>
</tr>
<tr>
<td>Lower back</td>
</tr>
<tr>
<td>Hip</td>
</tr>
<tr>
<td>Knees</td>
</tr>
<tr>
<td>Ankle/feet</td>
</tr>
</tbody>
</table>

3. For how long did you experience the pain? (specify how long)

<table>
<thead>
<tr>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days</td>
</tr>
<tr>
<td>Weeks</td>
</tr>
</tbody>
</table>

4. Did this problem occur during your nursing career?

<table>
<thead>
<tr>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
</tbody>
</table>

5. When did musculoskeletal pain in your body start in your nursing career?

<table>
<thead>
<tr>
<th>Time Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-4 years ago</td>
</tr>
<tr>
<td>5-10 years ago</td>
</tr>
<tr>
<td>11-15 years ago</td>
</tr>
<tr>
<td>16+ ago</td>
</tr>
</tbody>
</table>

6. Have you ever sought/received treatment from a health professional because of musculoskeletal pain?

<table>
<thead>
<tr>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
</tbody>
</table>
7. Have you ever been absent or had to take sick leave as a result of experiencing MSD?

| Yes | No |

8. If Yes, How long was the sick leave?

| From | To |

9. Have you ever changed your area/station of work because of musculoskeletal pain?

| Yes | No |

10. If you answered Yes to the above question, to which station did you move to?

| From | To |

11. Since you started working have you ever received training on ergonomics (correct posture, correct load handling etc..) at your workplace on how to prevent occupational hazards?

| Yes | No |

12. Do you have any intentions of quitting nursing profession for another job?

| Yes | No |

SECTION C: Risk factors

This section is about tasks that you perform at work that can contribute to the development of musculoskeletal disorders.
1. Do you perform the same task repeatedly each day/shift at work?

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

2. Do you work a 12 hourly shift?

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

3. Do you perform manual orthopaedic techniques (joint mobilizations, soft tissue mobilizations)?

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

4. Do you always take your tea break when you are at work?

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

5. Do you always take your lunch break at work?

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

6. What posture do you maintain most of the time when performing your daily tasks at work?

<table>
<thead>
<tr>
<th>Standing</th>
<th>Sitting</th>
<th>Bending</th>
</tr>
</thead>
</table>

7. Do you manually lift and transfer patients from beds?
<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. Do you manually lift patients from floors?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. How many patients do you often handle per day?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Have you ever continued to work while injured?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Do you ever find your work stressful?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. If yes What could be the reason?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

THANK YOU FOR YOUR COOPERATION
APPENDIX 3

SMUREC CLEARANCE CERTIFICATE

Sefako Makgatho Health Sciences University
Research & Postgraduate Studies Directorate
Sefako Makgatho University Research Ethics Committee
(SMUREC)

Molotlegi Street, Ga-Rankuwa 0208
Tel: (012) 521 5017/3080 | fax: (012) 521 3749
Email: hkrato.phiri@smu.ac.za
P.O. Box 163 Medunsa 0204

APPROVAL NOTICE - NEW APPLICATION

06 April 2017

Mrs. K Kgale
Department of Public Health
P.O. Box 215
Medunsa, 0204

SMUREC Ethics Reference Number: SMUREC/596/2017: PG

The New Application received on 22 March 2017, was reviewed by members of Sefako Makgatho University Research Ethics Committee 06 April 2017 and was approved on 06 April 2017.

Title: Prevalence and associated risk factors of musculoskeletal disorders among nurses in a tertiary hospital in Botswana

Researcher: Mrs. K Kgale
Supervisor: Dr. P. Cheaile
Department: Public Health
School: Health Care Sciences
Degree: MPH

Please note the following information about your approved research protocol:

Protocol Approval Period: 06 April 2017 – 06 April 2018

Please remember to use your protocol number (SMUREC/596/2017: PG) on any documents or correspondence with the REC concerning your research protocol.

Please note that the REC has the prerogative and authority to ask further questions, seek additional information, require further modification, or monitor the conduct of your research and the consent process.

After Ethical Review: Please note a template of the progress report is obtainable in the Research Office and should be submitted to the Committee before the year has expired. The Committee will then consider the continuation of the project for another year (if necessary). Annual a number of projects may be selected randomly for an external audit. Translation of the consent document in the language applicable to the study participants should be submitted.

International Organisation (IORG0008691), Institutional Review Board (IRB000010288) Expiry date: 06 December 2016, Federal Wide Assurance (FWA000023943) Expiry date: 31 August 2017 and NHREC No: REC 210428-003

Sincerely,

PROF C BAKER
DEPUTY CHAIRPERSON SMUREC

Date: 04/01/2017
APPENDIX 4

PERMISSION LETTER (MINISTRY OF HEALTH)

REFERENCE NO: HPDME 13/18/1 XI 05 June 2017

Health Research and Development Division

Notification of IRB Review: New application

Kagiso Kgakge
P.O. Box 53229
Gaborone

Dear Kagiso Kgakge

Protocol Title: PREVALENCE AND ASSOCIATED RISK FACTORS OF MUSCULOSKELETAL DISORDERS AMONG NURSES IN A TERTIARY HOSPITAL IN BOTSWANA

HRU Approval Date: 05 June 2017
HRU Expiration Date: 04 June 2018
HRU Review Type: Expedited Review
HRU Review Determination: Approved
Risk Determination: Minimal risk

Thank you for submitting new application for the above referenced protocol. The permission is granted to conduct the study.

This permit does not however give you authority to collect data from the selected sites without prior approval from the management. Consent from the identified individuals should be obtained at all times.

The research should be conducted as outlined in the approved proposal. Any changes to the approved proposal must be submitted to the Health Research and Development Division in the Ministry of Health for consideration and approval.

Furthermore, you are requested to submit at least one hardcopy and an electronic copy of the report to the Health Research, Ministry of Health and Wellness within 3 months of completion of the study. Approval is for academic fulfillment only. Copies should also be submitted to all other relevant authorities.

Vision: A Healthy Nation by 2036.
Values: Respect, Equity, Simplicity, Customer Focus, Teamwork, Accountability
Continuing Review

In order to continue work on this study (including data analysis) beyond the expiry date, submit a Continuing Review Form for Approval at least three (3) months prior to the protocol’s expiration date. The Continuing Review Form can be obtained from the Health Research Division Office (HRDD), Office No. 7A.7 or Ministry of Health website: www.moh.gov.bw or can be requested via e-mail from Mr. Kgomo to Mothanka, e-mail address: kgomothanka@gov.bw. As a courtesy, the HRDD will send you a reminder email about eight (8) weeks before the lapse date, but failure to receive it does not affect your responsibility to submit a timely Continuing Report form.

Amendments

During the approval period, if you propose any change to the protocol such as its funding source, recruiting materials, or consent documents, you must seek HRDC approval before implementing it. Please summarize the proposed change and the rationale for it in the amendment form available from the Health Research Division Office (HRDD), Office No. 7A.7 or Ministry of Health website: www.moh.gov.bw or can be requested via e-mail from Mr. Kgomo to Mothanka, e-mail address: kgomothanka@gov.bw. In addition, submit three copies of an updated version of your original protocol application showing all proposed changes in bold or “track changes”.

Reporting

Other events which must be reported promptly in writing to the HRDC include:
• Suspension or termination of the protocol by you or the grantor
• Unexpected problems involving risk to subjects or others
• Adverse events, including unanticipated or anticipated but severe physical harm to subjects.

If you have any questions please do not hesitate to contact Mr Kgomoto Mothanka at kgomothanka@gov.bw at 3632751. Thank you for your cooperation and your commitment to the protection of human subjects in research.

Yours faithfully

Dr K. Seipone

for/PERMANENT SECRETARY

Values: A Healthy Nation by 2036.
Values: Integrity, Equity, Excellence, Customer Focus, Teamwork, Accountability
APPENDIX 5

PERMISSION LETTER (PRINCESS MARINA HOSPITAL)

PLOT 1836 HOSPITAL WAY
TELEPHONE: 3621400
FAX: 3973776

PRINCESS MARINA HOSPITAL
P. O. BOX 258
GABORONE
REPUBLIC OF BOTSWANA


Ms Kagiso Kgakge
Sefako Makgatho Health Sciences University

Dear Ms Kgakge

RE: Prevalence and Associated Risk Factors of Musculoskeletal Disorders among Nurses in a tertiary Hospital in Botswana

The Research and Ethics Committee (REC) of Princess Marina Hospital met and discussed your request to conduct a study with the aforementioned title. Full approval has been granted.

Please observe the following:

1. Ask for permission from the head of department that you will be doing your research in.
2. Please ask for informed consent at all times where it is needed.
3. You will not change any aspect of your research without permission from the REC.
4. You need to report any unforeseen circumstances including the termination of the study to the REC.
5. You must allow the REC access to the study at anytime for purposes of auditing.
6. This permit is valid for one year; from 21 June 2017 to 20 June 2018.
7. At the end of the study you should give the research and ethics committee a hard copy and soft copy of your report.

Thank you

Sincerely,

[Signature]

Gladness O. Thomelang
Secretary Research and Ethics Committee