

**OCCUPATIONAL HEALTH HAZARDS ENCOUNTERED BY NURSES AT
LETSHOLATHEBE II MEMORIAL HOSPITAL IN MAUN, BOTSWANA**

by

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DEDICATION

To my beloved mother Ms Bathusitseng Keorekile for making me believe in myself, and lending an ear to my frustration. To my uncle P.G Ogopoleng for his constant support and encouragement.

To my friend Joseph Mbaiwa for continually making me feel that the academic race is worth running at whatever speed; all that matters is to arrive at the finishing point. He became a role model, showed interest in my self-development and wished me well in my profession.

I would also like to dedicate this mini-dissertation to the nurses of Letsholathebe II Memorial Hospital.

DECLARATION

I declare that the mini- dissertation, titled “*Occupational health hazards encountered by nurses at Letsholathebe II Memorial Hospital in Maun, Botswana*”, hereby submitted to the University of Limpopo for the Degree of Master of Public Health, has not been previously been submitted by me for a degree at this or any other university; that it is my work in design and in execution, and that all material contained herein has been duly acknowledged.



Opelo Keorekile

17th August 2015

Date

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ABSTRACT

Introduction and background

Nurses are an integral component of the health care delivery system and they encounter occupational health problems classified as biological, chemical, physical, and psychosocial hazards. Nurses also face health hazards such as Hepatitis B, Acquired Immune Deficiency Syndrome, tuberculosis, cytotoxic drugs, anaesthetic agents, needle stick injury, back pain, and stress. At Letsholathebe II Memorial Hospital in Maun, nurses and other health professionals face occupational health and safety risks at the workplace.

Aim and Objectives

The aim of the study was to identify the occupational health hazards encountered by nurses at Letsholathebe II Memorial Hospital in Maun, Botswana. The objectives were to identify occupational health hazards at Letsholathebe II Memorial Hospital; determine organic and inorganic disorders caused by occupational health hazards; determine coping mechanisms of nurses towards occupational health hazards and the compliance of nurses to written protocols that address occupational health hazards.

Research Method and Design

A quantitative descriptive cross-sectional method was adopted. The population comprised 200 nurses employed at Letsholathebe II Memorial Hospital. Simple random sampling was used to select 132 nurses who participated in the study. A self-administered questionnaire was used for data collection. Descriptive and inferential statistics were used for data analysis.

Results

The study revealed health hazards namely; back aches, frequent headaches, and persistent tiredness; mercury, solvents and anaesthetic gases; HIV, streptococcus,

staphylococcus, Hepatitis B and measles. Nurses also reported fatigue, loss of sleep due to stress, anxiety and persistent tiredness.

Conclusion

The study concluded that nurses at Letsholathebe II Memorial hospital experienced physical, chemical, biological and psychological health hazards.

Recommendations

The study recommends that nurses should have access to OHS information, that OHS awareness should be created at Letsholathebe II Memorial Hospital.

Keywords: Occupational Health, occupational hazards, occupational safety

DEFINITION OF TERMS

Nurse

A nurse is a person who has satisfactorily completed a prescribed programme of nursing education in an institution approved by a nursing council and licensed by that council to provide nursing services (Nurses and Midwives Professional Ethics and Practice Regulation, 2011). In this study, a nurse is a person who has been trained and has completed his or her studies, is registered with the Nurses and Midwifery Council of Botswana, and is currently working at Letsholathebe II Memorial Hospital.

Occupational health

Occupational health is defined as the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations, the prevention among workers of ill-health caused by their working conditions and the protection of workers in their employment from risks resulting from factors adverse to health (Mitchel, 2000). In this study, occupational health is defined as the highest possible way of keeping standardized practices to enhance the physical, mental and social wellbeing of nurses at Letsholathebe II Memorial Hospital.

Hazard

A hazard is the potential to cause harm (Harrington, 2000). In this study, a hazard is any risk that a nurse might be exposed to at Letsholathebe II Memorial Hospital that can cause temporary or permanent damage to a nurse's life.

Health hazard

A health hazard is property damage, loss of livelihood and services, social, environmental and economic disruption caused by a dangerous phenomenon, substance, human activity or condition (WHO, 2009). In this study, health hazard are the dangers that nurses encounter at the hospital that have the potential to affect their health.

Occupational health hazard

An occupational health hazard is a dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury, or other health impacts at the workplace (WHO, 2009). In this study, occupational health hazards are injuries sustained from falls, needle pricks, contact with infected body fluids from patients, lifting heavy patients and objects, and long periods of standing due to job demands.

LIST OF ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
BFTU	Botswana Federation of Trade Unions
CSO	Central Statistics Office
GDP	Gross Domestic Product
HIV	Human Immunodeficiency Virus
ILO	International Labour Organisation
NMCB	Nursing and Midwifery Council of Botswana
OHS	Occupational Health and Safety
SADC	Southern African Development Community
WHO	World Health Organisation

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CHAPTER 1

OVERVIEW OF THE STUDY

1.1 Introduction and background

Health workers, especially nurses, are often faced with health hazards in the workplace (Shimizu, Sakai, Okumura & Marui, 2010). Udasin and Gochfeld (1994) indicate that infection is one of the most important problems in health care services worldwide. Nurses are an integral component of the health care delivery system and they encounter a variety of occupational health problems that can be classified into four categories: biological, chemical, physical, and psychosocial hazards (International Labor Organisation, 1999). Some of the health hazards that nurses face at the workplace include infections such as Hepatitis B, Acquired Immun Deficiency Syndrome, tuberculosis, cytotoxic drugs, anesthetic agents, needle stick injury, back pain, and stress (Udasin & Gochfeld, 1994).

Infection is one of the most important causes of morbidity and mortality associated with clinical, diagnostic and therapeutic procedures. The challenge of occupational health hazards is common amongst health professionals in Africa where there is a lack of equipment and inadequate legislation. Occupational health hazards for health workers cannot be ignored. The World Health Organization (WHO) (2009) defines a health hazard as property damage, loss of livelihoods and services, social, environmental or economic disruption or caused by any dangerous phenomenon, substance, human activity or condition. Working conditions therefore have a strong impact on the health and wellbeing of workers in hospitals. If hospitals do not have a supportive working environment and occupational health and safety is not taken into consideration, workers can be exposed to health hazards.

Maier (2009) defines occupational health hazards as the potential risks to health and safety for workers who work outside the home. Employees can develop health conditions or sustain injuries if exposed to these risks at the workplace. Studies

conducted by Shires (2003) indicate that nurses who do not receive occupational health training are vulnerable to sharp injuries leading to blood-borne diseases. Shimizu et al. (2010) suggest that signs of intense mental fatigue are frequently observed in nurses who take on additional duties. Martin, Mullennix and Pisoni (2005) state that healthcare workers who handle chemotherapeutic agents report an increased incidence of acute health symptoms such as nausea, vomiting, headaches, and hair loss. Martin et al., (2005) further note that there is an association between exposure to the drugs and adverse effects on reproductive health among female staff members, including infertility, pre-term deliveries, spontaneous abortions, foetal abnormalities, and small-for-gestational-age births.

Health care workers are at a high risk of needle stick injuries and blood-borne pathogens as they perform their clinical activities (Geberding & Holmes, 1994). Through sharp injuries and contact with blood and other bodily fluids, nurses are exposed to blood-borne infections by pathogens such as Human Immunodeficiency Virus (HIV), Hepatitis B and Hepatitis C viruses (Geberding, Romeo & Ferraro, 1994). Recapping, disassembly, and inappropriate disposal increase the risk of needle stick injury (Pruss-Ustun, Rapiti & Hutin, 2005). Developing countries, where the prevalence of HIV-infected patients is very high, record the highest frequency of needle stick injuries too. Needle stick injuries were also reported as the most common occupational health hazard in a Nigerian teaching hospital (Geberding et al., 1994).

Botswana is one of the developing countries that have occupational health and safety challenges at the workplace. Hospitals like Letsholathebe II Memorial Hospital in Maun have nurses and other health professionals facing occupational health and safety risks at the workplace. Presently, no adequate research has been carried out to assess the occupational health hazards encountered by nurses in Botswana. In addition, very little research has been completed on how nurses comply with written protocols that are meant to address and mitigate health hazards at the workplace, nor on the impact of health hazards to nurses in Botswana, especially at Letsholathebe II Memorial Hospital in Maun. The aim of this study is therefore to identify occupational health hazards encountered by nurses at Letsholathebe II Memorial Hospital in Maun, Botswana.

1.2. Research Problem

Occupational health hazards in the workplace are of critical public health concern in Botswana. Health workers such as doctors, nurses and other support staff in private and public institutions are subjected to a variety of occupational health hazards, as in the case of Letsholathebe II Memorial Hospital in Maun. Occupational health hazards, and the extent to which they affect nurses, differ from one hospital to another. Letsholathebe II Memorial Hospital might be affected by four main types of occupational health hazards: chemical, biological, physical and psychosocial hazards. Some of the most common and severe hazards are musculoskeletal injuries, particularly of the lower back, caused by overexertion while moving heavy objects or patients. Nurses are exposed to cuts, bruises, and accidental needle stick injuries. Biological hazards consist of infections caused by bacteria, viruses and fungi, and can be transmitted via contact with infected patients or contaminated objects, body secretions, tissue or fluids. Although nurses at Letsholathebe II Memorial Hospital face such hazards, this area is largely mis-understood and under-researched. Letsholathebe II Memorial Hospital statistics between 2010 to 2014 show that, there are 124 cases of needle stick, blood splashes and amniotic fluid (Ngamiland DHMT, 2014).

Psychological hazards, such as stress, are also posing a very serious threat to the health and well-being of nurses in their workplace. Nurses in Botswana's hospitals are primarily involved in organizing the environment, material resources, and coordinating the work of the health staff, as well as providing care to the patients. Nurses are responsible for directing patient care tasks such as hygiene, administering medication, placing and changing bandages and vaccinating patients.

Although Botswana has legislation to address the challenges of occupational health hazards, much is not known about the extent to which nurses at Letsholathebe II Memorial Hospital are complying with written protocols and related management strategies designed to prevent and mitigate health hazards at the workplace. Workers in hospitals are likely to face many occupational health hazards. However, health hazards affecting nurses at Letsholathebe II Memorial Hospital and what hospital managers do

to prevent illness and injuries have not been adequately identified. This study therefore aims at identifying occupational health hazards encountered by nurses at Letsholathebe II Memorial Hospital in Maun.

1.3. Research Questions

- What occupational health hazards are commonly found at Letsholathebe II Memorial Hospital?
- What are the organic and inorganic disorders caused by occupational health hazards at Letsholathebe II Memorial Hospital?
- What mechanisms do nurses employ to cope with occupational health hazards?
- What is the compliance of nurses towards written protocols that address occupational health hazards at Letsholathebe II Memorial Hospital?

1.4. The Aim of the study

The aim of the study was to identify occupational health hazards encountered by nurses at Letsholathebe II Memorial Hospital in Maun, Botswana.

1.4. Objectives of the study are to:

- identify occupational health hazards at Letsholathebe II Memorial Hospital
determine organic and inorganic disorders caused by occupational health hazards
- determine coping mechanisms of nurses towards occupational health hazards at Letsholathebe II Memorial Hospital
- determine compliance of nurses to written protocols that address occupational health hazards at Letsholathebe II Memorial Hospital

1.6. Research Method and Design

A quantitative descriptive cross-sectional method was adopted for this research. The population comprised 200 nurses employed at Letsholathebe II Memorial Hospital in Maun Botswana. Simple random sampling was used to select 132 nurses who participated in the study. A self-developed questionnaire was used for collection of data.

Descriptive and inferential statistics were used to analyse data, including chi-square tests. A detailed description of the research methods is discussed in chapter 3.

1.7. The Hierarchy of Controls Framework

This study was informed by the hierarchy of controls framework, developed by Hazpak in 1996. The framework systematically identifies hazards and prioritizes intervention strategies. It is based on the premise that the best way to control hazards is to remove them from the workplace rather than relying on employees to reduce exposure. Additional means can also be used, but these offer less protection. The framework further states that elimination, substitution, engineering controls administration controls and personal protective clothing equipment can also be used as control measures (Hazpak, 1996).

A variation of the hierarchy has been in use for years in European countries, such as Germany, where emphasis is placed on removing the hazard, guarding the individual from the hazard, protecting the individual with equipment to ease some of the effects of any residual hazards that cannot be removed or guarded against effectively (personal protection), and providing information, instruction and training to individuals to enable them to operate intelligently in the face of those hazards un-removed or not controlled adequately (Heath, 1982). The hierarchy of controls is outlined in Hazpak (1996) as shown in figure 1.1, is a useful tool for outlining the preferred options for occupational health and safety risk control in any work environment, including in hospitals like Letsholathebe II Memorial Hospital.



Figure 1.1: Hierarchy of Controls Framework (Adapted from Hazpak 1996)

Based on the work and theory by Hazpak (1996) and from figure 1.1, the five different aspects of the theory can further be summarised as follows:

1.7.1 Elimination

Elimination of hazards refers to complete removal of the hazards from the workplace (Butch de Castro, 2003). In the case of Letsholathebe II Memorial Hospital, elimination suggests that latex-free gloves should be purchased for daily use to remove the risk that nurses will develop allergic reactions to latex materials.

1.7.2 Substitution

Substitution involves replacing a hazard with one that presents a lower risk (Hazpak, 1996). At Letsholathebe II Memorial Hospital, substitution may refer to the removal of some equipment that contains mercury, such as blood pressure machines and thermometers, if they have the potential of being broken, thus exposing workers to mercury, which can cause acute poisoning and death (Hudson, 2001).

1.7.3 Engineering controls

Engineering control refers to removing or isolating a hazard through technology (Butch de Castro, 2003), focusing on the source of the hazard or the pathway of transmission. In this study, use of a ceiling-mounted system for lifting patients out of bed and into a

chair would constitute an engineering control to prevent the nurse from the risks inherent to heavy lifting.

1.7.4 Administrative control

According to Butch de Castro (2003), administrative control refers to policies aimed at limiting worker exposure to a hazard, typically accomplished through work assignments. In this study, for example, to prevent a patient from assaulting a nurse, the policy is for staff members may work in pairs when providing care to or transporting a patient on a psychiatric unit. The presence of multiple staff members may discourage patient from attacking. Administrative controls, such as training, education, job rotation, safe work procedure, checklists, and a reward system for good safety and health suggestions should be employed to reduce the risks of hazards (Hazpak, 1996).

1.7.5 Personal protective equipment

Hazpak (1996) argues that personal protective equipment is necessary in a work environment. The success of this control is dependent on the equipment being chosen and fitted correctly, worn at all times and maintained properly. For example, gowns, gloves, masks and eye shields should be used when caring for a patient diagnosed with severe acute respiratory syndrome. As a result, personal protective equipment tries to reduce worker exposure, but does not control the hazards themselves.

The hierarchy of controls framework can be useful in a study like this one, mainly because it can prevent or minimize exposure to occupational hazards. It is critical to strive for the most effective measure possible and, when selecting control measures, the use of combination methods is vital. Employed nurses and their managers should be familiar with hazard control measures within their workplace (Hazpak, 1996). As shown in Figure 1, the elimination of the risk is the primary form of OHS risk control, however, the legislation and standards tend to lean more towards the minimization of the risk, particularly where it is not reasonably practical to eliminate the risk. In this study, the hierarchy of controls framework was useful in that it helped to identify occupational health hazards at Letsholathebe II Memorial Hospital. These hazards are classified into four categories: physical, chemical, biological and psychological hazards.

The theory also informed the study on the measures that are necessary for addressing occupational hazards before they cause harm in the workplace. The measures or controls that need to be implemented are linked to administration and personal protective measures.

1.8. Significance of the study

The study adds to the data on occupational health hazards encountered by nurses in the hospital. This study will strengthen the strategies in place to address occupational health hazards encountered by nurses in their workplaces and influence policy-making to improve the environment for nurses. Findings from this study will contribute to the induction and in-service programmes for hospital staff. The study will be used to improve understanding of the importance of hazards at the workplace to nurses .

1.9. Conclusion

This chapter presented the introduction and background information regarding occupational health hazards encountered by nurses at Letsholathebe II Memorial Hospital. The chapter also provided information on the research problem, objectives, and aim of the study, the Hierarchy of Controls Framework, the methods and the significance of the study. The next chapter constitutes a literature review for the study.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter provides the literature review for this study. The purpose of a literature review is to discuss the findings from previous research on the topic. This literature review is sub-divided into the topics relevant to the study. The information was obtained from published articles, online resources, books, journals and reports that are related to occupational health hazards at the workplace.

2.2 Diseases contracted at the workplace

Working conditions have a strong impact on workers' health. A non-supportive working environment can cause harm if not controlled, and can lead to occupational health hazards (WHO, 2009). Hospitals are moderate health-risk industries as they provide health services to people with diverse illnesses (Maier, 2009). Shiao, McLawsy, Huanggz and Guox, (2001) found that sharp injuries remain the commonest cause of exposure to blood-borne diseases for health care workers. This shows that occupational health hazards remain a challenge for health professionals in the workplace.

According to Udasin and Gouchfeld (1994), Hepatitis B is the most prevalent work-related infectious disease in the United States. Transmission may occur from percutaneous penetration from contaminated needles or other sharp instruments. Udasin and Gouchfeld (1994) further state that nurses employed in hospitals, particularly in emergency departments, pulmonary department and HIV unit, long term care facilities and outpatient clinics, are at risk of contracting tuberculosis. The risk of contracting HIV after percutaneous exposure to a contaminated needle is 0.3 - 0.4 % (Centre for Disease Control and Prevention, 1995).

A study conducted by Heminshaw and Marmot (1999) focused on the perceptions of environmental and occupational health hazards among agricultural workers found that

the most frequently reported health concerns were paediatric asthma, surface water contamination, food-borne illnesses, muscular strains, eye injuries and broken bones. South Africa has several acts and legislations in place to address issues of occupational health and safety, but the implementation of such legislative procedures is lacking. This is shown by the high number of claims made by health professionals following accidents at workplace. It is estimated that diseases contracted from workplaces contribute 0.05% of all compensation claims in South Africa, as certified by the compensation commissioner (Department of Health 2000). Diseases such as pneumoconiosis comprise 77% of all certified claims (Department of Health 2000). These figures indicate that occupational health and safety in the workplace is still lacking in South Africa. Although South Africa has these regulations in place, little is known about the nurse awareness of such legislative procedures against occupational health hazards.

Loewenson (1997) has stated that a survey of 1 585 professions in rural and urban Zimbabwe found occupational injuries and mortality rates similar in officially registered and non-registered companies, but the rates of occupational illness were higher in the latter. Loewenson (1997) further states that a fifth of the reported injuries resulted in minor or major permanent disability. Workers in the informal sector reported problems of poor work organization, poor access to clean water and sanitation, ergonomic hazards, hazardous hand tools and exposure to dust and chemicals (Loeweson, 1997).

2.3 Gases that pose danger to nurses at workplace

Exposure to waste anaesthetic gases may occur in operating rooms, labour and recovery rooms (McAbee, Gailuci & Checkoway, 1993). Long term exposure to these agents have been associated with increased risk of renal and hepatic disorders and are associated with an increased risk of spontaneous abortions and congenital abnormalities in exposed workers. While such gases are a serious threat to human health, the Occupational Health and Safety Act has not published any standards for waste anaesthetic gases. Gestal (1987) established that nurses could be exposed to formaldehyde when they work in renal dialysis units, during the transfer of tissues to formalin in preparation for pathology, and as a residue when used to disinfect operating rooms. Formaldehyde is associated with irritant allergic dermatitis, eye irritation and

occupational asthma (McAbee *et al.*, 1993). Elemental mercury is used in various instruments found in the health care system (Hudson, 2001). The greatest opportunity for exposure exists when there is breakage of the glass part of the thermometer or the sphygmomanometer and the mercury spills on the floor or countertop. Exposure to high levels can cause acute poisoning and death. Short term high exposure can cause pulmonary and central nervous system damage. Nurses can also bring mercury home on their shoes and clothing and, as a result, expose family members to hazards (Hudson, 2001).

2.4 Physical hazards encountered by nurses at workplace

A study conducted by Bolanie, Tinubu, Mbada, Oyeyemi and Fabumni (2010) in South West Nigeria shows that work-related musculoskeletal disorders can result from work-related events and are common among health care workers. The nursing population, which constitutes about 33% of the hospital workforce, is at particularly high risk and accounts for 60% of the reported occupational injuries. Bolanie *et al.*, (2010) further state that musculoskeletal disorders impact more significantly on the quality of life, absenteeism, work restrictions, likelihood of transferring to another job or developing a disability than any other group of diseases, with a considerable economic toll on the individual, the organization and the society as a whole.

Back injuries rank second among all causes of occupational injuries across professions (Garrett, Singiser and Banks 1992). Health care work is highly physically demanding, and the tasks that require heavy lifting, bending, twisting and other manual handling have been implicated in health care workers' back injuries. The frequent lifting of patients who are weak, debilitated and elderly increases the risk of back injuries in those who provide their care. An additional risk factor for back injury is gender: females are more likely to suffer from this complaint. Nursing activities such as lifting patients into bed, helping patients out of bed, transferring patients from the bed and carrying equipment are the most frequent causes of back pains. Shires (2003) claims that the most common occupational health hazard is lower back pain in nurses, and that physicians and nurses do not receive any training on occupational health hazards. This

lack of training contributes to the nurses' inability to protect themselves from such hazards.

The safety of nurses from work-induced injuries and illnesses is important to the patients as well as to the nurses themselves. The presence of healthy and well-rested nurses is critical to providing vigilant monitoring, empathetic patient care and vigorous advocacy. The health of nurses can impair patient health both acutely and in the long term (Department of Health, 2000). Wayne (2007) argues that nurses confront potential exposure to infectious diseases, toxic substances, back injuries and radiation. They are also subject to hazards such as stress and violence in the workplace. Wayne (2007) further states that a staggering 18% of 18 348 Canadian nurses who responded to a survey indicated that their patients were occasionally or frequently administered the wrong medications while in their care. Ergonomics is the application of scientific knowledge to the design of environments, tools, workstations and the content of work to suit the mental and physical limitations and capabilities of workers (Kotze, 1997). Juibari, Sanagu and Farrokhi (2010) investigated the relationship between knowledge of ergonomics and occupational health among the nursing staff affiliated to Golestan University of Medical Sciences. The results of this study confirmed that a significant number of nursing personnel had been suffering from a mild level of occupational injuries and musculoskeletal symptoms. It further says the existing challenges are caused by a lack of humanistic thinking in designing work systems, because ergonomics is not yet a requirement in organizational life.

2.5 Psychosocial hazards at workplace

Medical science and technology development, rapid patient turnover and rising dependency of professionalism in nursing have increased the complexity and volume of the tasks demanded from nurses, and for this reason the nursing profession is increasingly characterized by occupational stress, frequent job turnover and job dissatisfaction (Hawley, 1992). Psychological hazards such as high workload, highly demanding work, fatigue (both mental and physical), and burn-out are common in hospital environments that create stress, depression and mental fatigue in their staff (Sadlier, 2010). Managerial atmospheres also affect psychological and physiological

hazards (Sadlier, 2010). There is a strong link between occupational health risks namely chemical- physical and organizational risk factors namely lack of safety training, low level of safety climate, practices risks, and workplace injuries in public hospital employees (Sadlier, 2010). Lack of training, unsafe climates, and poor safety practices result in hospital workers being exposed to workplace injuries (Gimeno, Feknor, Burau & Delclos, 2005).

Research by the National Institute for Occupational Safety and Health (NIOSH) (2008) has identified stress as one of the key occupational health challenges for nurses at the workplace. For example, nurses who work with terminally and chronically ill patients, and those who work in intensive care units, emergency rooms, operating rooms are particularly at risk for stress related symptoms (NIOSH, 2008). The early signs of stress include irritability, loss of appetite, ulcers, migraine headaches, emotional instability and sleep disturbance (NIOSH, 2008).

Workplace factors that may contribute to stress include dealing with life-threatening illnesses, injuries, demanding patients, being overworked, understaffing, difficult schedules, the availability of specialized equipment, the hierarchy of authority, lack of control, participation in planning and decision making, and patient deaths. According to Lewy (1991), in many hospitals the nurse may feel isolated, fatigued, angry and powerless due to a sense of depersonalization created by large bureaucratic system. Stress-related symptoms can lead to an increase in the use of cigarettes, alcohol and drugs. The nurse's behavior and attitude may be adversely affected, leading to decreased job performance and increased absenteeism (Lewy, 1991).

In Japan, the Health and Safety Association Report published the results of medical examinations of the county's salaried employees. This report includes the results from 600, 000 employees in the health and hygiene sector. Nurses who work rotating shifts had complaints concerning fatigue; this was highest in the night shift, followed by evening then morning shift (Makino, Shimizu & Takata, 1995). The symptoms reported by night shift nurses included sleepiness, sadness and difficulty concentrating, with numerous complaints about cumulated fatigue and disturbed social life (Behar, 1989). Behar (1989) theorizes that shift work exerts adverse pressure by disturbing circadian

rhythms, sleep and family social life. Disturbances in circadian rhythms may lead to reduction in the length and quality of sleep and may increase fatigue and sleepiness, as well as gastrointestinal, psychological and cardiovascular symptoms. Koller (1996) states that shift-work, especially the night shift, has implications for the entire living sphere of mankind, leading to health hazards and stress. Shift workers are a population at risk due to the fact that they are exposed to psychological stress, desynchronization and reduced coping mechanisms.

Costa (2001) and ILO (1990) describe the combination effects of shift work and the extent of disruptions to circadian rhythms. These scholars also state that these effects are associated with phase shifting in sleep and wakefulness cycles, which cause interference with daily routines at work, in families and in social lives. Shift-work is associated with high rates of divorce and suicide, as well as an increased use of alcohol on the part of shift workers. Frustrations, low morale and diminished job satisfaction are also common among shift workers (Kogi, 1996). Nurses are also particularly prone to mental health problems compared with those who are engaged in other types of jobs because they work night or irregular shifts more often, which affects the circadian rhythm and disturbs other biorhythms, leading to failure of various physiological functions (Fujiwara, 1992).

2.6 Safety and training in the workplace

A meeting of occupational health professionals in the SADC Region noted that OHS professional recognition, training and development were needed across all the major categories of personnel: occupational safety processionalists, the inspectorate, occupational nurses, occupational medical practitioners and occupational hygienists (Loewenson, 1997). Only one country (South Africa) had training that covered all these disciplines, calling for regional co-operation in advancing most areas of occupational health professional training.

Norman (2001) states that education and training are the foundation for enabling improvement in Occupational Safety and Health, and that the implementation of effective health and safety hazards prevention programmes requires sound basic

education for work, certified induction and refresher training, and certified company specific training as part of lifelong learning. Norman (2001) claims that there is a link between poor or inadequate education and training, and poor Occupational Safety and Health performance. Competency-based training has facilitated the introduction of occupational safety health competencies into various industry competency standards, and this fresh approach to certification is linked to career progression.

According to Asa, Marcus and Jones (2013), a safety culture reflects individual, group and organizational attitudes, values and behaviors concerning safety. Safety management relates to the formal safety practices and responsibilities documented in a safety management system (Asa et al., 2013). A well-developed safety culture in an organization enables the maintenance and improvement of safety performance, with an emphasis on safety work and improvement processes for safety. Safety culture is a robust leading indicator or predictor of safety outcomes across industries and countries. Asa et al. (2013) indicate that organizations and companies with well-developed functional and proactive health and safety management are likely to experience fewer work-related accidents and incidents.

Shimizu *et al.* (2010) studied knowledge, awareness and compliance with universal precautions among health care workers, and found that nurses, medical doctors and medical technologists were knowledgeable about universal precautions. In Malaysia, human resource departments administer the control and prevention of workplace hazards. Preventative measures should consist of hazard elimination and reduction, and the provision of personal protective equipment (Harrington *et al.*, 2000). Studies by the Occupational Global Health Network (2007) have associated workplace exposures to hazardous drugs with health effects such as skin rashes, adverse reproductive outcomes, and possibly leukemia and other cancers.

According to Vredenburgh (2001), in order for employees to be active participants in a safety program, they must receive occupational safety training. Vredenburgh (2001) argues that a well-designed and administered training program should emphasise safe work practices and be derived from a true assessment of need, and that safety training provides the means for making accidents more predictable. To improve the quality of

health and safety for all employees, organizations should institute a systematic, comprehensive health and safety training program for new employees, provide a mentor for these employees and use a buddy system to help orient new employees in the health and safety quality systems, as well as continual re-educating and re-training employees in current health and safety issues (Vredenburgh, 2001).

Currently, the regulation of occupational health and safety is scattered over a number of Acts of parliament, under the custody of many government ministries such as the Factories Act, under the Ministry of Labour and Social Security; the Food Control Act Public Health Act and Control of Smoking Act, under the Ministry of Health; the Agrochemicals Act, under the Ministry of Agriculture; and the Mines, Quarries Works and Machinery Act, under the Ministry of Minerals, Energy and Water Resources (Botswana Federation of Trade Unions, 2007). Health and safety legislative strategies are found in different Ministries and they are not specific to address health issues found in the hospitals. Therefore, if there is no specific legislative strategy in the form of a health policy or an Act, health workers are at risk of being infected by diseases acquired from patients in the workplace.

2.7 Conclusion

This chapter presented the literature review for this study, covering the physical and chemical hazards that nurses are exposed to in the workplace. Research has shown that nurses confront potential exposure to infectious diseases, toxic substances, back injuries and radiation as well as being subjected to hazards such as stress, shift work and violence in the workplace. The following chapter provides the information on the research methods used in the study.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This chapter provides the details of how the study was conducted in order to achieve the set objectives and outcome. Furthermore, the chapter details how data were collected, managed, and analysed. It also provides justification for the choice of methods that were adopted in this study.

3.2 Study Site

This study was carried out at Letsholathebe II Memorial Hospital, located in Maun 3.1, Ngamiland District or North West District, Botswana as shown in figure 3.1. Maun is the fifth largest town in Botswana, the service administrative centre for the District, and the gateway to the Okavango Delta, so it is also known as the tourism capital of Botswana. Maun is accessible by road and air and has an international airport, Maun International Airport, which is close to the tourist attractions such as the Okavango Delta, Moremi National Park and Makgakgadi Pans National Park.

Letsholathebe II Memorial Hospital is a 360 bedded hospital with 516 employees, including nurses. The hospital has 33 departments providing different health care services. It is a referral centre for all surrounding clinics and primary hospitals. The hospital provides different specialties with a wide range of specialized personnel. The departments at Letsholathebe II Memorial Hospital include female and male surgical and medical units, gynaecology, ante-natal care and delivery, postnatal units, accident and emergency, outpatients, infectious disease control center, isolation unit, pediatric unit, theatre, intensive care unit, oncology unit, short stay unit, baby care unit, infection control unit, psychiatric unit and eye department.

Letsolathebe II Memorial Hospital is the largest hospital in the Ngamiland District. As a referral hospital for the district, it serves a population of 152, 384 found in the

Ngamiland District (CSO 2012). The airport is served by various international and local airlines, including Air Botswana, South African Airways and Air Namibia. Maun has a very good road network, and there are several car rental companies, such as Budget and Avis. Maun has a wide range of accommodation facilities, such as hotels, lodges, camps, chalets and picnic sites. In terms of recreation, Maun has at least more than one hundred accommodation facilities, including guesthouses. The hotels in Maun offer recreational facilities for the guests who come for fishing, water sports, diving and boat cruises. Private and government health facilities are also conveniently placed around the town to cater for the locals and tourists.

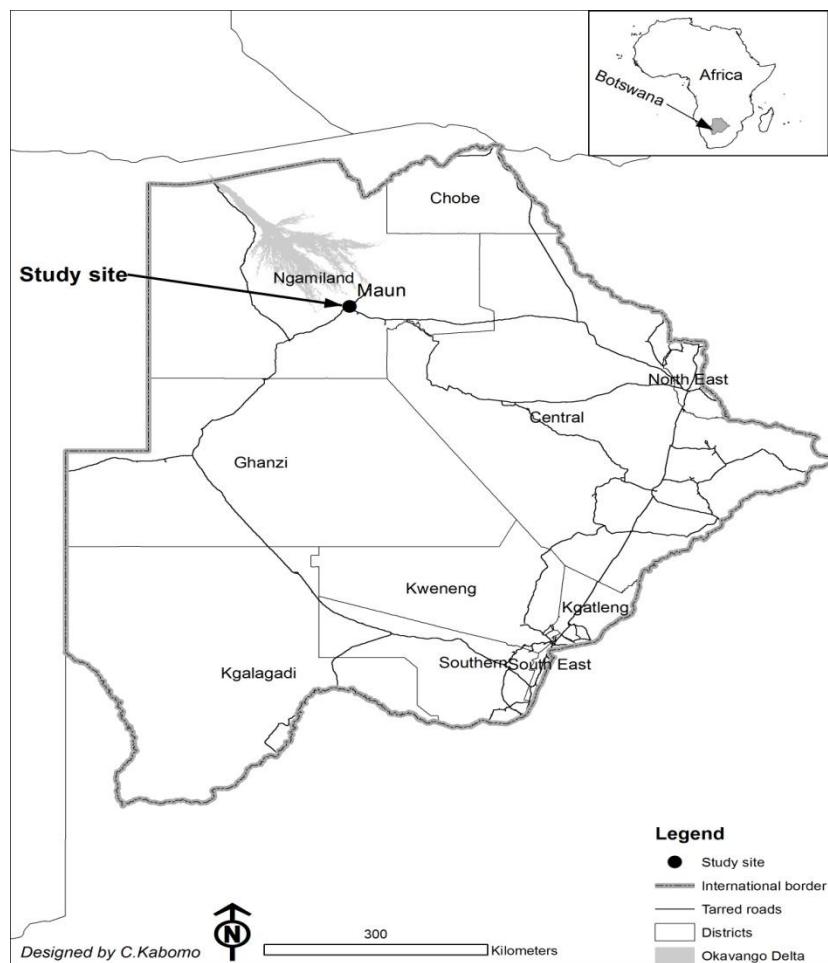


Figure 3.1: Map of Botswana showing Maun

Maun has become globalized, as it now has major retail chain stores such as Spar, Shoprite, Choppies, Score and international franchises such as Nandos, Wimpy and Barcelos. Maun has almost all the commercial banks that operate in Botswana:

Barclays, Standard Chartered, First National of Botswana and Stanbic Botswana (Magole & Gojamang, 2005). The presence of these services and facilities in Maun required the construction of Letsholathebe II Memorial Hospital as a referral Hospital in the district.

3.3 Study Design

A quantitative descriptive cross-sectional design was used to describe the occupational health hazards at one specific point in time. Therefore, quantitative research explains phenomena by collecting numerical data that are analysed using mathematically based methods (Aliaga and Gunderson, 2000). The descriptive approach was helpful in revealing patterns about the occupational health hazards that might go unnoticed at Letsholathebe II Memorial Hospital. The descriptive research design approach obtained information concerning the current status of occupational health hazards at Letsholathebe II Memorial Hospital. A cross-sectional design is defined as a study carried out at one time point or over a short period (Levin, 2006). According to Levin (2006), cross-sectional studies are usually conducted to estimate the prevalence of the outcome of interest for a given population, commonly for the purposes of public health planning. In a cross-sectional study, data can also be collected on individual characteristics, including exposure to risk factors, alongside information about the outcome (Levin, 2006). Cross-sectional studies can be thought of as a "snapshot" of the frequency and characteristics of a condition in a population at a particular point in time. Cross-sectional studies are carried out at one time or over a short period. As a result, the studies are usually conducted to estimate the prevalence of the outcome of interest for a given population. The data collected were used to assess occupational health hazards encountered by nurses at the hospital.

3.4 Population and sampling

3.4.1 Population

The population of the study consisted of 200 nurses at Letsholathebe II Memorial Hospital, allocated to the different departments of the hospital.

3.4.2 Sampling

The term sample refers to a portion of the population that is representative of the population from which it was selected (Barlett, Kotrlik & Higgins, 2001). Krejcie and Morgan's (1970) formula was used to calculate the minimum sample size for this study:

$$n = \frac{X^2 \times N \times P \times (1-P)}{(ME^2 \times (N - 1)) + X^2 \times P \times (1-P)}$$

Where :

n = sample size

X^2 = the table value of chi-square for one degree of freedom at the desired confidence level

N = Population size

P = the population proportion (assumed to be .50 since this would provide the maximum sample size)

ME = desired Margin of Error (expressed as a proportion (.05)).

The sample of nurses was calculated as follows:

n = ?

X^2 = 3.841

N = 200

P = 0.50

ME = 0.05

n = $3.841 \times 200 \times 0.5 \times (1-0.5)$

$$(0.05 \times 0.05 \times (200-1)) + 3.841 \times 0.5 \times (1-0.5)$$

n = $3.841 \times 200 \times 0.5 \times 0.5$

$$(0.0025 \times 199) + 3.841 \times 0.5 \times 0.5$$

n = $3.841 \times 200 \times 0.5 \times 0.5$

$$0.4975 + 3.841 \times 0.5 \times 0.5$$

n = 192.05

$$0.4975 + 0.96025$$

$$\begin{aligned}n &= \underline{192.05} \\&\quad 1.45775\end{aligned}$$

$$n = 131.744$$

$$n = 132$$

Following results from the formula, 132 nurses were selected to participate in the study. After the minimum sample size of 132 nurses was calculated, a simple random sample was conducted in order to select nurses for the study. Simple random sampling provided an equal opportunity for each nurse to be selected, thereby ensuring an unbiased representation among nurses. Each individual nurse's name was written on a piece of paper and allocated a number from 1 to 200. The numbers were placed in a hat then a 15 year old girl drew 132 numbers from the hat over the course of 20 minutes. A list of the 132 names of nurses drawn from the hat were written on an A4 page and given the title of "prospective respondents".

3.5 Inclusion and Exclusion Criteria

3.5.1 Inclusion Criteria

The study included nurse managers, all nurses registered with Nursing and Midwifery Council of Botswana (NMCB), permanent nurses working in hospital, and nurses working on contract.

3.5.2 Exclusion Criteria

The study excluded student nurses, as they are not always in the hospital, retired nurses, doctors, auxiliary staff or support staff at the hospital, laboratory staff and nurses on leave and those who were off-duty during data collection.

3.6 Pre-testing the questionnaire

A pre-test of the questionnaire was conducted at Gumare Primary Hospital prior to data collection. Pre-testing the questionnaire enabled the identification of flaws that would compromise the integrity of the study. Ten questionnaires were self-administered at Gumare Primary Hospital by ten nurses. The pre-test allowed the researcher to assess the feasibility of the study, to determine whether the sample size and sampling technique were adequate and effective, and to test the adequacy of the research instruments. The pre-test revealed that some questions were vague, so those questions were refined. Some questions were re-written to reduce the time required for questionnaire completion below 60 minutes. Results from the pre-test showed that 70% of the nurses were aware of occupational health hazards encountered in the hospital. About 80% of the nurses claimed that they did not know of any policies dealing with occupational health hazards in the hospital. However, 90% were never trained on anything related to occupational health hazards, while 85% did not have access to any legislation or policies dealing with occupational health hazards in the hospital. The pre-test made it possible to refine the questionnaire by re-writing ambiguous questions and reducing the completion time from 60 to 45 minutes. After the pre-test, the questionnaire was finalized and administered to nurses at Letsholathebe II Memorial Hospital.

3.7 Data Collection

A structured questionnaire with closed-ended questions was used for data collection. The questionnaire took 30–40 minutes to complete. It contained pre-determined responses from which respondents chose the answer that best expressed their viewpoints. The questionnaire had four sections. Section A consisted of seven questions on demographic data. Section B consisted of eighteen questions on occupational health hazards, divided into biological, physical, chemical and psychosocial health hazards. Section C addressed organic and inorganic disorders and it had eight questions. Section D dealt with the compliance of nurses towards written protocols that are meant to address occupational health hazards. The questionnaire captured information on the health hazards encountered by nurses while at their workplace. It also captured information on how nurses cope with occupational health

hazards, and the organic and inorganic disorders experienced by nurses while at work, as well as the mechanisms employed by nurses to cope with occupational health hazards at the hospital. The researcher distributed the questionnaire to the respondents.

3.7.1 Advantages and disadvantages of using a questionnaire

The use of questionnaires had the following advantages:

- Low cost: the researcher distributed them to the respondents
- High response rate with minimal missing responses
- Low demands on respondent time: the use of close-ended questions provided answers that respondents could select

Although the use of questionnaire has advantages, it also has disadvantages: the researcher could not probe responses, unlike during interview sessions.

3.8 Data Management and Analysis

Data collected in this study were coded and entered into a Statistical Package for Social Sciences (SPSS) version 22 database. Data were analyzed quantitatively through descriptive statistics and chi-square analysis. The chi-square test was used to determine the relationship between variables such as age, gender, position held by nurses, and variables such as injury, stress and shifts worked. Chi-square tests were also used to establish the relationships between the back injuries of nurses and heavy lifting of patients; needle stick injuries and HIV and AIDS infections; and smoking by nurses and night-shift work.

Descriptive analysis and cross-tabulations were carried out. The mean, median and standard deviation for the data were calculated. Quantitative analysis of data from closed-ended questions thus involved the production and interpretation of numerical values, frequencies, pie-charts and tables that described the data.

3.9 Validity and Reliability

3.9.1 Validity

To address the validity and reliability of the instrument that was used, the questionnaire was pre-tested. To achieve content validity, the questionnaire included a variety of questions on occupational health hazards encountered by nurses at their workplace, such as organic and inorganic disorders, the compliance level of nurses towards written protocols meant to address occupational health hazards, and the mechanisms employed by nurses cope with occupational health hazards. The questionnaire was submitted to experts in quantitative research and occupational hazards to ensure content validity.

3.9.2 Reliability

Reliability is defined as the consistency and dependability of a research instrument to measure a variable (Brink, van der Walt & van Rensburg, 2006). A scale or test is reliable to the extent that repeat measurements made under constant conditions will give the same results. Reliability was achieved by ensuring that the questionnaire and questions used were consistent among all the respondents.

3.9.3 Bias

Data collector bias was minimized by the researcher being the only one to administer the questionnaire, and by standardizing conditions such as exhibiting similar personal attributes to all respondents. Sampling bias occurs due to the difference between the population defined by the researcher and the actual population being studied through the sampling method (Christopher & Pannucci, 2010).

Bias in sampling method was minimized by ensuring that the questionnaires were piloted, adjusted and simplified so that respondents were more likely to participate. Furthermore, follow-ups of respondents were carried out by the researcher to determine whether they differed from the main population; if respondents were absent they were replaced with other suitable candidates. If the non-response rate was high, attempts were made to find out how the non-response might have influenced the results.

Data analysis bias, the form of bias created when raw data are transformed into erroneous research findings, was also minimised. This bias can occur through inappropriate uses of statistical techniques, leading to the incorrect interpretation of the survey results (Christopher & Pannucci, 2010). Data analysis bias was minimized by fully understanding all the statistical techniques that the researcher planned to use on the raw research data before creating the questionnaire.

3.10 Ethical considerations

3.10.1. Ethical clearance and permission

Ethical clearance was obtained from the University of Limpopo's Medunsa Ethics and Research Committee (MREC). Permission to conduct the study was obtained from the Botswana Research Unit, Ministry of Health, Gaborone. The nature and purpose of study was fully explained to all concerned parties. Approval and permission to conduct the study was also obtained from the Institution Research Board Committee of Letsholathebe II Memorial Hospital.

3.10.2. Informed consent

The respondents were requested to sign consent forms before responding to the questionnaire. In the consent form, the respondents were informed that the research is voluntary, and that if they felt uncomfortable during completion of the questionnaire, they could choose not to participate. The respondents were also informed that they would not be penalized in anyway should they decide not to participate or to withdraw from the study.

3.10.3. Confidentiality and Anonymity

The respondents were assured that the study maintains a high level of confidentiality although respondent anonymity. No records were made of respondent names. Instead, each respondent was assigned a number that identified them for participation purposes. Respondents were also notified that the study was mainly for academic purposes and that the information would not be revealed to any senior employee at Letsholathebe II Memorial Hospital.

The researcher therefore used study codes on the completed questionnaire instead of recording identifying information of respondents, and the questionnaire did not contain information that could readily identify respondents. The researcher kept a separate document that linked the study code to respondents, and identifying information was locked in a separate cupboard to enable access to the researcher only.

3.10.4. Protection from discomfort and harm

This study did not have any risk related to the physical harm of respondents. The questionnaire was designed to be completed between 40-60 minutes to avoid fatigue, headache, and muscle tension. This was based on the fact that a listening span for a human being is between 40-60 minutes.

The respondents completed the questionnaires in a confidential and safe place to protect them from discomfort and harm. A safe room was identified in the hospital where appointments were made so that nurses came at their convenient time.

3.11 Conclusion

This chapter discussed the research methods and design used in the study, including the study site, population and sampling, data collection, data analysis, validity and reliability as well as ethical considerations. The next chapter will discuss the presentation and discussion of results.

CHAPTER 4

PRESENTATION AND DISCUSSION OF RESULTS

4.1 Introduction

In this chapter, the results and their interpretation will be discussed. The results are presented into four parts: demographic data, occupational health hazards, organic and inorganic disorders, and compliance levels of nurses towards written protocols meant to address occupational health hazards.

4.2 Characteristics of Respondents

4.2.1 Gender of Respondents

The study had more female participants than males. Female nurses accounted for the majority of respondents as shown in table 4.1. These results suggest that nursing activities at Letsholathebe II Memorial Hospital attract more females than males.

Table 4.1: Respondents' gender

Gender	Number	Percentage/%
Female	78	59.1
Male	54	40.9
Total	132	100.0

4.2.2 Age Distribution of Respondents

The largest proportion of respondents fell into the 21-30 age range, followed by the 31-40 age range as in table 4.2. The mean age of respondents was 33 with Standard Deviation of 8.2 years and the median age was 31. The majority of the nurses working at Letsholathebe II Memorial Hospital are therefore in their early years of adulthood. These are the years when most people get married and have children.

Table 4.2: Respondents' age distribution

Age	Number	Percentage/%
20-30	66	50%
31-40	43	32.5%
41-50	17	12.9%
51 and above	6	4.6%
Total	132	100.0

4.2.3 Hospital Departments/Units

This study involved 132 nurses from the seven nursing departments of Letsholathebe II Memorial Hospital. The nursing managers are responsible for administering the allocation and placement of nurses to all units in the hospital. There is continuous communication between nursing managers and units managers regarding staffing and scheduling. The following units comprise different categories of nursing personnel who work day and night in the hospital.

Table 4.3: Respondents' Departments

Department/Unit	Number of respondents	Percentage/%
Medical	36	27.3
Surgical	33	25
Pediatric	12	9.1
Operating theatres	5	3.8
Obstetrics and Gynaecology	23	17.4
Outpatient departments	15	11.4
Accident and emergency	8	6.1
Total	132	100.0

4.2.4 Respondents' qualifications

Nursing is respected for being a professional career where individuals have to undertake at least basic training in nursing activities, especially as they relate to patients. As a result, all the nurses at Letsholathebe II Memorial Hospital are required to have a minimum qualification of Diploma in General Nursing. The majority of the respondents held Diplomas in General Nursing, some held Bachelor's Degrees in Nursing, but only a small percentage held a Master's Degree as shown in figure 4.1. The activities at Letsholathebe II Memorial Hospital are therefore carried out by nurses who meet the minimum Botswana qualification requirement of a Diploma.

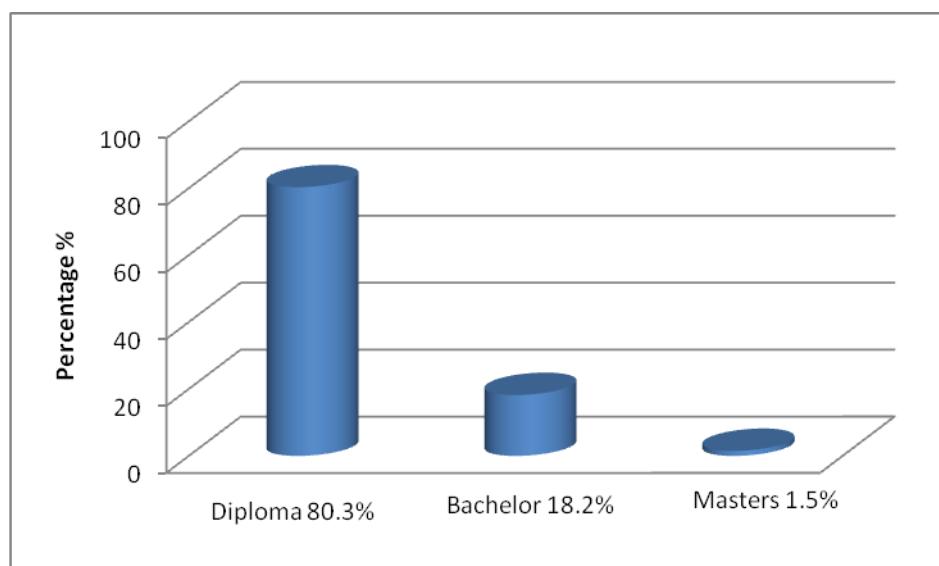


Figure 4.1: Respondents' qualifications

4.2.5 Marital status

Most of the respondents had never been married, but more than a third are married and have families as in table 4.4. The rest of the respondents were divorced, living together, widowed or separated. Regardless of their marital status, most females did have children and were single parents.

Table 4.4: Respondents' marital status

Status	Frequency	Percentage
Married	46	34.8
Never Married	68	51.5
Divorced	7	5.3
Widowed	1	0.8
Separated	1	0.8
Living together	9	6.8
Total	132	100.0

4.2.6 Position and experience of nurses

Experience and time spent in a particular work discipline and environment may contribute to the quality of service provided. Nurses at Letsholathebe II Memorial Hospital have worked there for a mean years of 5.5 and SD of 3.9 years. The majority of nurses are Principal Registered nurses, and less than a third were Senior Registered nurses in figure 4.2. The rest of the respondents were Chief Registered nurses or Registered nurses, the most junior nursing position in Botswana . These results suggest that the majority of nurses working at Letsholathebe II Memorial Hospital are experienced and well-qualified. It can therefore be assumed that nurses are likely to provide good quality service if the necessary resources, such as equipment, are available to them.

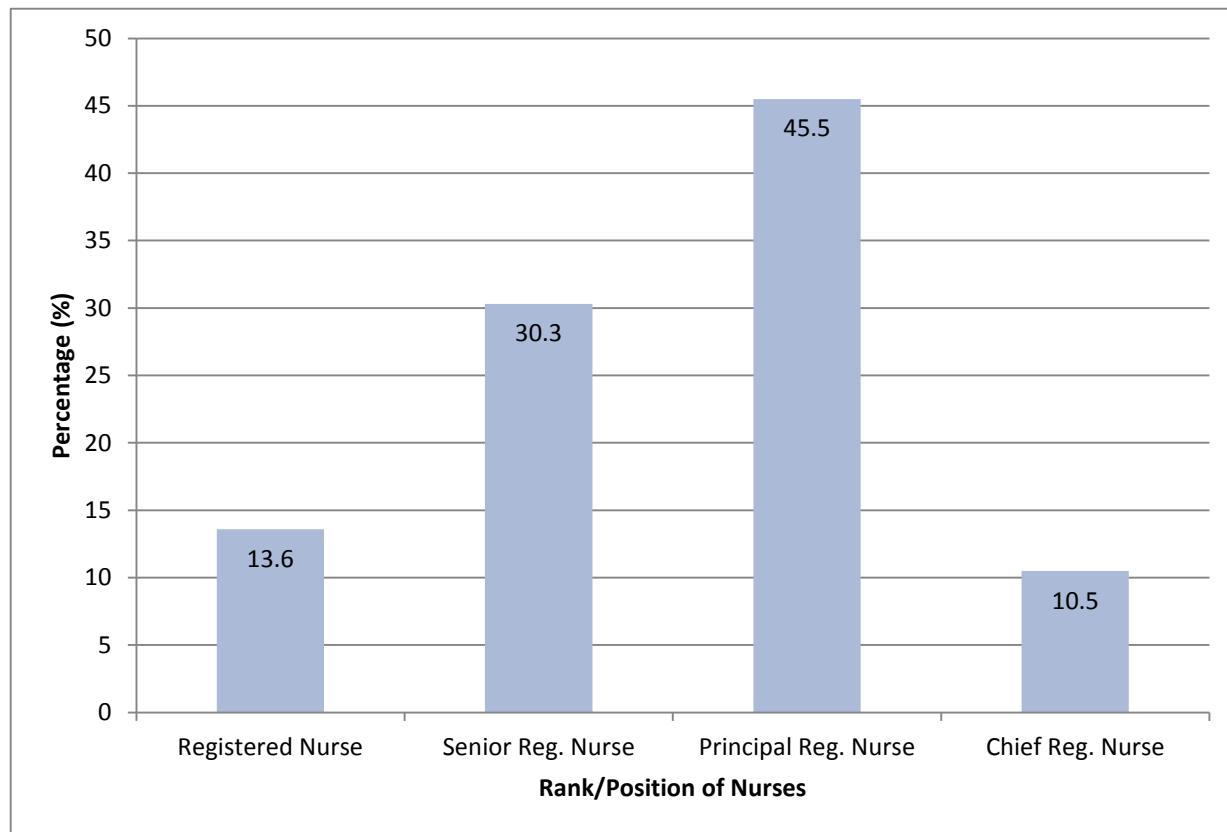


Figure 4.2: Respondents' position

4.3. Physical Health Hazards

The study revealed that nurses at Letsholathebe II Memorial Hospital experience persistent tiredness resulting from long working hours, particularly night shifts as in figure 4.3. The nurses experience fatigue and sleep loss caused by stressful working conditions. The Directorate of Public Service Management, 2010, Section 9 notes that the maximum hours that a government worker (including nurses) should work is 8 hours a day. Nurses on night shift at Letsholathebe II Memorial Hospital violate this provision since they work 12 hour shifts, from 19:30 to 7:30. These results show the inadequate compliance with the Public Service Act. The lack of a specific Act on OHS in health settings compromises the health of nurses and the lives of the patients during night shifts because nurses have to work long hours. The Public Service Act No: 30 of 2008, Section 9 furthers states that an employee whose nature of work requires it to be carried out continuously shall be engaged under shift work terms, and the periods of such work shall cover day, afternoon and night shifts of 8hours each. Each shift duty

shall attract an inconvenience allowance (commonly known as shift allowance) at a collectively agreed rate. This is also not being observed at Letsholathebe II Memorial Hospital, as nurses work continuously for 12 hour periods.

Results from this study also indicate that there are physical hazards that nurses at Letsholathebe II Memorial Hospital are faced with while at work. Backaches affected 41.7% of respondents, while headaches affected 31.1% respondents as in figure 4.3. A study of 125 nurses in Taiwan showed that within one year, 36.8% of nurses suffered from musculoskeletal problems (Nakhaei, Faraj-zadeh, Tabiei, Saadatjoo, Mahmudi-rad & Hosseini, 2006; Meshkati, Samei, Nami & Karimi-far, 2008; Nasl-Saraji, Shah-Taheri, Hosseini, Golbabae & Ghasem, 2008; Smith, Guo, Lee & Chang, 2002). These injuries are generally caused by lifting patients from one place to the other within a hospital. Transferring patients from beds to stretchers, turning patients around on the bed, and changing patients' clothes and bed sheets were important causes of musculoskeletal injuries in nurses (Goldman, Jarrard & Kim, 2000; Fanello, Jousset, Roquelaure, Chotard-Frampas & Delbos, 2002). Optimizing equipment and simplifying caring labors could reduce the incidence of occupational injuries.

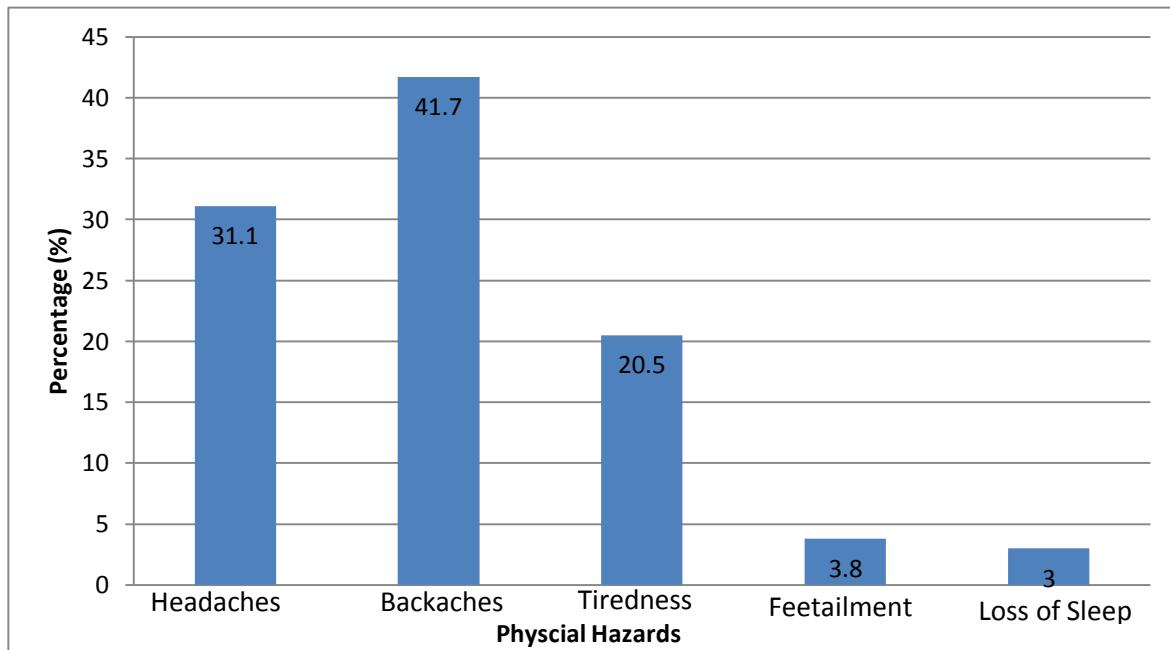


Figure 4.3: Physical hazards identified at Letsholothebe II Memorial Hospital

4.3.1 Injuries Sustained by Nurses while at Work

The results as shown in figure 4.4 indicate that 31.8% of the respondents experienced needle stick injury, 22% muscular strain, 31.1% had blood from patients spilling onto them while 15.1% had no injury. Needle pricks were the most common injuries experienced by nurses at Letsholathebe II Memorial Hospital. The Chi-square test was used to test the relationship between the ward where nurses work in the hospital and the injuries sustained by nurses. The relationship between these variables was significant, $\chi^2_{18} = 30.8$, $p < 0.001$. Results indicate that the ward where a nurse works in the hospital has an effect on the injury. Nurses working in medical and surgical wards were more likely to sustain injuries. Nurses working in the medical and surgical wards were more likely to sustain injuries with a combined figure of 52.3% as compared to nurses in maternity and pediatric wards which had a total of 26.1% regarding injuries.

The reasons for more injuries in the medical and surgical wards are that nurses are involved in lifting heavy patients. In the pediatric ward, there are fewer injuries because

there are no heavy patients to be lifted. In the maternity ward, women come to deliver and in most cases are able to walk on their own and also stay a short period of time as compared to surgical and medical wards where patients are bedridden and infectious; hence possibility of higher chances of infecting the health workers and causing injuries like backaches.

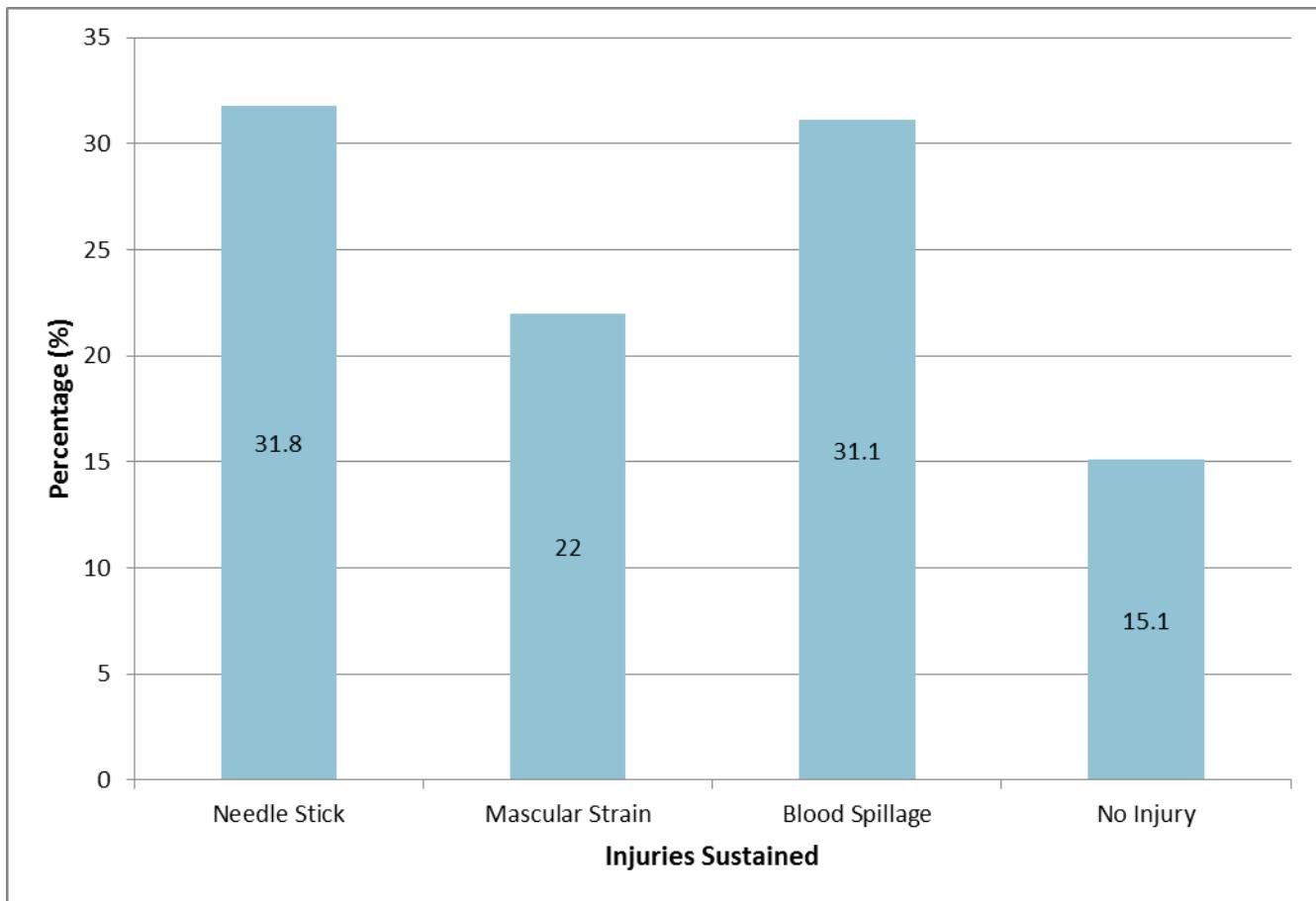


Figure 4.4: Injuries sustained by nurses at work

Wayne (2007) indicates that nursing is the most hazardous professions as most nurses suffered a needle stick or were cut on the job, 29% were physically assaulted, 25% suffered chronic back problems, and 9% suffered from depression. Gestal (1987) notes that needle sticks are likely to be the major source of infectious occupational diseases to which the health worker is prone. Nurses, not only at Letsholathebe II Memorial Hospital but around the world, are mostly injured during injection and stitching.

Results from this study revealed that occupational injuries among nurses at Letsholathebe II Memorial Hospital are very high at 84.9%. The high prevalence of percutaneous injuries could be attributed to the fact that, being a public hospital, it has a high workload, a factor that can be associated with occurrence of occupational injuries. In addition, the high prevalence of injuries at Letsholathebe II Memorial Hospital may be caused by the lack of specific programme measures to address occupational challenges such as inadequate personal protective equipment, lack of safer sharp devices, lack of information and non-adherence to standard precautions. Jacob, Newson, Murphy and Dick (2010) argue that the prevalence of sharps injuries is common even in rich countries such as the United Arab Emirates, where 19% of health workers reported sharps injuries in one year. In developing countries where the prevalence of HIV-infected patients is the highest in the world, the number of needle-stick injuries is also the highest (Wilburn, 2004; Mbaisi, Ng'ang'a, Wanzala & Omolo, 2013).

The spillage of patients' blood on nurses accounted for 31.1% of hazards. This is a relatively high incidence rate and describes a dangerous scenario because some of the blood could be contaminated by deadly diseases such as HIV and AIDS or Hepatitis. Mbaisi *et al.* (2013) argue that, even though all healthcare workers in contact with patients are at risk to exposure to blood and body fluids, nurses are most at risk due to injuries and splash exposures. Studies in other countries such as the United States have shown that nurses experience the majority of needle-stick injuries in the world (Pruss, Rabiti & Hutin, 2003; Gessessew & Kahsu, 2006). This is because nurses are most likely to handle sharp devices and have the most contact with patients.

4.4 Chemical Health Hazards

The main occupational hazards to which health workers are exposed to are classified as infections, accidents, radiation, exposure to noxious chemicals and psychological problems and assault (Gestal 1987). There are chemical agents/threats found in all hospital environments around the world including Letsholathebe II Memorial Hospital. Such agents include formaldehyde used for maintenance of tissues, anesthetic gases such as nitrous oxide, antiseptics and disinfectants, ethylene oxide used to sterilize heat-sensitive material and antineoplastic/cytostatic drugs. In this study, chemical

health hazards were identified at Letsholathebe Memorial Hospital and they include mercury/solvents, anti-cancer agents and anesthetic gases. More than a third of nurses were exposed to chemical risks such as mercury and solvents in the last five years as shown in table 4.5.

Chemicals used at Letsholathebe II Memorial Hospital are mainly antiseptics and disinfectants, which can cause skin burns during handling and use. Kam et al. (2007) argue that health problems associated with chemical hazards include dermatitis from latex gloves. Similarly, Xelegati, Robazzi, Marziale and Haas (2006) note that some of the health problems from chemicals include: irritations of the mucous membranes in the nose, mouth, eyes, edema or spasm of the larynx, obstructive bronchitis and occasionally pulmonary edema from formaldehyde vapors. Boyce and Pittet (2002); Rutala (1996); and Larson (1995) argue that, in choosing an antiseptic, the desired characteristics namely, absorption and persistence, should be considered along with evidence of a given product's safety and efficacy, its acceptability to staff and most importantly, its cost.

Table 4.5: Chemical hazards identified at Letsholathebe II Memorial Hospital

Chemical Hazards	Exposed to chemical agents	Not exposed to chemical agents
Mercury/Solvents	51 (38.6%)	81 (61.4%)
Anti-Cancer agents	2 (1.5%)	130 (98.5%)
Anesthetic gases	3 (2.3%)	90 (68.2%)

4.5 Biological Hazards

Biological hazards are a very serious concern in the nursing profession, not only at Letsholathebe II Memorial Hospital but at any hospital or medical facility in the world. According to Hosoglu et al. (2008), every year, hundreds of health workers are exposed to dangerous viruses such as hepatitis B and C, HIV and AIDS when injured by needles and sharp objects. In this study, respondents noted some of the biological hazards they face while at work at Letsholathebe II Memorial Hospital as Hepatitis B,

Staphylococcus, Streptococcus, HIV and AIDS and Measles. Results in table 4.6 show that 49.2% nurses are frequently faced with Hepatitis B at the workplace.

Hepatitis B and HIV are the most important of the occupational diseases (Gestal, 1987; Niu, 2000). Geddes (1986) also notes that HIV and AIDS is currently considered to be the infectious disease giving rise to most anxiety among hospital workers, a factor found to be a challenge at Letsholathebe Memorial Hospital. Caillard (1993) argues that injuries due to needle stick or pricks and sharp instruments are the most typical types of occupational accidents, the seriousness of which is due to the risk of infections from contaminated blood.

Table 4.6: Biological hazards identified at Letsholathebe II Memorial Hospital

Biological Hazards	Frequency	Percentage (%)
Hepatitis B	65	49.2
Staphylococcus	13	9.8
Streptococcus	8	6.1
HIV and AIDS	45	34.1
Measles	1	0.8
Total	132	100.0

The HIV prevalence rate in Botswana is 17% according to the National AIDS Coordinating Agency Report (2010). There is no doubt in this study that HIV and AIDS is one of the diseases that presents threats to nurses in Letsholathebe II Memorial hospital.

4.6 Psychosocial Hazards

The work environment has psychosocial hazards which include but are not limited to stress, violence and other workplace stressors. The hazard most commonly experienced by nurses at Letsholathebe II Memorial Hospital was persistent tiredness due to work activities, followed by fatigue, loss of sleep due to stress from work and finally anxiety due to work as shown in table 4.7.

This study shows that a significant number of psychological symptoms affect shift workers, such as loss of sleep due to stress from work. Lack of sleep is a major concern since it affects the health and performance of nurses who are dealing with human lives. Nurses in this study have shown that they are exposed to such hazards. The high percentage of respondents experiencing persistent tiredness implies that their performance could be impaired, which could have deleterious consequences on the health of the patients. Studies by Pheasant (1991) have shown that changes to one's psychological processes could affect one's ability to concentrate in the work place. This therefore suggests that measures should be taken to address the issue of stress in the workplace at Letsholathebe II Memorial Hospital.

Table 4.7: Psychological hazards identified at Letsholathebe II Memorial Hospital

Psychological Effect	Frequency	Percentage (%)
Loss of sleep due to stress from work	27	20.5
Persistent tiredness due to work related activities	54	40.9
Fatigue	37	28.0
Anxiety due to work related	8	6.1
Social Effects due to many hours spent at work	6	4.5
Total	132	100.0

In addition to the psychological hazards identified at Letsholathebe Memorial Hospital as in table 4.7, a Likert scale was used to measure stress level of nurses at the Hospital. The scale ranged from very much stressed to somehow stressed, moderately stressed, somehow not stressed and not stressed as in figure 4.5. The majority of nurses are faced with stress while at work at Letsholathebe II Memorial Hospital. Stress has effects and consequences on both the nurse at work and on their social life at home and within society. The Chi-square test was performed to compare the placement of nurses at the work in the ward at the hospital with the level of stress experienced by

nurses. The relationship between these variables was significant, $X^2_{24} = 39.7$, $p < 0.001$. These results suggest that the ward where a nurse works in the hospital has a relationship with the level of stress.

These effects and consequences have been confirmed by other studies that have shown that psychological hazards faced by nurses often have an effect at a social level (Korompeli & Sourtzi, 2010; Kivimaki *et al.*, 2003). Korompeli and Sourtzi (2010); Kivimaki, Virtanen, Vartia, Vahtera and Keltikangas-Jarvinen (2003) further argue that the nurses' changing work patterns of morning/evening/night could cause disruptions in their family and social life and lead to problems in their physical and emotional health. High levels of stress, poor quality sleep and problems affecting cardiovascular are experienced by nurses (Hemingway & Marmot 1999). Korompeli and Sourtzi (2010) note that nurses face gastrointestinal systems problems while Kivimaki *et al* (2003) argue that there various sorts of serious psychological disorders, such as depression, that nurses experience because of stress emanating from a work environment. Brinia and Antonaki (2013) argue that another problem that often arises among the nursing population is the burnout syndrome, which has three dimensions namely, emotional exhaustion, depersonalization and lack of personal achievement. Results from this study suggest that nurses at Letsholathebe II Memorial Hospital face such psychological problems of stress at the workplace.

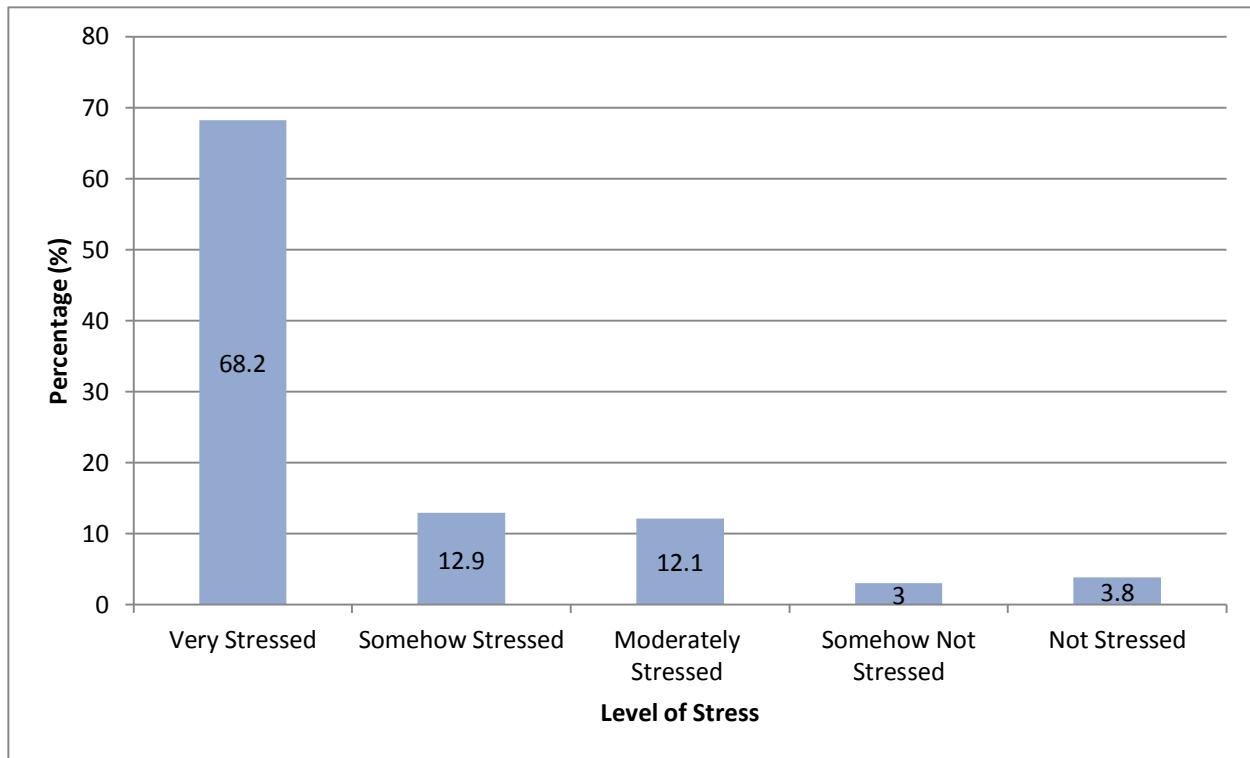


Figure 4.5: Stress levels caused by working night shift

4.7 Organic Disorders

This study investigated the organic and inorganic disorders that affect nurses at Letsholathebe II Memorial Hospital. Respondents were asked to state whether they have been exposed to diseases such as pneumonia, tuberculosis or influenza in the last five years following contact with patients. Out of 132 respondents, 44 (33%) have suffered from pneumonia, tuberculosis and influenza as shown in figure 4.6.

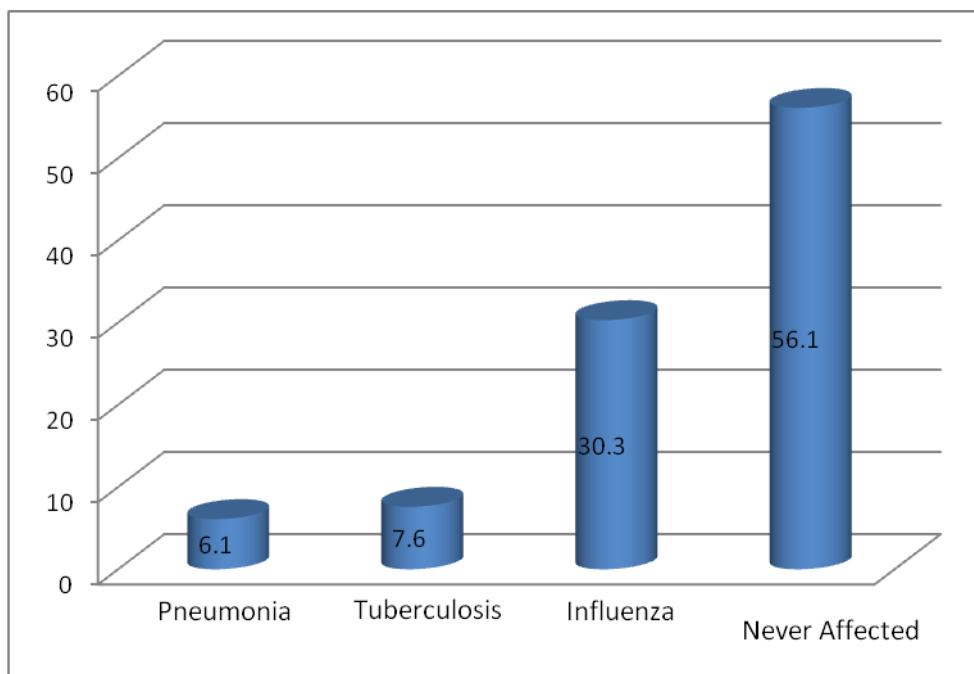


Figure 4.6: Nurses' exposure to diseases

4.8 Inorganic Disorders

This study identified inorganic disorders that affect nurses at Letsholathebe II Memorial Hospital. Respondents were asked to state whether they have ever been assaulted by patients while in the work place in the last five years. Most (69.7%) respondents have never been assaulted as shown in figure 4.7.

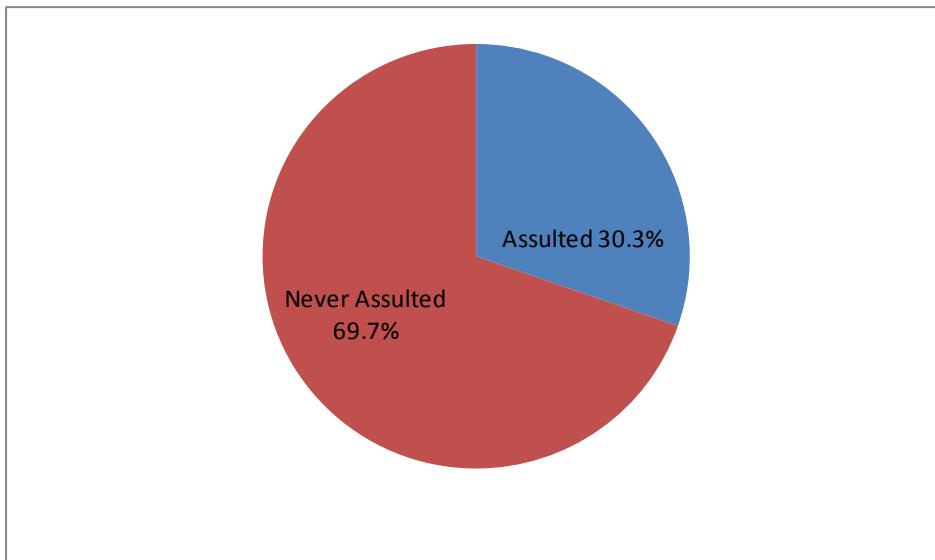


Figure 4.7: Percentage of nurses assaulted by patients in the last five years

This is supported by Gacki-Smith et al. (2009) who indicated that, violence more than 20 times in three (3) years, and almost 20% reported experiencing verbal abuse more than 200 times during the same period from patients. In the same survey, nurses who experienced frequent physical violence and/or frequent verbal abuse indicated fear of retaliation and lack of support from hospital administration and Emergence Department management as barriers to reporting workplace violence. Assault on nurses at Letsholathebe II Memorial Hospital thus confirms Workplace violence against nurses is a serious occupational risk for the domestic and global workforce particularly in hospitals. A survey by Gacki-Smith et al., (2009) also revealed that approximately 25% of the nurses in the United States experience physical the physical violence by patients on nurses that occurs around the world.

4.9 Stress experienced during working shifts

Nurses were asked at which time they experience much of the stress while at work. The majority of nurses described the night shift as more strenuous than the day shift as shown in figure 4.8.

The Chi-square test was used to examine the relationship between the placement of nurses in terms of wards in Letsholathebe II Memorial Hospital and the shift preferred.

The relationship between these variables was significant: $\chi^2_6 = 22.8$, $p < 0.001$. Results indicated that the wards where nurses work in the hospital have a relationship with shift preference. There is a diversity of problems encountered by nurses in a normal working situation (Sizeni, 2003). Some of these may be physical, chemical, psychosocial and socio-economical. Night work intensifies problems since the individual is working when the body clock is naturally telling the body to rest. Problems may vary with the individual since biological structures differ. It is very important to note that even nurses who choose to work night shifts regard it as strenuous because they experience sleeping problems along with other ailments.

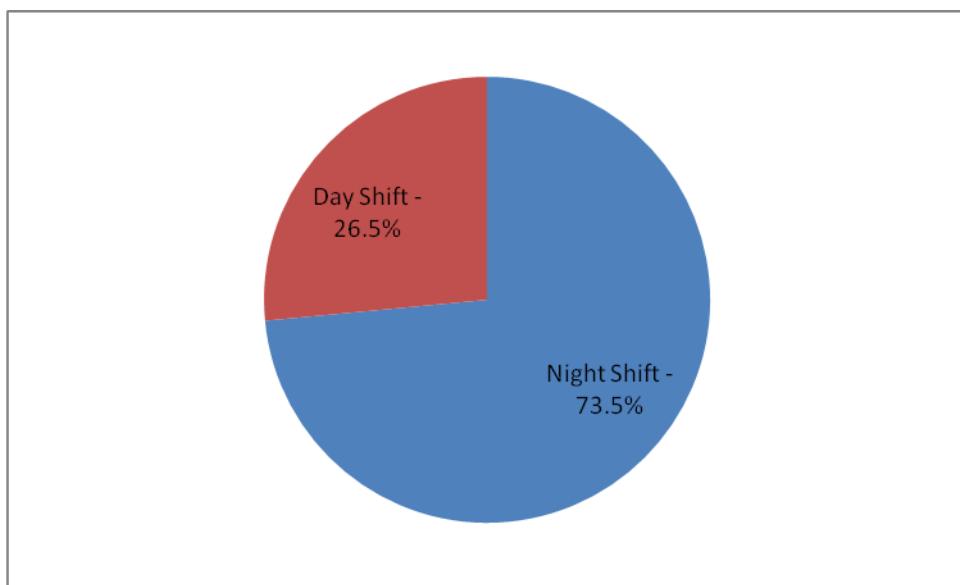


Figure 4.8: Nurses experiencing stress from working night and day shifts

Night shifts are not only a challenge to nurses at Letshothebe II Memorial Hospital but to nurses around the world. For example, a survey by Scott et al (2006) found that almost two thirds (65%) of the nurses in the United States reported struggling to stay awake at work at least once during the study period, and 20% of these nurses reported falling asleep at least once during their work shift. In total, nurses reported that they struggled to stay awake during night shifts and actually fell asleep during early morning hours. (Rogers et al, 2006). These results suggest that the night shift is a challenge for nurses around the world including Letsholathebe II Memorial Hospital.

4.10 Mechanisms Adopted to Cope with Occupational Health Hazards

Hospitals are part of a high demand, high expectation service industry, and are heavily reliant on staff for friendly, safe, effective and efficient delivery of service. They are stressful places for sick or injured patients and their families, but they can also be stressful for staff due to high workload demands, shift work, on-call duties, fatigue and burnout as well as high or unrealistic expectations from supervisors. Nurses experience physical and mental workload since their job involves standing, walking, bending, lifting and making decisions about patients, all of which contribute to exhaustion. Some nurses have adopted mechanisms to cope with unbearable situations at work as in table 4.8. Out of 132 respondents, 15(11.4%) used excessive alcohol intake as a coping mechanism, 13(9.8%) used tablets that induce sleep, while 10(7.6%) used excessive smoking. Most respondents at Letsholathebe II Memorial Hospital do not use the coping mechanisms indicated in table 4.8.

Table 4.8: Mechanisms used to cope with occupational health hazards

Mechanisms Used	Cope Mechanism is Used	Cope Mechanism is not Used
Excessive smoking	10 (7.6%)	122 (92.4%)
Tablets that induce sleep	13 (9.8%)	119 (90.2%)
Excessive alcohol intake	15 (11.4%)	117 (88.6%)

4.11 Compliance to Legislation and Policy on Occupational Health Hazards

The respondents were asked to state whether they have any education, training and knowledge on occupational health and safety at the work place. This question was meant to investigate compliance levels towards written protocols addressing occupational health hazards (even though found and addressed in a number of Acts of Parliament). The questions were also meant to investigate whether there are penalties

for offences and legal proceedings on issues of health safety and welfare at Letsholathebe II Memorial Hospital. Results indicate that only the Factories Act of 1992 has penalties for wrong-doing.

Section 73 of the Factory Act states that, "if any person is killed or dies or suffers any bodily injury in consequence of the occupier or owner of a factory having contravened any provision of this Act, the occupier or owner of the factory shall be liable to a fine not exceeding P400.00 or to imprisonment for a term not exceeding six months or to both and the whole or any part of any fine may be applied for the benefit of injured person or his family or otherwise as the court may order". However this Act does not apply to the hospital setting, hence the penalties deal directly with the factory environment which is different from the hospital.

With regard to the compliance to Legislation and Policy on Occupational Health Hazards by nurses at Letsholathebe II Memorial Hospital is that in Botswana, the Ministry of Health does not have an Act or policy that directly makes provisions for occupational health and safety in health settings. Letsholathebe II Memorial Hospital has a draft policy that is used in the hospital, which is why some respondents indicated that they were aware of the policy and regulations used by the hospital.

The purpose of the policy is to minimize the risk of occupational injuries and illnesses by the use of recommended loss and prevention and control techniques, to initiate and nature a culture of health and safety awareness within the hospital, and to promote health and safety strategies and procedures to achieve compliance with health and safety related legislations in Botswana, as well as world standards. Compliance with the policy means keeping records of identified hazards, including their risk level ratings and control measures, identifying staff needs, training on health and safety issues, and keeping and analyzing reports (Letsholathebe II Memorial Hospital Health and Safety Policy, 2012). However, the results indicated that respondents still lack adequate knowledge on occupational health hazards: only 25% had any knowledge. The policy stipulates that all newly-recruited and transferred staff are to be trained on occupational health and safety, but the results of this study indicate that only a small percentage (19.7) have been trained.

The regulations of occupational health and safety in Botswana are found in a number of Acts of Parliament and under the custody of many government ministries such as the Factories Act (under the Ministry of Labour and Social Security); the Food Control Act, Public Health Act and Control of Smoking Act (under the Ministry of Health), Agrochemicals Act (under the Ministry of Agriculture); the Mines, Quarries Works & Machinery Act (under the Ministry of Minerals, Energy and Water Resources); the Atmospheric Pollution (Prevention) Act and Waste Management Act (under the Ministry of Environment, Wildlife and Tourism); and the Radiation Protection Act (under the Ministry of Communication, Science and Technology). The lack of unified Health Act on OHS means that OHS in health settings is compromised in Botswana.

The results of this study show that there is inadequate training of nurses in OHS at Letsholathebe II Memorial Hospital: most of the nurses were never trained on OHS (Table 4.9). Training is carried out “on the job” rather than through formal training by the experts, so more training is needed from the occupational health experts. This limitation is exacerbated by the fact that there is no Act of Parliament in Botswana that makes provision for nurses to be trained on OHS. Although there is no Act of Parliament being violated by Letsholathebe II Memorial Hospital, the inadequate OHS training for nurses compromises OHS in the hospital.

The results show that most nurses do not have access to legislation and policy dealing with occupational health hazards at Letsholathebe II Memorial Hospital (Table 4.9). Guidelines are available in every unit, but the results show that relatively few nurses read them. None of the Acts of Parliament stipulate that nurses should be provided with legislation and policy or guidelines dealing with occupational health safety in the workplace. In addition, there is no Act of Parliament in Botswana that provides for the training of nurses either through short courses or seminars about legislation and policy dealing with occupational health hazards and safety in the workplace. Based on the fact that there is no an Act of Parliaments or guidelines that require nurses to be provided with OHS training in the workplace, safety in health settings is compromised. This phenomenon does not only affect OHS at Letsholathebe II Memorial Hospital but in other health facilities in Botswana as well.

The majority of nurses indicated that they did not have adequate knowledge of occupational health hazards. Most (75%), nurses noted that they were not knowledgeable about any policy in the hospital dealing with occupational health hazards. This is due to the fact that there are some guidelines in the hospital that are used.

Table 4.9: Knowledge and training in occupational health and safety

Knowledge/Training	There is Knowledge/Training	There is no Knowledge/Training
Knowledge on occupational hazards, procedures and regulations	33 (25%)	99(75%)
Policy dealing with occupational hazards	40 (30.3%)	92 (69.7)
Training on occupational health hazards	26 (19.7%)	106 (80.3)
Accessibility to legislation and policy dealing with occupational health hazards	22 (16.7%)	110 (83.3)

The Chi-square test was used to test the relationship between the educational level of nurses and the training on machines used at the hospital. The relationship between these variables was significant, $\chi^2_2 = 7.98$, $p < 0.018$. These results suggest that nurses at Letsholathebe are generally not trained in the use of machines which they operate on daily bases. In this case, occupational health and safety in the hospital is compromised for both the patient and the nurse operating the machine. The nurses are operating a machine that they were never trained to operate. To meet the demand for an improved compliance level of nurses towards written protocols that deal with occupational health hazards, there has to be increased training, access to legislation and policies, as well as adequate knowledge on procedures and regulations dealing with hazards in the hospital.

4.12 Conclusion

This chapter presented and discussed the results about the occupational health hazards which affect nurses at Letsholathbe 11 Memorial Hospital. The hazards are categorized into four namely, physical, biological, chemical and psycho-social hazards. The legislative and policy compliance on occupational health and safety by nurses at Letsholathebe II Memorial Hospital was also discussed. The next chapter addresses the summary, conclusions, limitations and recommendations.

CHAPTER 5

SUMMARY, LIMITATIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter provides the summary of findings, conclusions, limitations and recommendations made from the results of the study. The recommendations focus on what can be done to improve occupational health and safety issues at Letsholathebe II Memorial Hospital.

5.2 The Aim of the study

The aim of this study was to identify occupational health hazards encountered by nurses at Letsholathebe II Memorial Hospital in Maun, Botswana. The results of the study showed that this aim was achieved, as indicated in chapter four of this study.

5.3 Objectives of the study

- To identify occupational health hazards at Letsholathebe II Memorial Hospital.
Results from this study indicated that the main occupational physical health hazards at Letsholathebe II Memorial Hospital among nurses include injuries caused by needle pricks, splash of blood from patients, chemical burns, headaches, backaches and painful feet. Biological health hazards included: staphylococcus, HIV and AIDS, and measles. Chemical health hazards were mercury/ solvents, radiation, and anesthetic gases. Psychological health hazards were stress, loss of sleep, persistent tiredness and fatigue. The conclusion is that the Letsholathebe II Memorial Hospital has occupational health hazards that contribute to an environment that is not safe for nurses and other health professionals.
- To determine organic and inorganic disorders caused by occupational health hazards
Results indicated that 44.4% of nurses were exposed to diseases such as pneumonia, tuberculosis or influenza in the last five years due to contact with the

patients. The study results suggest that a substantial number of nurses at Letsholathebe hospital have been exposed and affected by diseases while at the workplace.

- To determine coping mechanisms of nurses towards occupational health hazards at Letsholathebe II Memorial Hospital.

Results showed that 7.6% nurses practice excessive smoking in order to cope with occupational hazards experienced at workplace, 9.8% take tablets to induce sleep and 11.4% consume alcohol excessively. Most nurses in Letsholathebe II Memorial Hospital do not use coping mechanisms.

- To determine compliance of nurses to written protocols that address occupational health hazards at Letsholathebe II Memorial Hospital.

The results indicated that most nurses had no access to legislations and policy dealing with occupational health hazards in the hospital. Most respondents did not have adequate knowledge on occupational health hazards, and most nurses did not know about any policies in the hospital dealing with occupational health hazards. Our results show that legislation should provide an effective framework of standards and direction in which occupational health and safety in hospitals such as Letsholathebe II Memorial can be implemented.

5.4 Summary

This study focused on physical, biological, chemical and psycho-social hazards. Closed-ended questions were self-administered to nurses who were respondents in this study. Results indicated that the main occupational physical health hazards at Letsholathebe II Memorial Hospital among nurses include injuries caused by needle pricks, splash of blood from patients, burn injury from chemicals, headaches, backaches and painful feet.

The study highlighted the lack of knowledge and training for nurses at Letsholathebe II Memorial Hospital on occupational health and safety. Nurses lack the necessary knowledge on legislation, policies and strategies that govern occupational health and safety in the workplace. Some of the legislative and policy issues nurses are unaware of are safety procedures and regulations, policies on occupational health hazards in the hospital, training on occupational health hazards, and access to legislations dealing with

occupational hazards in Letsholathebe II Memorial Hospital. Some of the occupational and health hazards in the hospital are linked to a lack of knowledge of the required international standards in health facilities. The study also identified the occupational health and safety hazards at Letsholathebe 11 Memorial Hospital, and made recommendations to address them. There are several benefits to be obtained from this education and training on occupational health and safety for healthcare professionals. Such benefits are associated with the provision of up-to-date knowledge and skills, which makes it easy for nurses to cope with their workloads and work related demands. Most training programs on health and safety usually have various inter-related aims: providing better understanding of various hazards in the hospital environment, promoting safety, improving the application of protection measures required for each nursing task, reducing accident frequency and maintaining the condition of nurses' health.

Nurses in Letsholathebe II Memorial Hospital work for 12 hours during the night, which is too long and the absence of variation in activities makes it more monotonous, so the body is unable to adjust and perform as expected. This study has also shown that the majority of the nurses at Letsholathebe II Memorial Hospital have not been trained on occupational health hazard and safety. Without adequate education, nurses may underestimate the potential impacts of occupational health hazards such as needle stick and sharp injuries.

5.5 Limitation of the study

The study was limited to Letsholathebe II Memorial Hospital only and the results cannot be generalized to all Botswana hospitals and health services.

5.6 Recommendations

This study makes the following recommendations:

5.6.1. Training seminars and workshops for nursing staff

Adequate, up-to-date and ongoing education and training for all health care workers is a vital component of occupational health service. We recommend that all hospital

workers, including nurses at Letsholathebe II Memorial Hospital, are to be taught and trained in safety measures. Letsholathebe II Memorial Hospital therefore requires annual training workshops and seminars on occupational health and safety for its nursing staff. All nurses should be trained, sensitized and updated on issues related to infection prevention and occupational risk reduction. In addition, Hepatitis B vaccination is recommended for nurses and institutions should provide mandatory immunization programmes for all the nurses at the hospital.

Education and training should actively include specific and integrated roles for the occupational health department, health and safety committee members, infection control practitioners, managers and front-line workers. Involving all parties is essential to success and sustainability, as leadership by peer-nominated workers and local champions increases engagement by every level of worker and encourages participation. Training and awareness need to reach all health care workers, as the objective is to establish a culture of prevention and a healthy workplace environment.

The training program should also include education sessions for policy makers and hospital managers on occupational injuries. To encourage participant engagement, training should focus on issues that have been identified as high priority by nurses during the study. It is also vital to educate and train leaders to ensure that they will set an example to be followed by their staff. Including basic concepts of occupational health and safety in the training and orientation of all management professional will lead to greater appreciation and support for occupational health and safety services in the health care setting. Complying with workplace and regulations is the ultimate key to safety within work environment. Enforcing a rule is to ensure safety through compliance.

5.6.2. Breaks between long working hours

Nurses at Letsholathebe II Memorial Hospital require breaks for relaxation between the long hours they work, especially on night shifts. Authorities should recognise the importance of having breaks between long hours of working, and use appropriate equipment and facilities at the hospital as a way of improving occupational health and safety for nursing staff and any other health personnel. This is particularly true in the

emergency rooms and intensive care units (ICU) of the hospitals, where maximum attention is required.

5.6.3. Reduce night shift length

The long hours worked by nurses at Letsholathebe II Memorial Hospital during night shifts increase the levels of stress and tiredness. These long shifts therefore should be reduced from 12 hours to more manageable periods. Based on the findings of this research, nurse managers have a responsibility to formulate strategies to assist those who find it difficult to work at night. Recording and following up good and bad incidents will be the foundation of planning. A situational analysis will assist managers to identify the existing occupational health hazards in Letsholathebe II Memorial Hospital, and they will be able to develop and implement possible strategies to reduce hazards in the hospital. It will help to remove certain trends that can disturb the smooth running of the hospital.

5.6.4. Protection of nurses from blood exposures and injuries

Nurses at Letsholathebe II Memorial Hospital are frequently being exposed to blood from sick patients and injuries from needle pricks. Exposure to infectious diseases, whether blood-borne or air-borne pathogens, is sometimes greater because nurses are unaware of the procedures and protocols they should observe while in the workplace. This study therefore recommends that all staff members should be made aware of the protocols and that there should be a point person for each department who is contacted immediately when an incident occurs. The point person will be directly responsible for ensuring that a nurse receives appropriate and timely post exposure prophylaxis, in addition to emotional support and regular follow-ups.

These incidents can be stressful, therefore careful monitoring of anxiety and coping strategies are important. Letsholathebe II Memorial Hospital needs to identify and develop efficient strategies to protect nurses from occupational exposures to blood and body fluids. Letsholathebe II Memorial Hospital should also establish a surveillance system for registering, reporting and managing occupational injuries and risk exposure. Other safety measures include enhancing nurse safety by providing safety devices such

as auto disable/retractable needles, adhesive tapes and blunt sutures. Nurses should be made aware of relevant policies and procedures for appropriate management of exposure, like washing eyes, skin and mouth, first aid for penetrating sharp injuries, prophylaxis for high risk exposure, and testing for the source. Findings from this study revealed that procedures regarding occupational health and safety are found in various policies and Acts of Parliament. These Acts generally fail to address pertinent issues regarding occupational health settings. There is therefore a need for the government to develop relevant procedures for health settings.

The hospital management should protect nurses from the infections by ensuring that nurses receive appropriate and timely post-exposure prophylaxis, in addition to emotional support and regular follow-ups. In order to improve compliance levels of nurses with protocols, the regulatory authority charged with administering legislation needs to do so in a professional, constructive and consistent manner to make the hospital a safe environment for nurses, patients and any other health worker.

5.6.5 Further research

Further research should be conducted in other health care institutions of Botswana regarding occupational health hazards experienced by health professionals.

5.7 Conclusion

Chapter 5 discussed the summary of the study, the review of objectives and their achievement, the limitations and recommendations of the study.

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APPENDIX 1: QUESTIONNAIRE FOR NURSES

SECTION A: DEMOGRAPHIC DATA

1. Gender

1. Male

2. Female

2. Age _____ years

3. What is your maximum educational level?

1. Diploma

2. Bachelor's Degree

3. Master's Degree

4. Other (specify) _____

4. Marital status

1. Married

2. Never married

3. Divorced

4. Widowed

5. in separation

6 living together

5. Occupational rank?

1. Registered nurse

2. Senior registered nurse

3. Principal registered nurse

4 Chief registered nurse

6. What is your present placement at work?

1. Surgical units

2. Medical units

3. Pediatric units

4. Obstetrical units

7. How long have you been working at Letsholathebe II Memorial Hospital?

SECTION B: OCCUPATIONAL HEALTH HAZARDS

Physical Hazards

8. Which of the following physical hazards have you experienced in the last 5 years in the place of work?

1. Frequent headaches

2. Backaches

3. Persistent tiredness

4. Feet ailment

5. Loss of sleep

6. Other (specify)

9. Have you sustained any occupational injury at work in the last 5 years?

1. Yes

2. No

10. Do you have personal protective clothing /equipment in your workplace?

1. Yes

2. No

11. Have you ever been trained on the machines or equipment used daily in your work place?

1. Yes

2. No

Biological Hazards

12. Have you ever been on post exposure prophylaxis (PEP) in the last 5 years due to an accident/mistake at work?

1. Yes

2. No

13. In the last 5 years, have you ever sustained the following injuries while at the work?

- a. Needle stick injury
- b. Muscular strain
- c. Spillage of patient body fluids

14. Have you ever been exposed to any disease that is occupation associated?

- 1. Yes
- 2. No

15. Have you ever had blood tested for Hepatitis B due to exposure to the disease at workplace since you started working?

- 1. Yes
- 2. No

16. Have ever had any immunization against occupational diseases due to exposure while at workplace in the last 5 years?

- 1. Yes
- 2. No

17. Which of the following biological hazards are you frequently facing withing your work environment?

- 1. Hepatitis B

2. Staphylococcus
3. Streptococcus
4. HIV/AIDS
5. Measles virus

Chemical hazards

18. In the last 5 years, have you been exposed to any chemical risks such as mercury, solvents, anesthetic gases while at work in your department?
1. Yes
 2. No
19. Have you been exposed to radiation while administering ant-cancer agents in the last three months?
1. Yes
 2. No
20. Have you ever had an abortion which was a suspicion of anesthetic related gases in your unit? *(for female participants only)*
1. Yes
 2. No

Psycho-social hazards

21. Do you smoke excessively in an attempt to relieve work stress?
1. Yes
 2. No
22. Do you take some tablets to induce sleep when from night duty?

1. Yes
2. No

23. Do you take alcoholic drinks excessively to reduce work related stress and working at night?

1. Yes
2. No

24. Rank what you perceive might be the stress level of co-workers due to working night shifts?

1. Very Stressed
2. Somehow stressed
3. Moderately stressed
4. Somehow Not stressed
5. Not stressed at all

25. Regarding night shift, please tick the most appropriate for you!

1. I prefer night shift it suits me
2. I do not prefer night shift
3. It is strenuous
4. It is comfortable



SECTION C: ORGANIC AND INORGANIC DISORDERS

Organic Disorders

26. Have you ever suffered from any lung disease which is occupation related in the last 5 years?

1. Yes

2. No

27. Have you in the last 5 years suffered from the following diseases due to exposure to patients suffering from these diseases?

1. Pneumonia

2. Tuberculosis

3. Influenza

Inorganic disorders

28. Which of the following physiological challenges do you currently experience resulting from work related hazards?

1. Loss of sleep due to stress from work

2. Persistent tiredness due to work activities

3. Fatigue

4. Anxiety due to work related

5. Social relationship due to many hours spent at work

29. Have ever been assaulted by a patient while at work?

1. Yes

2. No

30. Which shift do you find most strenuous?

1. Day
2. Night

31. Is there any difference to you when working at night or during the day?

1. Yes
2. No

32. How productive are you when working during the day?

- 1 Very productive
- 2 Somehow productive
- 3 Moderately productive
- 4 Less productive
- 5 Not at all productive

33. How productive are you when working during the night?

- 1 Very productive
- 2 Somehow productive
- 3 Moderately productive
- 4 Less productive
- 5 Not at all productive

SECTION D: Compliance level of nurses towards written protocols meant to address occupational health hazards.

34. Do you use equipment or material at your work that you consider hazardous?

1. Yes

2. No

35. Do you have adequate knowledge on occupational hazards and safety procedures and regulations at your work place?

1. Yes

2. No

36. Do you know of any policy in the hospital dealing with occupational hazards?

1. Yes

2. No

37. Have ever been trained of anything related on occupational hazards in your work place?

1. Yes

2. No

38. Do you have access to any legislation and policy dealing with occupational hazards in your work place?

1. Yes

2. No

**APPENDIX 2: PERMISSION LETTER, RESEARCH UNIT (MINISTRY OF
HEALTH, BOTSWANA)**

**3: PERMISSION LETTER, INSTITUTION RESEARCH BOARD (APPENDIX
LETSHOLATHEBE II MEMORIAL HOSPITAL)**

NGAMI DHMT



Republic of Botswana

Fax : 6860819
Telephone: 6879000

P. O. Box 12
Maun, Botswana

REFERENCE NO: M 6/50/12 I

16th June 2014

Ms Opelo Keorekile
P O Box 12
MAUN

Dear Madam,

**OCCUPATIONAL HEALTH HAZARDS ENCOUNTERED BY NURSES IN
LETSHOLATHEBE II MEMORIAL HOSPITAL, MAUN, BOTSWANA**

NOTIFICATION OF IRB REVIEW: NEW APPLICATION

Approval Status: APPROVED

Approval Date: 23rd June 2014

Expiring Date: 22nd June 2015

Risk Determination: Minimal Risk

You are hereby given an unconditional approval. The research may commence with immediate effect.

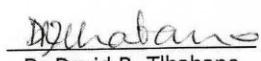
The Ngami DHMT IRB will further request for a quarterly brief report of the progress of the study. You are advised immediate reporting of unanticipated or anticipated adverse effects to subjects.

If you have any questions/queries, please contact Dr David TLHABANO at drlhabano@gmail.com, tel +267 7111 0430 or G. M. Mothibi at gmmothibi@gmail.com, tel +267 687 9625/71633558.

Thank you for your commitment in protecting human subjects in Research in the Ngami DHMT. The IRB wishes you a joyous and successful period of study in our jurisdiction.

Thank you.

Yours faithfully


Dr David R. Tlhabano
(NGAMI DHMT CHAIR IRB)
For/**NGAMI DHMT HEAD**

DRT/LM

APPENDIX 4: MEDUNSA RESEARCH ETHICS COMMITTEE CLEARANCE

APPENDIX 5: LETTER FROM LANGUAGE EDITOR

Emily Bennett

PhD, BSc

Friday 17th October 2014

To whom it may concern

By copy of this letter, I confirm that I edited the language of the manuscript entitled “Occupational health hazards encountered by nurses at Letsholathebe II Memorial Hospital in Maun, Botswana”, written by Ms Opele Keorekile.

Yours Sincerely

A handwritten signature in blue ink, appearing to read "Bennett".

Dr Emily Bennett