# OCCUPATIONAL EXPOSURE TO TUBERCULOSIS: KNOWLEDGE AND PRACTICES OF EMPLOYEES AT SPECIALISED TUBERCULOSIS HOSPITALS

**By**

**LUSANDA NDLEBE**

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**Supervisor: Prof M. Williams**

**Co Supervisor: Dr W. ten Ham-Baloyi**

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# DECLARATION

**DEPARTMENT OF ACADEMIC ADMINISTRATION**
**EXAMINATION SECTION**
**SUMMERSTARND NORTH CAMPUS**
PO Box 77000
Nelson Mandela Metropolitan University
Port Elizabeth
6031

Enquiries: Postgraduate Examination Officer

Nelson Mandela Metropolitan University

*for tomorrow*

## DECLARATION BY CANDIDATE

**NAME:** Lusanda Ndlebe

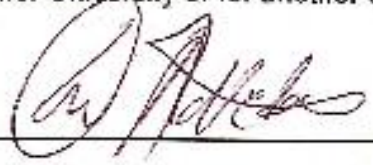
**STUDENT NUMBER:** 213410516

**QUALIFICATION:** Masters in Health & Welfare Management

**TITLE OF PROJECT:** OCCUPATIONAL EXPOSURE TO TUBERCULOSIS: KNOWLEDGE AND PRACTICES OF EMPLOYEES AT SPECIALISED TUBERCULOSIS HOSPITALS

**DECLARATION:**

In accordance with Rule G5.6.3, I hereby declare that the above-mentioned treatise/ dissertation/ thesis is my own work and that it has not previously been submitted for assessment to another University or for another qualification.

**SIGNATURE:** 

**DATE:** 31/01/17.

## DEDICATION

This research is dedicated to my baby sister (Othembele Ntantiso) and my son (Onotando Ndlebe) who supported me through the process of conducting this research.

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I am truly grateful to my supervisor Prof. Maggie Williams and co-supervisor Dr. Wilma ten Ham-Baloyi for their invaluable support and guidance while completing my treatise.

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## ABSTRACT

Knowledge and safer practices regarding occupational exposure are crucial to all employees working in healthcare facilities, especially Tuberculosis (TB) hospitals. This study aimed to explore and describe the knowledge and practices of employees working in three specialised TB hospitals regarding occupational exposure to TB. The results of the study will be used to make recommendations to the Eastern Cape Department of Health (ECDOH) and hospital managers that could assist in reducing the prevalence of occupational TB.

This quantitative, descriptive and contextual study was conducted in three specialised TB hospitals in the Nelson Mandela Bay Health District (NMBHD). Convenience sampling was used to select the research participants. The knowledge and practices of 181 employees towards occupational exposure to TB and infection control was measured through a self-administered questionnaire. The questionnaire covered areas such as the knowledge of TB and infection control, the infection control policy, infrastructure as well as patient transportation. The whole population was targeted and out of a potential 253 employees, 181 were on duty during the stage of data collection and agreed to willingly participate in the study. The data was analysed descriptively using MS excel and MS word.

This study revealed that 69% (n=124/181) of employees in the three specialised TB hospitals in the NMBHD have adequate knowledge of infection control. However, only 10% (n=18/181) of employees reported appropriate infection control practices, while almost half of the participants 42% (n=76) apparently practice infection control poorly. The majority (78%, n=141) of the employees in the three specialised TB hospitals in the NMBHD reported knowing about the availability of an infection control policy in their respective hospitals, however only 42 % (n=76) have reportedly read the policy.

In conclusion, knowledge and practices regarding occupational exposure in specialised TB hospitals in the NMBHD is not optimal. It is however, important to note that the majority of employees have knowledge about the TB disease itself and its symptoms.

Recommendations were made in order to improve infection control knowledge and practices. These include the development of a plan for purchasing of equipment to address infection control, development of a curriculum specific for non-nursing personnel and the establishment of a plan to ensure the availability of patient consultation rooms and dining halls. A further recommendation deemed important by the researcher was isolation glass as a compulsory specification when purchasing patient transportation vehicles, in order to provide protection for the drivers transporting patients to and from the hospital.

**KEYWORDS:** Employees, Exposure, Knowledge, Practices, Tuberculosis

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## LIST OF ABBREVIATIONS

| | |
|---|---|
| AIDS | Acquired Immune Deficiency Syndrome |
| HIV | Human Immune Virus |
| MDR-TB | Multidrug Resistant TB |
| MHAI | Management of Hospital-Acquired Infection |
| NMBHD | Nelson Mandela Bay Health District |
| OHSA | Occupational Health and Safety Act |
| PHC | Primary Healthcare |
| TB | Tuberculosis |
| WHO | World Health Organization |

# CHAPTER 1

# OVERVIEW OF THE STUDY

## 1.1. INTRODUCTION & BACKGROUND

Tuberculosis (TB) ranks as the second leading cause of death from infectious diseases worldwide, following human immune deficiency virus (HIV) and the latent acquired immune deficiency syndrome (AIDS). The latest WHO global report reflects that in 2013 approximately 90 million people developed TB and 1.5 million people died from the disease (WHO, 2014:17).

South Africa is counted among the countries with the highest burden of TB as it has the third highest number of people with TB worldwide, following India and China, and has in addition experienced a 400% increase in the incidence of TB during the past 15 years (WHO, 2014:24). South Africa had an estimated prevalence of 450 000 cases of active TB during the year 2013 alone. Therefore, in a population of about 50 million people, 1% develops active TB disease each year. Furthermore, 60% or 270 000 of the estimated 450 000 TB cases in South Africa are co-infected with HIV (WHO, 2014:24).

In South Africa, the risks of contracting TB and rates of TB among hospital employees (also referred to as occupational TB) are poorly documented especially in the Eastern Cape Province.

The main sources of infections and therefore a mode of transmission are hospital personnel, patients and clothing items such as doctors' white coats, nurses' uniforms, hospital garments, privacy curtains, stethoscopes, bed rails and common hospital surfaces. It is thus important to ensure that all hospital employees have adequate knowledge of all potential sources of infection and infection control measures as well as the appropriate attitudes and practices in order to ensure that appropriate measures are implemented (Prüss, Kay, Fewtrell & Bartram, 2002:149; United Kingdom Office, 2003:27).

Training in good practice and knowledge of organisational infection control policies and procedures helps to promote a culture of good infection control practice throughout the hospital. Effective infection control practice cannot be achieved without the commitment of well-informed and trained staff. It is therefore essential for hospital employees to receive education and training during induction regarding occupational TB and infection control as well as to undergo refresher training at regular intervals to ensure good practices of infection control. South Africa is seemingly not the only country challenged by a lack of consistency with regards to infection control training in healthcare facilities. This is revealed by an audit report on Management of Hospital Acquired Infection (MHAI) of 2003 in the United Kingdom where most healthcare facilities' infection control training was more likely to be provided to newly appointed nursing employees as compared to categories such as senior doctors and support services employees. The senior doctors and support service employees in some healthcare facilities are neither provided with infection control training on appointment nor as refresher training. This lack of training may result in in a decline in standards of practice regarding infection control (United Kingdom Office, 2003:142).

A study done in Jamaica revealed a lack of knowledge on TB among hospital employees in Jamaica as well as the necessity for TB workshops and seminars (White, 2011:30). Only 40% of participants scored a good mark on questions relating to TB and only 16% of participants reported attending a TB workshop, seminar or lecture 12 months prior to the study (White, 2011:31). The results of this study however, did not provide sufficient evidence to conclude that low levels of knowledge, poor diagnostic practices and low perception of TB are posing a challenge in the public health sector. (White 2011, 47).

A recent study conducted in three Kwazulu Natal district public hospitals with specialised Multi-Drug Resistant TB (MDR-TB) wards highlighted a need to investigate infection control measures and practices throughout the hospitals and to ensure that all hospital staff members receive infection control training in order to minimise the incidence of occupational exposure to TB (Tudor, 2013:6). In this study the largest category diagnosed with TB were clinical workers (48%, n=53) followed by support service employees (33%, n=36) and employees who previously worked in a TB ward (20%, n =14) in comparison

to employees with no history of working in a TB ward (8%, n=98) (Tudor, 2013: 3). Findings in this study also indicated that employees stationed in non-clinical areas such as the stores department also had a high incidence of TB which suggested that TB transmission occurs throughout the hospitals as employees usually socialise during tea breaks and lunch hours. These results prompted an urgent need for all employees in healthcare facilities to be routinely screened for TB (Tudor, 2013:6).

Effective infection control programmes requires good standards of hygiene, which often involve having the personal discipline to undertake a simple, repetitive task such as washing of hands frequently and thoroughly. In order for people to maintain personal discipline, they need a good standard of facilities such as clean washbasins in working order which will enable them to undertake the task efficiently as part of their normal routine. The MHAI audit conducted by an infection control team in the United Kingdom found that more than half of hand washing facilities had major faults. One in four basins was blocked, taps were faulty, one in ten basins had no soap, rubbish bins to collect paper towels were not available, overflowing, or had faulty lids and there were no paper towels for drying hands (United Kingdom office, 2013:145).

Most healthcare workers who work in high risk areas fail to wash their hands after having contact with each patient. On average, compliance with hand washing is estimated to be about 40% in South Africa. This low level of compliance is a concern considering that hand washing is singly the most important, evidence-supported, intervention for the prevention of transmission of organisms as a consequence of direct contact (Duse, 2005). For example, health facility acquired infections are frequently viewed as a consequence of poor compliance with hand washing techniques (Du Plessis et al., 2010: 25).

Furthermore, screening and surveillance of TB among hospital employees are vital for an effective infection control system but unfortunately, South Africa is challenged by a lack of accurate systems to detect hospital acquired infections. In cases where these systems do exist, standardised definitions of hospital acquired infections are not uniformly applied and therefore make it difficult to draw accurate and consistent conclusions about the data obtained. In addition, it is deemed almost impossible to convince hospital administrators

that healthcare associated infections are common, and that this is due to a lack of accurate data in South African healthcare facilities (Duse, 2005:39).

A qualitative study undertaken in a hospital in Kwazulu Natal highlighted further challenges facing the implementation of infection control programmes in South African hospitals. The challenges emphasised by managers include but are not limited to lack of resources, distrust of infection control measures among employees as well as inconsistent focus on personal protection on an individual level (Zelnick, Gibbs, Loveday, Padayatchi & O'donnell, 2013: 10). In addition, employees pointed out confusion over inconsistency between policy and implementation. For example, policy states that employees should wear a mask all the time but in practise masks had to be conserved to minimise costs (Zelnick et al., 2013:11).

Innovative policies, procedures, practices, and guidance for employees can have a positive impact on the detection, reporting, and management of infections with benefits for patients and employee safety; however this area still needs consideration in South Africa. An infection control audit that was conducted in 10 primary healthcare facilities (PHC) in the Western Cape, aiming at evaluating administrative, environmental, and personal protective control measures to prevent occupational TB as well as infrastructure in these PHC facilities, highlighted a number of discrepancies. Lack of infection control policies, integrated waiting rooms for TB and non-TB patients, poor use of N-95 respirator masks when collecting sputum and poor ventilation in consultation rooms, the sputum collection rooms as well as the X-ray room areas were among the highlighted errors (Mphahlele, Tudor, Van der Walt & Farley, 2012: 4).

Similar findings regarding infection control in TB facilities were found in the Eastern Cape and Northern Cape. A study conducted in 2013 investigated the extent of TB and infection control measures at PHC facilities in three districts namely, Alfred Nzo (Eastern Cape), O.R. Tambo (Eastern Cape) and John Taolo (Northern Cape). The results of this study revealed a lack of infection control committees, infection control policies, unoccupied infection control officer's position, scanty TB screening programmes, a high incidence of TB among employees and a lack of record keeping documents for infection control and

no training provided to employees (Engelbrecht & Van Rensberg, 2013:223). This study publicised a clear and urgent need for further investigation of policy driven interventions, training and support in the Eastern Cape and Northern Cape. Accordingly, the researcher would like to explore and describe knowledge and practices regarding occupational exposure to TB of employees at specialised TB hospitals.

## 1.2. PROBLEM STATEMENT

The researcher has worked in two specialised TB hospitals in the Nelson Mandela Bay Health District (NMBHD) and based on her observations and occupational health internal reports, employees in specialised TB hospital are affected by occupational TB.

It was during her period of employment in one of the hospitals that the researcher observed a number of infection control discrepancies. Although the hospital had an active infection control programme, infection control policy, infection control committee and an infection control officer appointed, there were discrepancies in terms of infection control practices.

Employees only wore protective coats as protection against cold in winter but did not wear protective coats in summer. Due to lack of office space, there were no patient consultation rooms for part-time doctors which led to the nurse's duty rooms being used for consulting patients. The same duty rooms that were used for patient consultations were used as dining rooms during tea and lunch breaks for staff. Even though there were hand washing basins in all wards, employees seldom washed their hands. Furthermore, although patients are regarded as highly infectious during admission, neither of the employees who work in the admission desk wore a mask when admitting patients. General assistants and workshop employees also seldom wore masks even when working in the wards. Lastly, drivers were observed transporting TB patients from the hospital to other facilities without wearing masks.

The aforementioned observations prompted the researcher to review the internal occupational health reports for specialised TB hospitals in the NMBHD. In order to ascertain if occupational exposure to TB is a concern in all specialised TB hospitals in the

NMBMD, the researcher obtained statistics from all three specialised TB hospitals in the NMBHD and reports revealed the following information:

Statistics in the first hospital the researcher worked in showed that a total of eight (4%) out of 180 employees in the hospital were infected with TB during the years 2010 to 2015. Of the eight workers, three were general assistants, three were administrative workers and two were nurses (OHS report, 2015a:3).

Statistics in the second hospital showed that 2 (1.6%) out of 125 employees throughout the hospital were infected with TB during the years 2014 to 2015. One of the employees was a patient vehicle driver and the second one was a general worker (OHS report, 2015b:8).

Statistics in the third hospital showed that seven (3.4%) out of 205 workers throughout the hospital were infected with TB during the years 2010 to 2015. Four were general workers, one an administration worker and the remaining two were nurses (OHS report, 2015c:11).

The above statistics suggest that employees are not adhering to infection control principles to prevent TB. This led the researcher to believe that occupational exposure to TB, especially among employees working in specialised TB facilities in the NMBHD, is a concern. The research question which underpins this study is therefore: what are the knowledge and practices of employees working in specialised TB hospitals regarding occupational exposure to TB.

## 1.3. PURPOSE OF THE STUDY

The purpose of the study was to describe the knowledge and practices of employees working in specialised TB hospitals regarding occupational exposure to TB in order to provide recommendations to hospital and district management that could assist to reduce the prevalence of TB amongst healthcare workers.

## 1.4. OBJECTIVE OF THE STUDY

- To describe knowledge and practices of employees in specialised TB hospitals regarding occupational exposure to TB.

## 1.5. DEFINITION OF KEY CONCEPTS

For the purpose of this study, the following concepts will be defined:

*Occupational TB:* Tuberculosis (TB) is an infectious bacterial disease caused by Mycobacterium TB, which most commonly affects the lungs. It is transferred from person to person via droplets from the throat and lungs of people with active TB disease (WHO, 2016). In this study, occupational TB refers to TB that has been clinically diagnosed via smear sputum, culture or x-ray in a person working in a TB facility.

*Infection control measures:* Infection control measures are prevention and control measures that are in place with the aim to ensure the protection of those who might be vulnerable to acquiring infectious diseases both in the general community and while receiving care in health facilities (WHO, 2016). In this study the term refers to TB prevention and control measures that are directed at preventing TB infection, for example infection control policies as well as practices such as cough etiquette, opening of windows and wearing of protective masks.

*Employees:* A person employed for wages or salary, especially at non-executive level (online Oxford English dictionary, 2016). In this study the term refers to all employees working for specialised TB hospitals irrespective of their position, qualifications or rank.

*Knowledge:* Knowledge are facts, information and skills acquired through experience or education (online Oxford English dictionary, 2016). In this study the term refers to theoretical and practical understanding of TB and infection control.

*Transmission:* To pass something from one place or person to another (online Oxford English dictionary, 2016). In this study the term refers to passing of TB from patients, clothing items such as doctors' white coats, nurses' uniforms, hospital garments, privacy curtains, stethoscopes, bed rails and common hospital surfaces to employees.

*Exposure:* The state of having no protection from something harmful (online Oxford English dictionary, 2016). In this study the term refers to lack of protection from TB in the workplace.

## 1.6. PARADIGMATIC PERSPECTIVE

A paradigmatic perspective is fundamental image of the subject matter within science. It serves to define what should be asked, the questions to be asked, how the questions should be asked as well as the rules to be followed in interpreting the answers obtained (Botma, 2015:40).

TB is a nasocomial infection and the researcher therefore used the chain of infection model as the foundation for the study (Custer, 2012). The focus of the chain of infection model is to create a link between hospital patients, hospital employees and the risk of exposure to occupational infections. In this model the author seeks to explain the chain of events that take place when an infection is being transmitted from a primary host (patients) to a secondary host (employees) via potential sources of infections such as the hospital equipment and hands of employees. This chain of events could possibly be catalysed by lack of knowledge and inappropriate practices regarding infection control and TB (Custer, 2012). The modes of entry include nose, eyes and mouth whereas modes of transmission include transportation vehicles, water, air and direct contact (Custer, 2012). See figure 1.1 below:

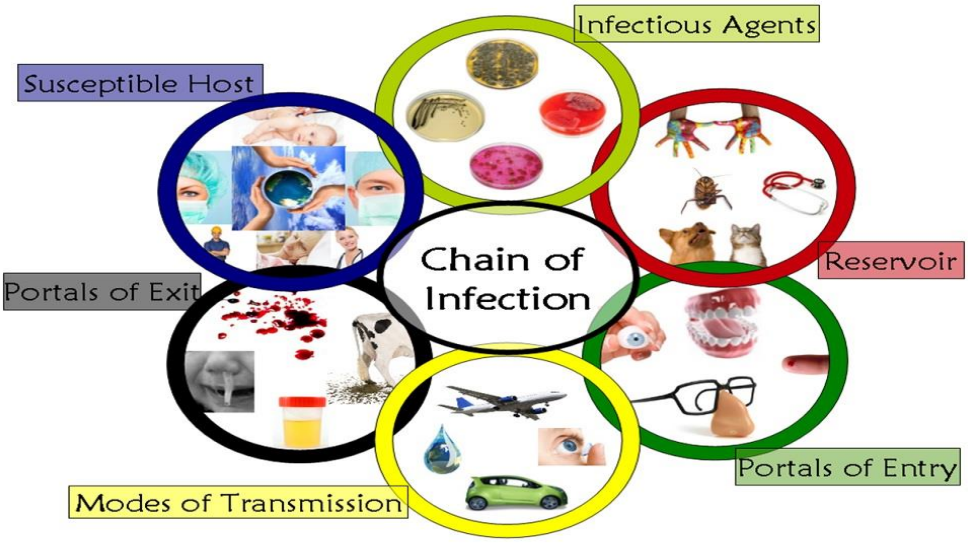


***Figure 1.1: Chain of infection***

## 1.7. RESEARCH DESIGN & METHODOLOGY

A brief description of the research design and methods used in the study is outlined below. More detail regarding the operationalization of the design and methods is outlined in Chapter Three.

### 1.7.1 Research Design

A Research Design is a structured approach followed by the researcher to answer a particular research question. (Ehrlich & Joubert, 2014:78). According to Ehrlich & Joubert (2014), a research design has also been known as “the architecture” of the study, because the choice of a study determines how the population is sampled, data collection measured and the data analysis process completed (Ehrlich & Joubert 2014:78). A quantitative, exploratory, descriptive and contextual study was used in this study. A comprehensive explanation of the research design will be provided in Chapter Three.

### 1.7.2. Research Methods

A research method is the structure or procedure used by the researcher to gather and analyse data relevant to the research question. This section encompasses the description of the research population, sampling methods and techniques, data collection, data analysis as well as the strategies that will ensure validity and reliability of the research study. A thorough explanation of the research design will be provided in Chapter Three.

### 1.7.3. Research Population

Research population refers to the group of people to whom the results will be applicable and the population from which the sample is selected (Botma *et al*, 2015:274). This group of people needs to be defined in respect of person, place, time as well as other factors relevant to the study (Ehrlich & Joubert, 2014:98). The research population for the current study included all employees in three specialised TB hospitals in the NMBHD. There are a total of 253 employees employed in all three specialised TB hospitals in the NMBHD.

### 1.7.4. Sampling Method

Sampling involves selection of specific research participants that will be included in the study. The reason for sample selection is usually because the population group is too large for everyone to participate in the study (Botma, 2015:274).

However in this study the population size was small, therefore the entire population was used.

### 1.7.5. Data Collection

Data collection is a process by which values are obtained for the characteristics of individuals being studied. The data collection includes the data collection tool and data collection method which are briefly outlined in the following sections. See chapter three for details on data collection tool and the data collection process.

#### 1.7.5.1. Data Collection Tool

A data collection tool is an instrument used to obtain values for the characteristics of individuals being studied. The characteristics that are measured are called variables (Ehrlich & Joubert, 2014:111). Ehrlich & Joubert (2014:111) further states that, measurement can be done using a variety of means such as instruments, questioning, documentary sources and direct observations (Ehrlich & Joubert, 2014:112).

In the current study a structured self-administered questionnaire was used to explore and describe knowledge and practices of employees working in specialised TB hospitals regarding occupational exposure to TB (see Annexure A).

#### 1.7.5.2. Data Collection Method

Appointments with the hospital were made prior to the data collection date. Upon arrival at the hospitals, an announcement was made by the respective hospital manager to inform all employees about the researcher's arrival and encouraging them to cooperate. All participants were gathered in one place at the beginning of the data collection period and were informed about the research project and the processes by the researcher. Data

collection was then conducted for the duration of time that the researcher visited the hospitals.

### 1.7.6. Pilot Study

A pilot study is a test run of aspects of the main study and it requires an in-depth look at the questionnaire with the aim of improving its quality (Ehrlich & Joubert, 2014:121). A pilot study was conducted in the current study. Details are outlined in Chapter Three.

### 1.7.7. Data Analysis

According to Botma *et al.* (2015: 146), if a study includes the entire target population, the researcher needs to use descriptive statistics where as if a representative sample is used, the researcher has to use inferential statistics. The researcher used descriptive statistics to describe the population. The steps for processing and analysis of quantitative data will be described in Chapter Three.

## 1.8. QUALITY OF THE RESEARCH

The quality of the research was enhanced by ensuring reliability and validity as well as ethical considerations, which will be outlined in the following sections. Validity is the extent to which a measurement instrument actually measures what it is meant to measure (Ehrlich & Joubert, 2014:9). Validity was ensured in the current study by seeking the advice of experts such as the researcher's supervisors and statistician as well as conducting a literature review. Reliability refers to the degree of similarity of the results obtained when the measurement is repeated on the same subject (Ehrlich & Joubert, 2014:9). The researcher ensured reliability by comparing the results of the pilot study with those of the questionnaire used in the main study. Details are outlined in chapter Three.

## 1.9. SIGNIFICANCE OF THE STUDY

The results of this study may assist in minimising the risk of occupational exposure to TB and other hospital acquired infections in specialised TB hospitals as well as improve the infection control knowledge and practices of their employees.

## 1.10.ETHICAL ISSUES APPLICABLE TO THE STUDY

Ethics is defined as a theory or system of moral values, the specific moral choices to be made by a person and the rules or standards governing the conduct of a person or the members of a profession (The American Heritage dictionary, 2000).

Ethical issues that were adhered to include permission to undertake the study and the study tools. More details will be given in Chapter Three.

## 1.11.DISSEMINATION OF RESULTS

The report of this study will be submitted in partial fulfilment of requirements for the Degree of Health and Welfare Management in the Faculty of Health Sciences at the Nelson Mandela Metropolitan University. A hard copy and electronic copy will be filed at the NMMU library. Additional copies will be sent to the hospital managers of the three hospitals as well as the Nelson Mandela district manager. The report will also be published in a peer reviewed accredited journal.

## 1.12. CHAPTER OUTLINE

So far, the background to the research has been discussed. The research question and objectives were defined in this first chapter. A brief outline of the following chapters is described below.

**Chapter One:** Overview of the study: This chapter provides a background to the study and rationale on the importance of the study.

**Chapter Two:** Literature review: The purpose of the literature review chapter is to review pertinent literature that discusses knowledge and practices of employees in specialised TB hospitals with regard to infection control.

**Chapter Three:** Methodology: The chapter describes the research methodology, study design, setting and population, sampling, study period, data collection, pilot study, data analysis, variables and ethical considerations used in this study. Limitations and ethical considerations are also discussed in this chapter.

**Chapter Four:** Results and discussion: This chapter presents the findings from the data collected in relation to its aims and objectives as well as a discussion of the findings.

**Chapter Five:** Recommendations, Conclusion and Limitations: This constitutes the last chapter of the report and derives conclusions from the research related to the objectives of this study, outlines the limitations and makes recommendations regarding occupational exposure to TB.

## 1.13. CHAPTER SUMMARY

This chapter detailed a brief overview of the study. The problem statement has been formulated and the study objectives outlined. Some of the concepts used in the study were defined and clarified. The paradigmatic perspective used in this study was briefly described. The research design and methods used in this study have been discussed. Ethical considerations were also briefly discussed. The focus of the next chapter will be to provide an overview of tuberculosis and infection control and will take the form of a literature review.

# CHAPTER TWO

# LITERATURE REVIEW

## 2.1. INTRODUCTION

The literature review will discuss the following issues: Introduction to Tuberculosis (TB) disease, Global Epidemiology of TB, Sources of Occupational Infections, Transmission and Prevention of Occupational Infections, Evidence of Poor Infection Control in South African Health Facilities, Factors Affecting Knowledge and Practices of TB as well as the Prevention of TB Infection. The purpose of the literature review chapter is to review pertinent literature that discusses knowledge and practices of employees in specialised TB hospitals with regard to infection control.

## 2.2. INTRODUCTION TO THE TB DISEASE

TB is a communicable disease caused by the bacteria mycobacterium TB in humans, and may affect several organs within the body. The primary site for active TB infection is the lungs (DOH, 2014:10).

There are five closely related mycobacteria responsible for TB, namely mycobacterium TB, mycobacterium bovis, mycobacterium africanum, mycobacterium microti and mycobacterium Canetti. Mycobacterium TB is the most common bacteria among the five. TB is usually spread from person-to-person through the air by droplet nuclei that are produced when a person with pulmonary or laryngeal TB coughs, sneezes, talks or sings. The factors that determine the likelihood of Mycobacterium TB transmission include, the number of organisms expelled into the air, the concentration of organisms in the air, determined by the volume of the space and its ventilation, as well as the length of time an exposed person breathes the contaminated air (DOH, 2014:10).

TB transmission mostly occurs indoors, in dark, poorly ventilated spaces, where droplet nuclei stay airborne for a long time. Direct sunlight kills tubercle bacilli, but they can survive in the dark for several hours. Close contact and prolonged exposure increases the risk of transmission. Once infected, the progression to active disease is dependent

on the immune status of the individual. In people with normal immunity, 90% will not progress and only 10% will develop active disease (DOH, 2014:10).

## 2.3. GLOBAL EPIDEMIOLOGY OF TB

TB is a major global health problem causing ill health among millions of people each year. Approximately 90 million people developed TB and 1.5 million people died from the disease in 2013 (WHO, 2014:17). This TB associated global health problem occurs as a result of inadequate programs for disease control with poorly supervised treatment, multiple drug resistance TB (MDR), co-infection with HIV/AIDS, a rapid rise in the world's population of young adults (Kumar & Clarke;, 2010:930).

In 2013, about 9.0 million people developed TB, 1.5 million died from the disease and 1.1 million of whom were co-infected with HIV/AIDS. The latest WHO global report indicates high global totals for incidences and deaths in 2013 compared to previous years and that reflects an increase in national data use. 56% (n= 5040000) of the 9 million people who developed TB in 2013 were from the South East Asia and Western Pacific region, approximately 25% were from the African region and the remaining 24% and 11% were from India and China, respectively. An estimated 13% of the 9 million who developed TB were co-infected with HIV/AIDS and the African region accounts for about 4 of every 5 TB cases and deaths among people who were HIV positive (WHO; 2014:13).

## 2.4. THE RELATIONSHIP BETWEEN TB AND HIV

People who are HIV positive are more likely to become infected with tuberculosis as compared to HIV negative individuals. This occurs as a result of an inverse relationship that exists between the two conditions. HIV weakens the immune system which reduces the body's ability to fight TB bacteria and therefore increases the risk of TB infection (CDC, 2016:3).

## 2.5. THE PREVALENCE OF HIV AMONG HEALTH WORKERS IN SOUTH AFRICA

The prevalence of HIV is very high among the general population (19.2%) in South Africa (UNAIDS, 2016:8). This high prevalence of HIV/AIDS has impacted greatly on TB in

South African healthcare workers. The high HIV epidemic has increased the patient burden with TB co-infection. The increase in the number of patients with TB has caused an increase in healthcare workers' exposure to occupationally acquired diseases such as TB (Grobler, Mehtar, Adams, Sanni, Van der Walt & Osman, 2016).

A study that was conducted in four South African provinces revealed that 15.7% of all employees in the health sector (both public and private) were living with HIV/AIDS. The public sector alone had an HIV/AIDS prevalence of 16.3% (Shisana, Maluleke, Chauveu & Schwabe, 2004:4).

A study done in two public hospitals in Gauteng province provided further evidence on the challenge of HIV/AIDS to health service delivery in South Africa. The overall HIV prevalence in the tested population was 11.5%. (Connelly, Youssef, Roberts, Tsotetsi, Jordan, DE Silva, Rosen & Bachman; 2007:117). The high prevalence of HIV/AIDS among health employees is disturbing as it exposes employees working with TB infected patients to greater risk of occupational infection.

## 2.6. SOURCES OF OCCUPATIONAL INFECTIONS

TB infection causing organisms are present everywhere on people and in the environment. A large number of occupational infections are caused by organisms normally present on patients' bodies. Other sources of these occupational infections in hospitals include infected employees; people visiting patients who are carrying organisms but are not infected themselves; moist, unclean areas in the hospital environment; dry objects and surfaces that have been contaminated by being in contact with an infected person as well as medical devices (United Kingdom Office, 2003:26).

Employees may be infected by TB outside of their work environment, however they face an additional occupational risk by being exposed to TB infected patients and clothing items such as doctors' white coats, nurses' uniforms, hospital garments, privacy curtains, stethoscopes, bed rails and common hospital surfaces (Prüss *et al.*, 2002:149). It is therefore important to ensure that all hospital employees have adequate knowledge of all

potential sources of infection in order to ensure that appropriate measures are implemented (Prüss *et al.*, 2002:149; United Kingdom office, 2003:27).

## 2.7. TRANSMISSION AND PREVENTION OF OCCUPATIONAL INFECTIONS

According to Dusé (2005:35), transmission of occupational infections such as TB occurs in three ways:

1. Contact spread - This transmission involves skin-to-skin contact and the direct physical transmission of microorganisms from a patient to another or by a healthcare employee. This usually happens during patient examination. Contact spread can also involve indirect contact whereby a healthcare employee comes into contact with non-living objects or surfaces such as bedpans, thermometers, etc. that are contaminated with microbes.
2. Droplet spread - This involves the spread of pathogens by respiratory droplets produced during coughing, sneezing, talking, and respiratory therapy procedures such as bronchoscope.
3. Airborne spread. This occurs when droplets that are less than 5 microns in size are produced by coughing, sneezing, or occurring as a result of procedures such as suctioning.

Infection control measures such as hand washing with either aqueous or non-aqueous hand decontamination agents, wearing of personal protective equipment such as gloves, masks, gowns, and eye protection, safe disposal of waste, appropriate cleaning, sterilisation of equipment and patient-care items as well as appropriate decontamination of linen and the environment are vital to prevent cross transmission of microorganisms from patients to healthcare employees and vice versa. Additionally isolation procedures such as contact isolation, droplet isolation and airborne isolation depending on the mode of transmission of the suspected microorganism, are required (Dusé; 2005:38).

## 2.8. EVIDENCE OF POOR INFECTION CONTROL KNOWLEDGE AND PRACTICES IN SOUTH AFRICAN HEALTH FACILITIES

According to a study done by Farley regarding national infection control of drug-resistant tuberculosis in South African hospitals, the infection control infrastructure varies across facilities with some facilities having almost no infection control while others have a fully functioning prevention program. The lack of attention to infection control practices is particularly worrying as current available research demonstrates transmission between patients and transmission to health workers as well (Farley, Tudor, Mphahlele, Franz, Perrin, Dorman & Van der Walt, 2012:6).

Administrative measures are generally poorly implemented in the majority of facilities in South Africa as infection control practices are poor in some specialised TB facilities despite the availability of an infection control policy. Most facilities have available signage to educate patients and employees about cough hygiene, however the majority of facilities do not separate coughing patients from other patients, and provision of masks or tissues as well as waste bins to coughing patients is not regarded as a necessity. Sputum is collected in almost every ward and there is a shortage of a mobile sputum collection booth. Most facilities do not implement an “outdoor-only visit” policy and when visits do occur inside the wards, most facilities do not offer N-95 masks to visitors (Farley et al, 2012:4; Mphahlele *et al.,* 2012:4).

According to the Centers for Disease *Control* and prevention (CDC), respirators protect healthcare workers and others from inhaling droplet nuclei, while surgical masks reduce the number of droplets being exhaled into the air by persons with infectious TB disease when they breathe, talk, sneeze or cough. It is therefore recommended that healthcare workers and patients suspected or diagnosed with TB wear respirators masks. However, there is a dire shortage of N95 masks at the clinics and some facilities lack knowledge for proper use of N95 masks and surgical masks in South Africa (Mphahlele *et al.*, 2012: 4). Possible reasons for the eluded infection control practices may be due to lack of TB infection control training for professional nurses and CHWs, as well as poor compliance with the levels of infection control prioritised by the WHO. The South African health system has made a significant attempts to provide infection control education and training

to Healthcare workers in TB facilities, however, there is still a dire need for continuing education on care of patients with TB (Farley *et al.,* 2012: 6).

TB facilities in South Africa are maximising the potential for natural ventilation through open windows and doors, but the directional air flow control mechanisms are problematic. A small portion of facilities are utilising circulating fans, extraction system and ultraviolet (UV) germicidal irradiation, however some of these facilities lack a cleaning, monitoring and maintenance plan for such equipment. (Farley *et al.,* 2012: 6).

## 2.9. FACTORS AFFECTING KNOWLEDGE AND PRACTICES OF TB

Having knowledge about standard precautions is the most important factor for compliance with infection control practices. It is commonly known that knowledge is one of potential promoting factors for good practices (Tada, Watanabe & Senpuku, 2014:26). There are several factors influencing knowledge and practices such as age, level of clinical training, work experience and education.

### 2.9.1. Age

A study done at Dr. George Mukhari Academic Hospital in Rarankuwa revealed that participants who were less than 39 years of age obtained a slightly higher score when asked questions about infection control compared to participants above 39 years. The young participants also displayed good practices compared to the above 39 year olds (Mndzebele & Kandolo, 2014:213). Opposing results were however obtained in a study done on dentists in Japan which revealed that participants aged 49 years or younger had a higher adherence in six items of infection control practices namely, wearing masks, gloves, hand pieces, education manuals, vaccine compared to those aged 50 or older. The possible reasons for this outcome was that older participants were experienced and most of the participants in the study were in this age group (Tada *et al.,* 2014:26).

Both notions stated above are in contrast to what was established in a study by Saini, Singh, and Jairus (2011) where it was concluded that there was no difference in the

knowledge of ward assistants of different ages towards infection control. This study suggests that age may not necessarily be a barrier to knowledge. It is however vital to note that knowledge and safer practices on infection control are crucial to all health personnel despite their age and to counter the age influence on knowledge, Health authorities should ensure that training is provided on a continuous basis (Saini *et al*., 2011).

### 2.9.2. Level of Clinical Training

A higher clinical training is associated with a higher level of knowledge. In a descriptive survey done to investigate practices of HCWs with regards to TB infection control measures at Dr. George Mukhari Academic Hospital. The categories known to have a higher level of clinical training such as medical doctors and pharmacists had a higher score in terms of knowledge of infection control, followed by the nurses, then radiographers, and lastly pharmacist-assistants (Mndzebele & Kandolo, 2014:216). These results were similar to those of a study done by Farley *et al.* (2012:6) which established that employees with a higher level of clinical training (e.g. medical doctors and allied health workers) are associated with a greater infection control knowledge and more appropriate attitudes and practices.

Contrary to the two above mentioned studies, a study done in Botswana by Tlale, Frasso, Kgosiele, Selemogo, Mothei, Hapte and Steenhoff (2016) established that among categories with a reasonable level of clinical training such as health education assistants and doctors had the same level of knowledge as other categories. This could be due to a number of factors including suboptimal quality or technique of training or insufficient knowledge retention. (Tlale *et al.*, 2016).

### 2.9.3. Work Experience

It is believed that experienced employees are supposedly more knowledgeable in their work activities and precautions (e.g. infection control) required while performing their duties in comparison to the new appointees. However a study by Mndzebele and Nkandolo (2016:16) established no significant difference in three categories of work experience. This could be attributed to more frequent training organised for the less

experienced or it could be due to self-initiatives to stay informed on TB control measures in the workplace. It is important to note that this is an area that needs further investigation.

### 2.9.4. Education

Education of general practitioners and private sector specialists in South Africa is achieved by continuing medical education (CME) seminars, attendance at scientific meetings, and participation in departmental meetings at medical schools as well as independent sources such as medical circulars, scientific publications and the internet. Medical practitioners and allied healthcare workers in South Africa are required to collect CPD points to keep them up to date with newly developed information, however the level of education regarding infection control is still not optimal despite this system (Duse', 2005:40).

## 2.10. THE PREVENTION OF TB INFECTION

There are two basic principles that govern the main measures that should be taken in order to prevent the spread of TB and other nosocomial infections in healthcare facilities. The first is to separate the infection source from the rest of the hospital and the second is to eliminate any route of transmission (WHO, 2006b:151), which will be outlined as follows:

### 2.10.1. Separation of the Infection Source

The first essential measure that should be taken in preventing the spread of nosocomial infections is isolation of infected patients. Isolation is expensive, labor-intensive, and usually inconvenient or uncomfortable for both patients and health-care personnel. Its implementation should therefore be adapted to the severity of the disease and to the causative agent. Disease-specific precautions should include details of all the measures to be taken in the case of a specific disease caused by a defined organism, for example a private room and wearing of masks or gowns (WHO, 2006b:153).

A study done in a tertiary academic hospital in Cape Town regarding TB infection prevention and control experiences of South African nurses yielded inconsistent results. Participants working in wards with TB routine reported the availability of isolation rooms, curtains around beds and general personal protective equipment such as surgical masks and gloves whereas participants from general wards reported lack of isolation facilities (Sissolak, Marais & Mehta, 2011:4). A study by Engelbrecht et al. (2013:24)revealed similar results where all patients visiting most Primary Health Care (PHC) facilities would sit in the same waiting area and no isolation of coughing patients from others.

### 2.10.2. Eliminating the Route of transmission

In South Africa, the health and safety of all employees at work is covered by the Occupational and Safety Act, No 85 of 1993 (OHSA). The Act stipulates that the employer is obliged to provide as far as is reasonable practicably, a safe workplace without risk to the health of its employees. Through the Hazardous Biological Agents (HBA) regulations, the Act provides guidance on the management of TB in occupational settings, including requirements to conduct health risk assessments every two years in facilities where HBA could be found. There is also a national infection prevention and control policy for TB, MDR-TB and XDR-TB which acts as a guide for management and health workers to help minimise the risk of TB transmission in healthcare facilities where there is a risk of TB transmission (OHSA, 1993:1).

Regarding infection control within institutions, the legislation requires employers to adhere to a three-tier hierarchy of control, namely; administration controls such as availability of an infection control policy and infection control training; personal protective equipment such as protective clothing and hand hygiene utensils as well as engineering controls such as ventilation, filtration and ultraviolet germicidal irradiation (OHSA, 1993:1).

#### 2.10.2.1. Administrative control

Infection control policy and training

Based on the South African OHSA legislation, an employer is required to ensure that employees are adequately and comprehensively informed about both practical aspects and theoretical knowledge regarding the infection control regulations, the potential risk caused by exposure, the measurements to be taken by the employer to protect the employees, the vitality of good housekeeping and personal hygiene measures, employee personal protection, necessity and correct use of safety equipment as well as the necessity for medical surveillance (OHSA, 1993:6). Furthermore, the South African legislation requires an employer to give the instructions in writing, in the form of a policy and to provide details of the procedures expected in sub regulation (OHSA, 1993:6).

#### 2.10.2.2. Personal protective equipment and clothing

The South African OHSA legislation requires that all employees who might be exposed to infections adhere to lawful instructions given by the employer regarding the adherence to instructions about hand hygiene, and personal protective clothing. These factors will be outlined in the following sections.

Hand hygiene

Hands of health-care workers are known to be the most frequent vehicle of nosocomial infections. The primary preventive measure for nosocomial infections is therefore hand hygiene. This refers to both hand washing and hand disinfection. Hand washing with adequate quantities of water and soap for 40 to 60 seconds removes more than 90% of the transient, i.e. superficial, flora including all or most contaminants (WHO, 2006b:156).

Insufficient or very low compliance with handwashing recommendations have been reported from both developed and developing countries. Adherence of healthcare workers to recommended hand hygiene procedures appears to be inconsistent. The mean baseline rates range between 5% and 89% with an overall average of 38.7%. Healthcare workers clean their hands on average from 5 to 42 times per shift and 1.7 to 15.2 times per hour. In addition, the duration of hand cleansing episodes ranged on average from as short as 6.6 seconds to 30 seconds (WHO, 2009:5).

Protective clothing

Protective clothing refers to items such as respirators, protective coats and gloves. Regulations issued by Occupational Health and Safety administration (OHSA) for workplace health and safety requires the use of protective clothing in healthcare settings to protect employees from exposure to blood pathogens, mycobacterium tuberculosis and any potentially infectious diseases (CDC, 2016:4).

These items should be used correctly to prevent the transmission of infections. For example, when a mask is fitted, and used correctly to prevent seal leaks, it greatly reduces the chance that inhaled air will contain infectious bacilli. Even though a surgical mask only filters 50% of the inhaled particles, it theoretically has the equivalent effect of doubling the room ventilation and does so at a fraction of the cost (Bock, Jensen, Miller & Nardell, 2007:112). Furthermore, wearing gloves is recommended when it is anticipated that an employee will be in contact with potentially infectious materials. However, it is important to note that the use of gloves does not replace the need for hand hygiene by either hand rubbing or hand washing and the re-use of gloves is not recommended (WHO, 2009:17). It is recommended that protective coats be disposable. If re-usable coats are used then they need to be cleaned, laundered and stored correctly after use. Protective gowns are used to protect the skin and clothing (CDC, 2016:6).

In a study by Sissolak *et al.* (2011:5) regarding TB infection prevention and control experiences of South African nurses, surgical masks were available in most wards as per their standard operating procedures, however, participants from wards without TB routine, reported that the masks were not used at all in the hospital. Some participants complained about the lack of knowledge on how to use respirators and masks. The above-mentioned study yielded similar results to a study done by Engelbrecht *et al.* (2013:224) in 10 South African PHC facilities, where a serious shortage of N95 respirator masks was reported.

### 2.8.2.3. Engineering controls

Engineering controls are the second line of defense for preventing the spread of TB in health-care settings. These environmental controls include ventilation (natural and mechanical), filtration and ultraviolet germicidal irradiation (WHO, 2008:15).

Ventilation

Controlled natural ventilation is the most common method used by healthcare facilities as it reduces the risk of spreading TB considerably. When fresh air enters a room, it dilutes the concentration of particles in room air. Natural ventilation depends entirely on the opening of doors and windows to bring in air from the outside. Controlled natural ventilation requires routine checks to ensure that doors and windows are maintained in an open position that enhances ventilation. Fans may also assist in distributing the air (WHO, 2008).

Another method of ventilation used to prevent contaminated air from flowing out of the room into adjacent areas in laboratory or health-care facilities, is by maintaining an air pressure difference between the two areas which is known as negative ventilation. Negative ventilation draws air into the room from adjacent areas and exhausts it directly to the outside, removing and diluting any infectious particles (WHO, 2008).

Observations based on a study done by Sissolak *et al.* (2011) regarding TB infection prevention and control experiences of South African nurses at an academic tertiary hospital in Cape Town revealed that the hospital had no designated TB wards. The hospital only had a closed ventilation system with a limited number of rooms having access to natural ventilation, and only five rooms on one medical emergency ward were equipped with negative exhaust ventilation (Sissolak *et al.,* 2011:4).

Ventilation is the most frequently used environmental control, however there are potential supplemental approaches namely, air filtration and ultraviolet germicidal irradiation. Air filters can be very expensive but they can be very useful as they remove at least 99.97% particles. When air filters are installed, an air handling system suitable for adequate

supply and exhaust needs to be designed. Proper installation, testing and meticulous maintenance are important (WHO, 2008:16).

The use of ultraviolet germicidal irradiation to prevent tuberculosis transmission in occupied spaces is controversial, however on the basis of ongoing studies, experience of tuberculosis clinicians as well as microbiologists from the CDC still recommend ultraviolet germicidal irradiation (WHO, 2008).

## 2.11. CHAPTER SUMMARY

Employees working in specialised TB hospitals are at risk of acquiring TB because it an airborne disease. However an active infection control program consisting of availability of infection control administrative controls (infection control policies and trainings), personal protection (protective coats, N95 masks and hand hygiene) as well as environmental control such as ventilation, air filtration and ultraviolet germicidal irradiation can assist to minimise the risk.

Chapter 3 will outline the study design, the setting in which the study was conducted, the study population and sampling strategy used, how data was collected, including the design of the data collection instrument, a detailed data analysis plan and ethical considerations.

# CHAPTER THREE

# METHODOLOGY

## 3.1. INTRODUCTION

This chapter outlines the methodology used to conduct the study. The chapter covers the study design, the setting in which the study was conducted, the study population and sampling strategy used, how data was collected, including the design of the data collection instrument, a detailed data analysis plan and ethical considerations.

## 3.2. AIM OF THE STUDY

To describe the knowledge and practices of employees working in specialised TB hospitals regarding occupational exposure to tuberculosis.

## 3.3. OBJECTIVE OF THE STUDY

The objective for this research study is as follows:

- To describe the knowledge and practices of employees in specialised TB hospitals regarding occupational exposure to TB.

## 3.4. RESEARCH DESIGN

A quantitative, descriptive and contextual design was used in this study, which will be outlined under the following sections.

### 3.4.1. Quantitative Research

Quantitative research is an essential tool for generating knowledge in health science and providing evidence for health education and management. Creswell (2013:18) describes quantitative research design as an approach for testing objective theories by examining the relationship among variables. The variables can be measured by instruments so that numbered data can be analysed using statistical procedures.

In this study, a quantitative research design was used to explore and describe the knowledge and practices of employees in specialised TB hospitals regarding occupational exposure to TB. The researcher utilised a self-administered questionnaire as a tool to obtain data and descriptive statistical methods were used to analyse data. Prior to commencement of the study the research methods and design were developed.

### 3.4.2. Descriptive Research Design

A descriptive design is used to gain more understanding about characteristics within a particular field of study. This type of study may be used to develop a theory, identify a problem, and make judgements or to identify what others in similar situations are doing (Grove & Burns, 2015:215). Furthermore, descriptive design used if the researcher wants to describe the variable of interest as it naturally occurs. It's mostly used when little is known about the topic. (Botma *et al*, 2015:110).

This, research design is appropriate for this study because limited information is available that describes the knowledge and practices of employees working in specialised TB hospitals regarding occupational exposure to TB in the Eastern Cape.

### 3.4.3. Contextual Research Design

Contextual designs are used when one wishes to understand participants and to find out more about their fundamental desires, intents and drives (Holtzblaatt & Beyer, 2015:8). Additionally, contextual design provides insights not only into the kinds of evidence or data used but also how a relationship is conceptualised. For some purposes, context is the method or the interactions it involves (Mason & Dale: 2011:31).

The study was conducted in three specialised TB hospitals in the Eastern Cape Province. The hospital are in the Nelson Mandela Bay Health District. Hospital A is situated in Langa Township, five kilometres from Uitenhage town and provides services to all the townships around Uitenhage town. Hospital B is situated in New Brighton Township, five kilometres away from Port Elizabeth town and provides services to the citizens of New Brighton and its surroundings. Hospital C is situated in Bethelsdorp, twenty five kilometres from Port Elizabeth town. The hospital provides services to the whole Port Elizabeth community

and surrounding areas. The hospitals have approved bed capacities of 350, 333 and 186 respectively. The hospitals are specialised TB hospitals with Hospitals A and B admitting patients diagnosed with normal TB disease whereas Hospital C also admits patients with drug resistant TB types such as MDR TB and XDR TB.

## 3.5. RESEARCH METHODOLOGY

Research methodology is defined as a description of the systematic way problem are solved (Rajasekar, Philominathan & Chinnathambi, 2006:5). The research methodology should include sufficient details to enable another researcher to replicate the investigation (Brink, 2012:199).

### 3.5.1. Research Methods

A research method is the structure or procedure used by the researcher to gather and analyse data relevant to the research question. This section encompasses the description of the research population, sampling methods and techniques, data collection, data analysis as well as the strategies that will ensure validity and reliability of the research study.

### 3.5.2. Research Population

Research population refers to the group of people to whom the results will be applicable and the population from which the sample is selected (Botma *et al.*, 2015:274). This group of people needs to be clearly defined in respect of person, place, time as well as other factors relevant to the study (Ehrlich & Joubert, 2014:98).

The research population for the current study included all employees in specialised TB hospitals in the NMBHD. There are a total of 253 employees employed in all three specialised TB hospitals in the NMBHD. For the purpose of this study the specialised TB hospitals in the NMBHD were named hospital A, B and C. Table 3.1 below illustrates the distribution of employees in specialised TB hospitals in the NMBHD.

***Table 3.1.: Distribution of employees in specialised TB hospitals in the NMBHD***

| | **Hospital A** | **Hospital B** | **Hospital C** | **Total** |
|---|---|---|---|---|
| Population per hospital (N) | 90 | 100 | 63 | 253 |

### 3.5.3 Sampling

In this study, convenience sampling was used for the study. All employees who were on duty at the time when the researcher was at each facility to collect data, were willing to participate and were in line with the inclusion criteria utilised in the study, were asked to participate. The inclusion criteria for this study included all employees who:

- Have worked in one of the specialised TB facilities in the NMBHD for an uninterrupted period of 6 months or longer
- Were able to read and write in English.

Table 3.2 (below) shows the number of participants per hospital who were on duty during the period of data collection, agreed to participate in the study and fulfilled the inclusion criteria. Out of a potential 253 employees, 181 were on duty during the stage of data collection and agreed to willingly participate in the study.

***Table 3.2.: Participants per specialised TB hospital***

| | **Hospital A** | **Hospital B** | **Hospital C** | **Total** |
|---|---|---|---|---|
| Sample per hospital (n) | 64 | 66 | 51 | 181 |

### 3.5.4. Data Collection

Data collection is a process by which values are obtained for the characteristics of individuals being studied (Ehrlich & Joubert, 2014:112). The data collection includes the data collection tool and data collection process, as outlined in the following sections.

#### 3.5.4.1. Data Collection Tool

A questionnaire from a study conducted by Bhebhe, Van Rooyen and Steinberg (2014) (Annexure E) was adapted and used in the current study. This was a structured self-administered questionnaire which assisted the researcher to describe knowledge and

practices of employees working in specialised TB hospitals regarding occupational exposure to TB. Section A of the questionnaire consisted of four demographic questions, two were multiple choice questions, one dichotomous question as well as one question and answer type of question. Section B consisted of seven questions related to knowledge of employees regarding occupational TB and four of the seven were multiple choice questions, one true or false question with eight sub-questions; and two filter and follow on questions. Section C was related to practices of employees regarding occupational to TB and consisted of eight filter and follow on questions, two multiple choice questions as well as one dichotomous-question.

#### 3.5.4.2. Data Collection Process

The process of data collection includes acquiring participants and collecting the data needed for the study. Prior to data collection the researcher obtained ethical clearance from the NMMU research ethics committee (human) (REC-H), ethics number: H16-HEA-NUR-025 (Annexure F). Permission by means of written letters was obtained from the Eastern Cape Department of Health (Annexure G), NMBHD manager and respective specialised TB hospital managers as well as consent of participants (Annexure B) prior to conducting the study.

A self-administered questionnaire was used to collect data and the researcher was the primary data collector. The aforementioned questionnaire was adapted from a questionnaire used in a similar study by Bhebhe, Van Rooyen and Steinberg (2014) (Annexure E). Appointments with the hospitals were made prior to the data collection date. Upon arrival at the hospitals, an announcement was made by the respective hospital manager to inform all employees about the researcher's arrival and encouraging them to cooperate. All participants were gathered in one venue and were informed about the project and the research process was explained to them by the researcher. Data collection was then conducted on the three days that the researcher visited the hospitals. The data collection was conducted on site in each hospital hall after obtaining signed, informed consent from each participant. The participants were requested to answer the questionnaire independently. The questionnaire took approximately 5 to 10 minutes to

complete and the questionnaires were collected on the same day. Questions were asked in English and answers were also written in English to facilitate analysis.

## 3.6 DATA ANALYSIS

The data was analysed using descriptive statistics. Ms Excel and Ms Word were used to analyse the data. The steps for processing the quantitative data are listed below (Botma *et al.*, 2015:147):

- Data capturing: The data capturing was done by the researcher. A spreadsheet was prepared based on the pre-coding done in the data gathering instrument. The labels used for variables were unique but could be easily identified by the researcher. After data capturing has been finished, the original questionnaires were locked away in order to comply with anonymity and confidentiality promised to participants in the consent form.
- Data cleaning: This is the first step involved in processing the data to ensure that the data are clean and free from inconsistencies. It involves scrutinising the questionnaire for errors, gaps or incompleteness. The data was printed and checked against the original documents. The data was cleaned by verifying the data with the responses in all the questionnaires in order to check for omissions, duplication and mistakes.
- Coding: Once the data had been cleaned, the next step was to code the data. Coding of data is aimed at transforming the information into numerical values to facilitate easy analysis. In this study coding of data was performed by the researcher.
- Data analysis: Data was then descriptively analysed by the researcher using MS Excel and Ms Word.

Descriptive statistics were used to summarise and describe data in order to give the reader a visual presentation of data. The data analysed were displayed in the form of tables and graphs.

### 3.6.1. Development of New Variables

#### 3.6.1.1. Knowledge Score

A knowledge score was developed based on the national TB guidelines. Responses were given a score according to whether the answers on the questions about knowledge (Section B of the questionnaire – Annexure A) were correct or not. The questions covered on the questionnaire included knowledge of TB and infection control as well as the infection control policy. The researcher used her own discretion to develop the scoring system. The score allocation for multiple choice questions was done as follows: For every correct answer a score of “2” was given, for every uncertain answers such as “sometimes” or if the participant could select more items per question a score of “1” was given, and a score of “0” was given for the wrong answer. Furthermore, score allocation for true and false questions was done as follows: “Wrong” and “don’t know” answers were given a zero mark and correct answers were each given one mark. The maximum possible score was 21. Respondents were then classified into one of the three following groups:

1. Score ≤ 7 correct answers = poor knowledge
2. Score 8 - 14 correct answers = moderate knowledge
3. Score 15 – 21 correct answers = good knowledge

#### 3.6.1.2. Practice Score

The answers to the ten reported practice questions were coded and scored. Based on the guidelines of infection control practice, a judgement was made by the researcher about whether the answer reflected good or bad practice. Again, for every correct answer a score of “2” was given, a score of “1” for uncertain answers such as “sometimes” or if the participant could select more items per question, and a score of “0” was given for a wrong answer. The maximum possible score was 20. Based on the practice score, participants were put into one of three categories as follows:

1. Score ≤6 correct answers = poor practice
2. Score 7 – 12 correct answers = moderate practice
3. Score 13 – 20 correct answers = good practice

### 3.6.2. Pilot Study

In the current study a structured questionnaire was obtained from a study done by Bhebhe, Van Rooyen and Steinberg (2014) (Annexure E). Adjustments were made to the questionnaire to make it suitable for the current study population. A pilot study was conducted over a week period. The pilot study consisted of five employees from different areas of work, namely administration, admissions, clinical, general assistant and nursing in one of the specialised TB hospitals in the NMBHD. The pilot study was conducted to test the comprehension of the questions. Participants were requested to comment on how the questionnaire can be improved. After the pilot test, there were minor amendments to the questionnaire. The amendments included adding extra options such as “I don’t work with TB patients” and “I don’t know” as these options were absent in the original questionnaire. The results from the pilot study were not included in the analysis.

### 3.6.3. Developing Recommendations

The first step towards development of recommendations is the evaluation of the need (Mind tools, 2016). According to Scotland Intercollegiate Guideline Network (SIGN), recommendations need to be explicitly linked to supporting evidence. In the current study, a literature review was conducted to identify and critically appraise the evidence (SIGN, 2016). However, the recommendations in the current study were primarily based on the study results.

### 3.6.4. Quality of the Research

Before a study can be implemented the measurement instrument needs to be evaluated for validity and reliability. Through this step the researcher ensures that the data obtained is valid and reliable.

### 3.6.5. Validity

Validity is the extent to which a measurement instrument actually measures what it is meant to measure (Ehrlich & Joubert, 2014:9). Details of how validity was ensured in the current study are outlined in the following sub-sections:

#### 3.6.5.1. Face validity

Face validity refers to the extent to which a measure or question makes sense to those knowledgeable about the subject or familiar with the language and culture of participants (Ehrlich & Joubert, 2014:8).

The researcher gave the instrument to her supervisor who is an expert in the field of study in order to assess at face value of the questionnaire. The researcher further ensured face validity by conducting a pilot study and getting feedback from participants on how they perceived the questions and how the questionnaire could be improved. Furthermore, the researcher also included the expert advice of the statistician to assist with formatting of the data collection instrument and lay out of questions.

#### 3.6.5.2. Content validity

Content validity requires that the measure accounts for all the elements of the variable being investigated (Ehrlich & Joubert, 2014:8).

The researcher performed an in depth literature review (Chapter Two) on the study topic before developing the questionnaire. The instrument was reviewed by the researcher's supervisor and statistician who are experts in the field in order to check whether the questionnaire adequately covered the research question.

### 3.6.6. Reliability

Reliability refers to the degree of similarity of the results obtained when the measurement is repeated on the same subject (Ehrlich & Joubert, 2014:9).
The researcher ensured reliability by comparing the results of the pilot study with those of the questionnaire used in the main study.

### 3.6.7. Ethical Considerations

As mentioned in Chapter One, ethical considerations observed in this study are discussed further.

#### 3.6.7.1. Permission to undertake the study

Ethics approval was obtained from the Faculty Postgraduate Studies Committee (FPGSC) at Nelson Mandela Metropolitan University, ethics number: H16-HEA-NUR-025 (Annexure F) as well as from the Eastern Cape Department of Health (Annexure G) and the Chief Executive Officers (CEO) of the three specialised TB hospitals in the NMBHD.

#### 3.6.7.2. Research study tools

The ethics pertaining to the use of the research study tools such as data collection tools and reporting of the research findings were ensured by the researcher by eliminating possible scientific misconduct. There are three ethical principles that were followed in this study, namely respect for people, justice and benefits.

##### 3.6.7.2.1. Respect for people

Respect for people is demonstrated by maintaining anonymity and confidentiality (Botma *et al.,* 2015:17). Anonymity means even the researcher doesn't know whom the responses belong to and confidentiality pertains to how the researcher manages personal information. It is the researcher's duty to ensure that only the researcher have access to the information and that information is not willingly or unintentionally shared with other people unless the person whose confidence it is has consented to sharing the information (Botma *et al.,* 2015:17). According to Botma, anonymity becomes challenging when conducting studies in the environment where the researcher and the participants know each other. The researcher and participants in the current study knew each other, hence the researcher provided a box where all the completed questionnaires were placed by respective participants in no particular order.

Furthermore, in the current study confidentiality was maintained throughout the study as the questionnaires were kept in a locked place and accessed by the researcher only. No names or personal details that could identify the participants were requested. Each questionnaire was assigned a number and the information aggregated for presentation of results so that no individual response could be identified.

#### 3.6.7.2.2. Justice

The principle of justice means that participants should be treated fairly. The researcher has to adhere to the research protocol and information given in the information leaflet. If new interventions or techniques has to be used, new informed consent must be obtained (Botma *et al*, 2015:20). The time it takes to complete the questionnaire must be determined during the pilot study and mentioned in the final information leaflet. Furthermore, it is unjust to gather data without the knowledge of participants because it is violation of privacy. Participants needs to be given contact details where they can lodge a complaint should they feel that their rights are being violated (Botma *et al.,* 2015:21).

In the current study, no new interventions, procedures or techniques not stated in the proposal and information leaflet were performed. Individual written informed consent was obtained from each participant. The time it would take to complete the questionnaire as well as the contact details of the NMMU ethics committee were provided in the information leaflet and the indicated time was adhered to. The participants were informed that their participation was voluntary and that they had the right to terminate their participation any time if they did not want to continue.

## 3.7. CHAPTER SUMMARY

In this chapter the researcher put methodological aspects pertaining to the study into perspectives. The research method employed by the researcher has been unpacked in detail in order to justify the chosen research design. Validity and reliability of the data collection instrument were explained. Ethical considerations that were maintained throughout the study were outlined. In the following chapter the results of the data collected will be discussed and analysed.

# CHAPTER FOUR

# RESULTS AND DISCUSSION

## 4.1. INTRODUCTION

Chapter Three explains the mechanisms used to capture raw data, how it was subsequently sifted and explains what was found to be relevant. Furthermore, the analysis of the data and the type of statistics used is explained.

This chapter outlines the results of the study and brings the research findings to the fore and interprets findings according to the stated objectives. In a nutshell, this chapter summarises data presentation. Furthermore, the results of the study are discussed and compared with previous studies as per the literature.

This chapter is divided into the following sections: the response rate, the demographic profile of the participants, the knowledge of participants about TB and infection control, and the infection control practices of participants.

## 4.2. RESPONSE RATE

The overall response rate was high, Out of a potential 253 employees, 181 were on duty during the stage of data collection and the participants agreed to willingly participate in the study. 35% (n=64) of the participants were from hospital A and 36% (n=66) of the participants were from hospital B. The remainder (29%, n=51) were from hospital C. The sample represents 72% of all workers employed by the three specialised TB hospitals in the NMBHD. The results obtained will be described per section of the questionnaire. The results discussed cover the total number of (N=181) participants across the three hospitals and not per hospital. The aim of the study is not to compare hospitals but rather to obtain the overall knowledge and practices of occupation TB and infection control through the participants.

## 4.3. DEMOGRAPHIC PROFILE OF THE PARTICIPANTS

Section A of the questionnaire included the demographics of the participants. Questions were asked regarding the participant's age, gender, education level as well as their job title. Figures 4.1 to 4.4 show that 35% (n=63) of employees who participated in this study were between the ages of 36 and 45 years and the majority were females (72%, n=131). Over 62% of participants (n=113) attended high school and less than a third of the participants (n=49) had a tertiary qualification. It is important to note that the majority of participants (63%, n=114) had neither clinical nor nursing training.

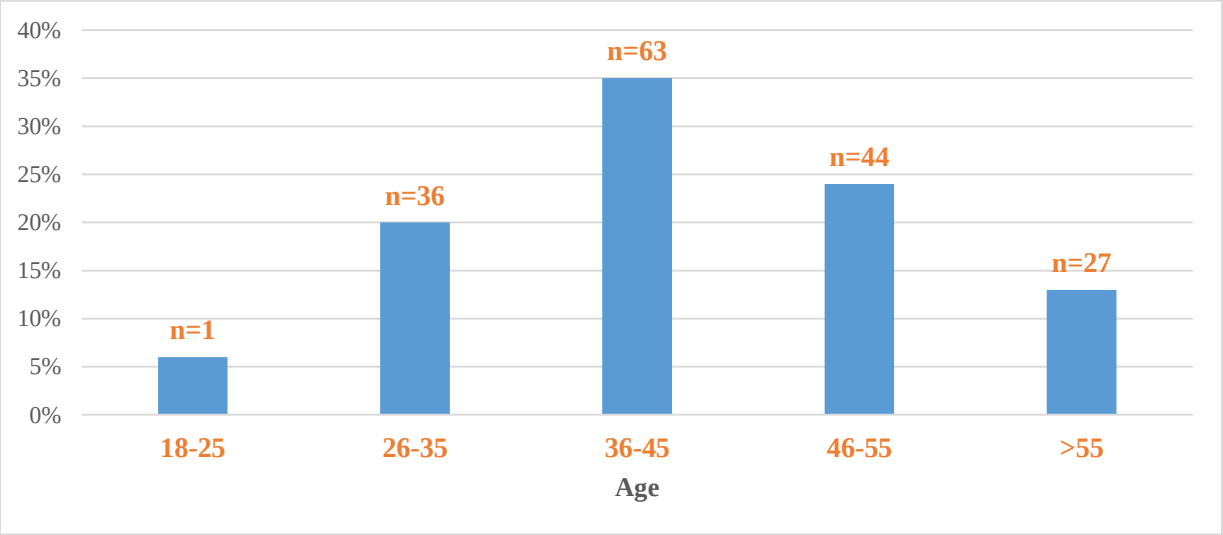


***Figure 4.1: Age distribution of participants (N=181)***

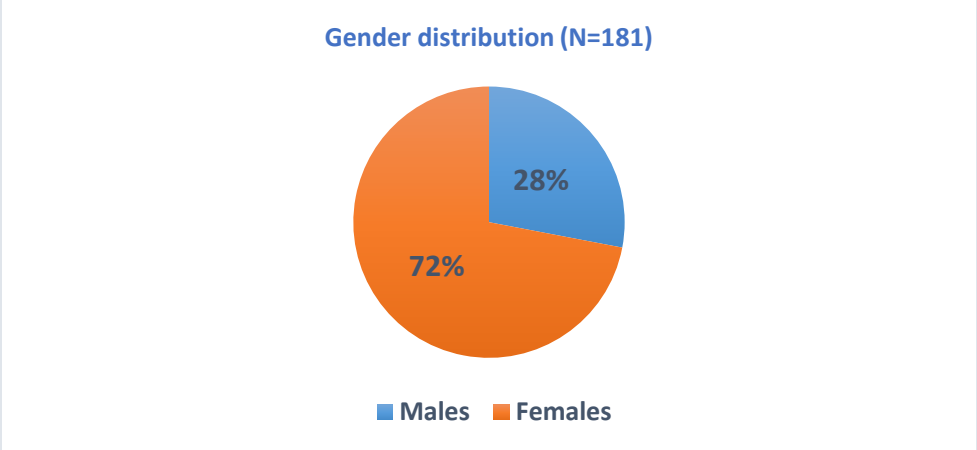


***Figure 4.2: Gender distribution of participants***

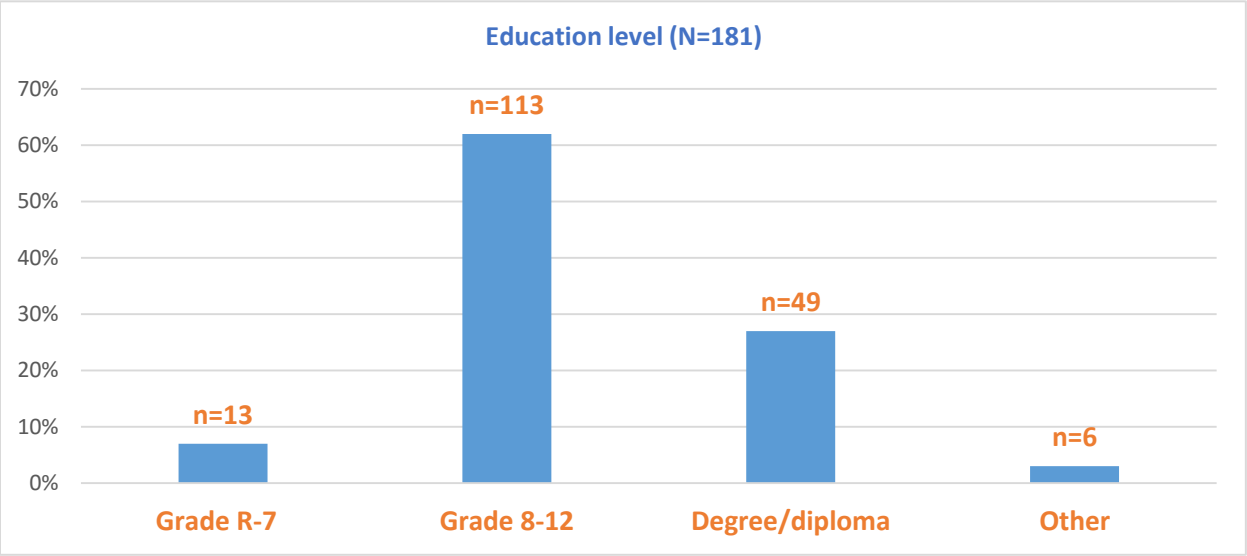


***Figure 4.3: Education level of participants***

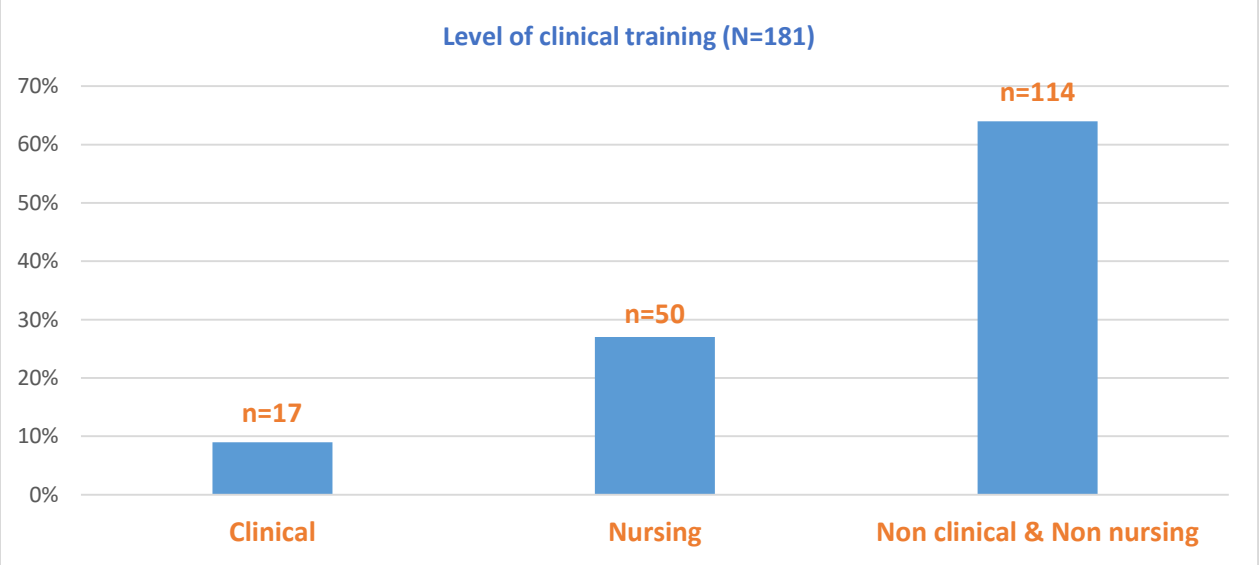


***Figure 4.4: Level of clinical training***

## 4.4. KNOWLEDGE OF THE PARTICIPANTS

Section B of the questionnaire comprises of seven questions regarding the knowledge of employees about occupational TB exposure, including infection control, which is outlined as follows:

### 4.4.1. Knowledge about TB and Occupational TB Exposure

Questions included the entailed route of TB transmission, the symptoms of TB, diagnosis of TB, true and false statements about TB knowledge, infection control and the infection control policy, which will be outlined in the following sections.

#### 4.4.1.1. Route of TB transmission

The first question asked how TB is transmitted from one person to another. Participants had seven options to choose from. The correct response was option number two "airborne". 77% of participants (n=124) answered the question correctly as displayed in figure 4.5.

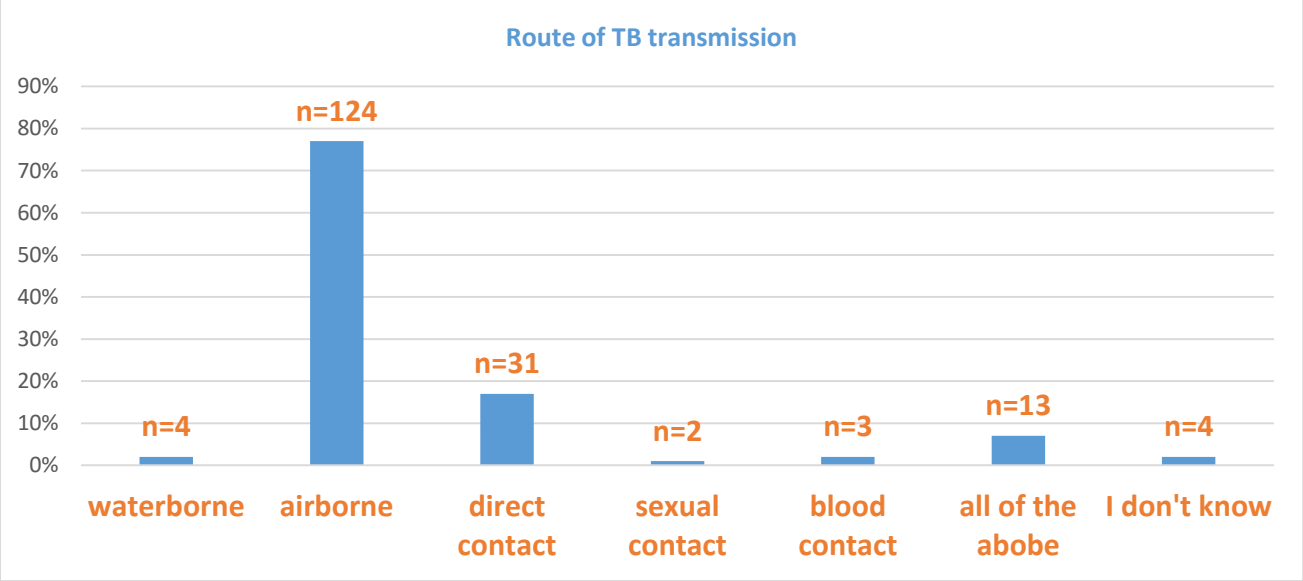


***Figure 4.5. Knowledge of route of TB transmission***

These results are in-line with those of a study by Bhebhe et al. (2014:3) regarding knowledge, attitudes and practices of healthcare workers regarding occupational exposure to tuberculosis. The said study consisted of 129 participants and the results revealed that, the majority of participants (90.7%, n=117) recognised airborne spread as the mode of transmission, whilst 9.3% (n=12) gave other, inappropriate modes of transmission that included waterborne spread and direct contact.

#### 4.4.1.2. Symptoms of TB

The second question required participants to identify the symptoms of TB and participants had eight options to choose from. There were four correct answers to this question, namely cough more than or equal to two weeks, loss of weight, fever and night sweats. The majority of participants: 91% (n=165) correctly identified coughing for equal to two or more weeks as one of the TB symptoms, followed by loss of weight (82%, n=148), and night sweats (77%, n=139). Fever was the least identified symptom by only 35% (n=63) of the participants. 16% (n=29) incorrectly identified blood in stools, oral thrush and chronic diarrhoea as symptoms of TB. See figure 4.6.

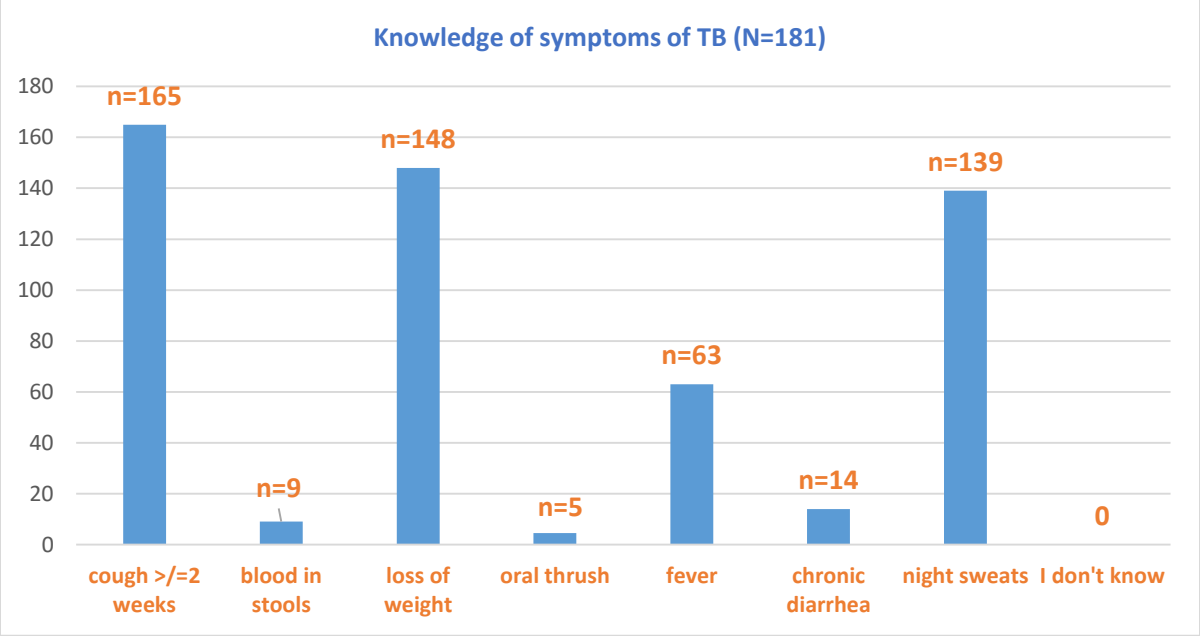


***Figure 4.6: Knowledge of TB symptoms***

Similar results were shown in the aforementioned study by Bhebhe *et al.* (2014:3) where most participants were able to identify constitutional symptoms of TB and only 53.5% (n=69) considered fever to be a symptom of TB. Also in-line with the current study are the results of a survey done by White (2011:31) on knowledge, attitudes and practices on TB among healthcare workers in Kingston & St. Andrew in Jamaica. The said study consisted of 242 participants and the results indicated that a chronic cough lasting for more than three weeks, was amongst the most frequently identified symptoms of active infectious

TB (indicated by 65%, n=160) of participants. White's (2011:31) study further revealed that fever was among the least identified symptoms of active TB (indicated by approximately 50% of participants, n=140).

#### 4.4.1.3. Diagnostic tools for TB

The third question required participants to choose the correct diagnostic tools for tuberculosis and there were six options to choose from. The correct answers were sputum smear and pleural fluid aspirate analysis. The majority of participants: 91% (n=140) correctly identified sputum smear as a diagnostic tool whereas only 12% (n=22) managed to correctly identify pleural fluid aspirate analysis as diagnostic tools for TB as displayed in figure 4.7.

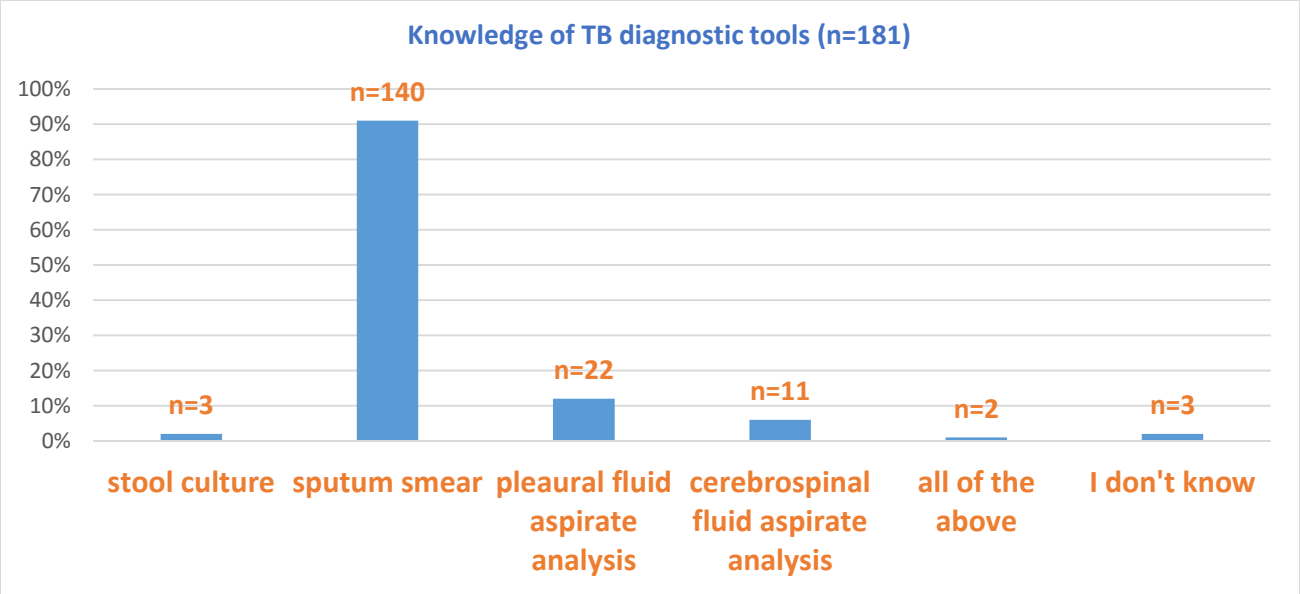


***Figure 4.7 TB diagnostic tools***

In-line with the current study is the study mentioned above done by Bhebhe et al. (2014:3). Where the majority of participants (96%, n=125) managed to only identify sputum examination as a diagnostic tool for tuberculosis.

#### 4.4.1.4. The type of TB that spreads from person to person

The fourth question required participants to choose the type of TB that spreads from one person to another and there were eight options to choose from. The correct answer was "pulmonary TB". The majority (81%, n=146) of participants managed to correctly identify

pulmonary TB as the type of TB that spreads from one person to another, which is outlined in figure 4.8.

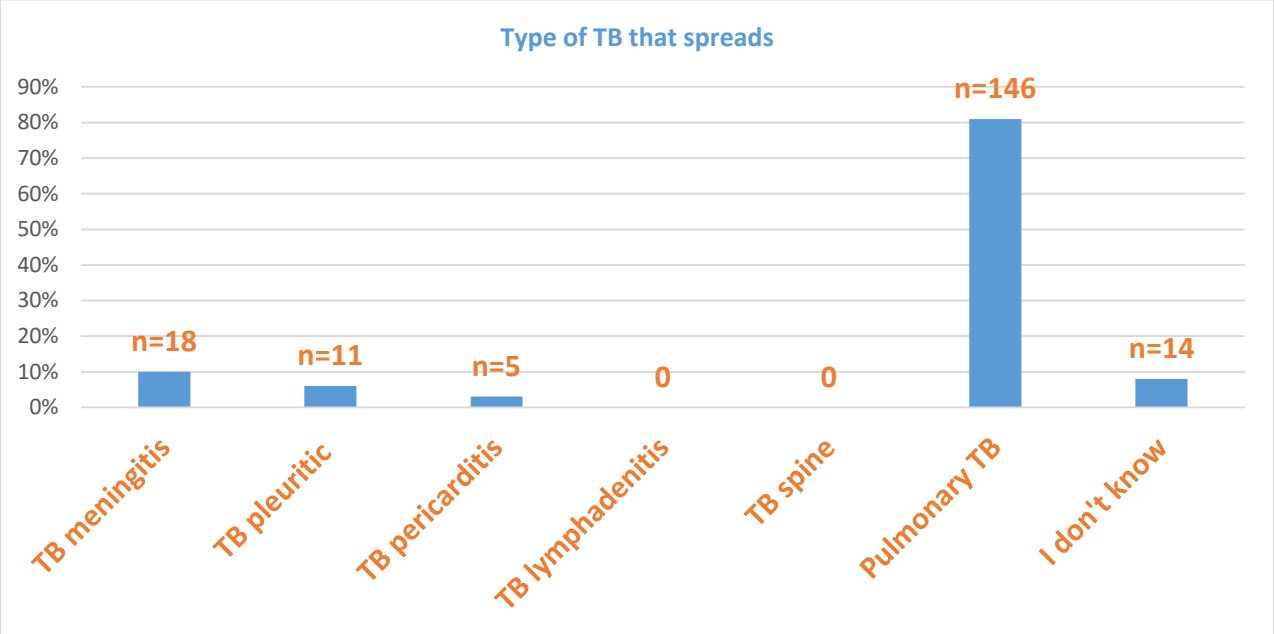


***Figure 4.8: Responses regarding the type of TB that spreads***

Similarly, in Bhebhe *et al.*'s study the majority of participants (94.7%, n=122) identified pulmonary TB as the type of TB that spreads from one person to another (Bhebhe *et al.,* 2014:3).

#### 4.4.1.5. True or false statements regarding knowledge on TB

The fifth question required participants to state whether the given statements regarding TB and infection control were true or false. There were seven questions and the response for all seven questions was "true". The majority of participants (between 93%, n=168 and 85%, n=154) answered most questions correctly in this section. Results are displayed in table 4.1 below.

*Table 4.1: General questions about TB and infection control (n=181)*

| Responses | True | False | Don't know |
|---|---|---|---|
| 1. TB is treated for at least 6 months | 93% | 2% | 5% |
| 2. TB is preventable | 88% | 6% | 6% |
| 3. HIV makes a person more vulnerable to TB. | 85% | 11% | 4% |
| 4. Washing hands with soap reduces the spread of infection. | 88% | 8% | 4% |
| 5. A person needs to wear a protective coat and gloves before entering the isolation ward or area. | 88% | 7% | 5% |
| 6. A person needs to take off the gown and gloves before leaving work area. | 93% | 6% | 1% |
| 7. A person needs to wash hands before leaving the isolation ward or area. | 93% | 6% | 1% |

Different responses to question one on table 4.1 above were obtained in the survey done by White regarding knowledge, attitudes and practices on TB among health care workers in Kingston & St. Andrew, Jamaica. In the said survey, only 25% of participants (n=61) correctly identified the standard length of treatment as 5 – 6 months for a newly diagnosed case of TB. However, in the same study done by White, the majority of participants shared similar views as participants in the current study regarding question two. 71.7% of participants (n=175) were aware that normal pulmonary TB could be prevented by following a specific anti-TB regimen (White, 2011:31).

In-line with the results of question three in table 4.1 above are results by Bhebhe *et al.* where the majority of participants (96.1%, n=123) recognised the link between HIV and TB (Bhebhe *et al.,* 2014:3).

Similar responses to questions four to seven in table 4.1 were displayed in a study done by Peta (2014:27) regarding knowledge, attitudes and practices of general assistants towards infection control at Letaba hospital in Lesotho where, 87% of the participants (n=

89) answered the questions on hand washing correctly. More than half; 60% (n= 58) of participants gave the correct answer to the questions about the use of gloves. A study that yielded slightly different results was that done by Hayeh and Esena (2013:50) regarding infection prevention and control practices among health workers at Ridge Regional Hospital in Accra, Ghana. In the said, study only 41.2% of the participants (n=84) identified hand washing as a means of preventing hospital acquired infections.

Thereafter, additional questions were posed about the infection control policy, which is outlined in the following sections.

### 4.4.2. Knowledge of participants regarding infection control policy

Questions regarding the knowledge of employees regarding infection control policy including knowledge about the availability of the infection control policy and reading of the policy, the storage of the infection control policy as well as receiving training about it is outlined in the following sections.

#### 4.4.2.1. Availability to the infection control policy

An infection control policy needs to be made available to all employees. Furthermore, employees need to be encouraged to read the infection control policy. Table 4.2 below outlines the knowledge about availability of an infection control policy. It is highlighted that over 89% of participants (n=161) knew about the availability of a hospital infection control policy. 81% (n=147) reported to know where it is kept, however only 49% (n=89) of the participants reported to have read it.

*Table 4.2: Availability of infection control policy (n=181)*

| | Yes | No |
|---|---|---|
| Know whether available or not | 78% (n=141) | 22% (n=40) |
| Know where it is kept | 81% (n=147) | 19% (n=34) |
| Have read it | 49% (n=89) | 51% (n=92) |

Similar results to the current study were displayed in a qualitative study done by Sissolak *et al.* (2011:5) regarding TB infection prevention and control experiences of South African

nurses. The study was done in a large tertiary hospital in Cape Town. The results revealed that some participants knew about a TB infection policy at the hospital however, they were unaware of its content (Sissolak *et al.,* 2011:5).

#### 4.4.2.2. Storage of infection control policy

Majority of participants (n=110) reported that the infection control policy is kept in the infection control officer's office instead of having a copy kept in their respective offices or lockers for easy access. (See figure 4.9.)

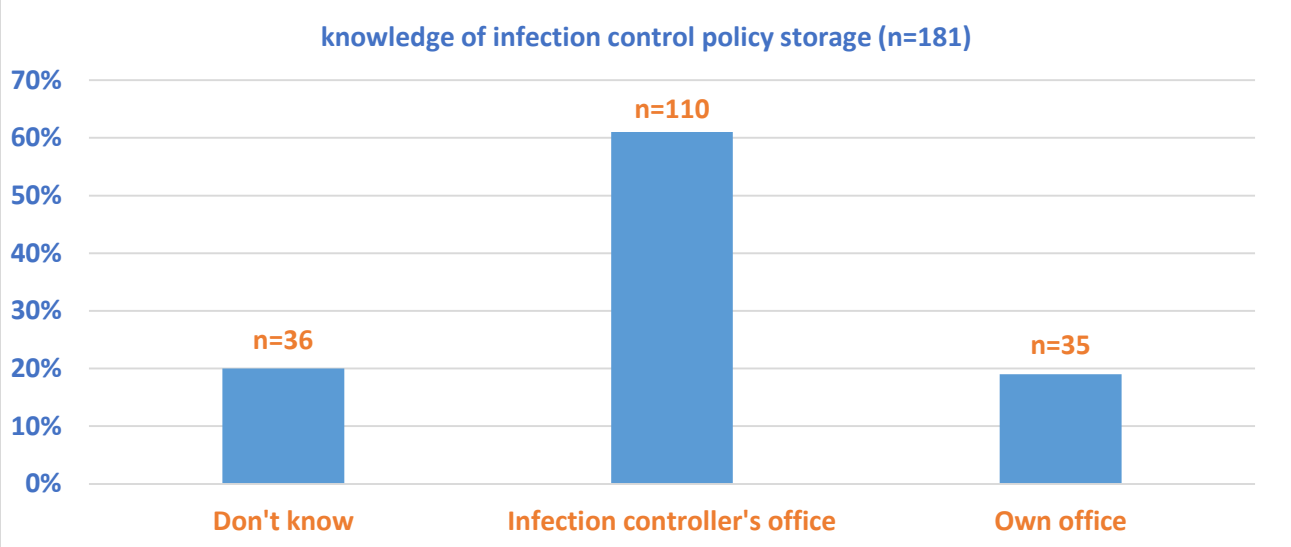


***Figure 4.9: knowledge infection control policy storage***

The aforementioned study by Sissolak *et al.* (2011:5) revealed that the said hospital had a TB infection control policy draft written in English and had seemingly not been made known to all employees. Additionally, the results obtained in a study by Hayeh and Esena (2013:51) regarding infection prevention and control practices among health workers at Ridge Regional Hospital in Accra, Ghana, also revealed that the majority of participants (57.8%, n=118) stated that they knew about the TB infection control protocol or policy but had no access to it.

### 4.4.2.3. Training on infection control policy

In order for the infection policy to be effectively used to combat exposure of occupational TB, training in infection control policy should be provided. Table 4.3 below indicates that slightly more than half of the participants: 58% (n=105) reported having been trained on infection control policy, and 44% of those trained (n= 46) reported having received the training in the past six months.

*Table 4.3: Infection control policy training (n=181)*

| | |
|---|---|
| **Received training on infection control policy** | **58% (n=105)** |
| **Time since last training (n=105)** | |
| **0 to 6 months** | **44% (n = 46)** |
| **7 to 12 months** | **11% (n = 11)** |
| **13 to 24 months** | **13% (n= 14)** |
| **>24 months** | **32% (n= 34)** |

Figure 4.10 shows that the type of training on infection control received, was mostly during orientation and induction (40%; n=42), followed by training received on the job (35% (n=37), and 18% (n=17) received training through a short course.

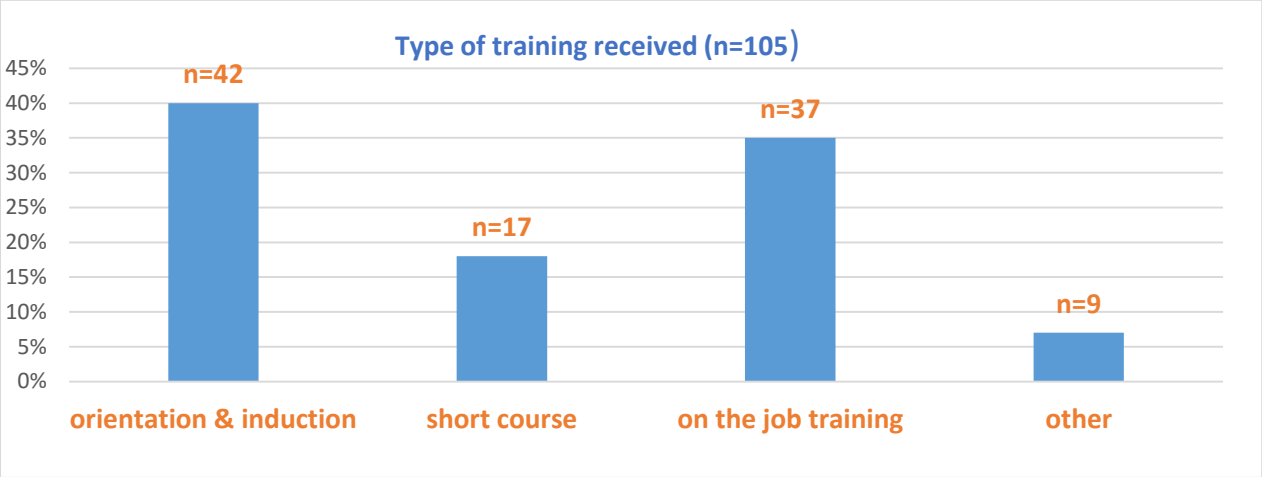


***Figure 4.10: Type of training received by participants***

Despite the number of participants who reported having received training as part of their orientation as well as the on the job training in the current study, literature suggests that

the TB infection control training provided by hospitals, is inadequate (Tshingatano, 2015:149). In a qualitative study that Tshingatano conducted in rural-based hospitals of the Vhembe district, Limpopo, South Africa, the results revealed that hospitals used workshops, in-service education, TB awareness campaigns, teachable moments and TB infection control rounds as methods of providing TB training. When asked about the content of training, participants stated that training only covered aspects such as the spread of TB; signs and symptoms of TB; TB management; how to put on N95 respirators; the use of protective gowns; and how to register patients on the TB suspect register. Neither of the participants mentioned anything specific about infection control (Tshingatano, 2015:149).

### 4.4.3. Overall Knowledge Scores of the Participants

Figure 4.10 presents the overall knowledge scores of the participants regarding their overall knowledge of TB, occupational exposure of TB, including infection control. The results show that participants have a good knowledge of TB (scores between 15 and 21), with an average score of 16. Generally, the majority of participants (69%, n=124) displayed a good knowledge of TB and infection control which means the percentage of participants managed to get 15 out of 21 correct answers. Most of the participants obtained a high score on questions about TB transmission, the symptoms of TB, as well as the general questions about TB and infection control. Participants obtained a low score on questions about TB diagnostic tools. The possible reason for obtaining a low score on this question is the fact that the majority were non-nursing and non-clinical participants.

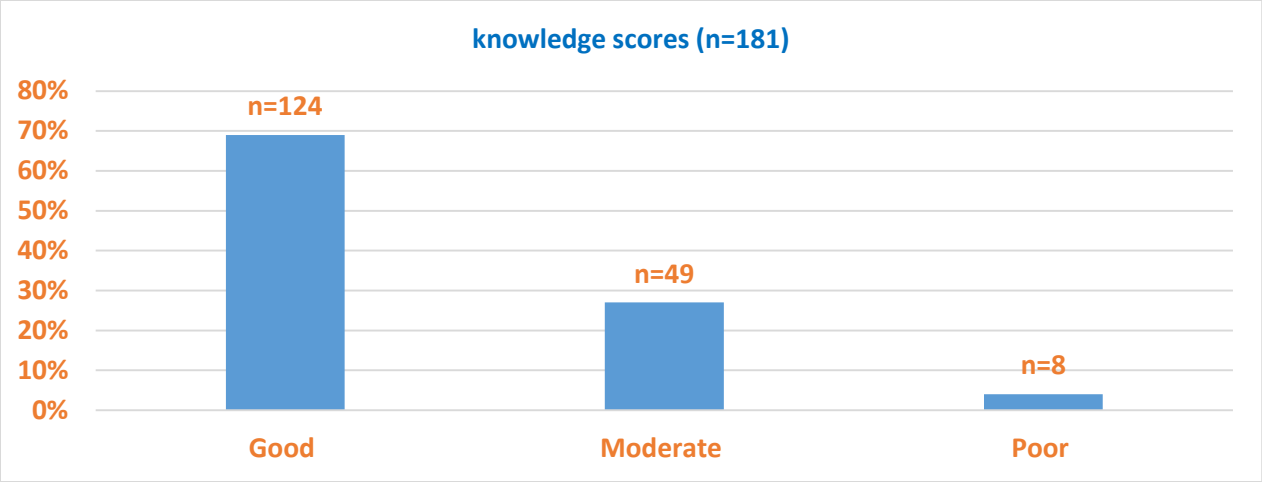


***Figure 4.11: Knowledge scores of participants***

The results of the current study are in-line with those of a study done by Mndzebele and Kandolo. (2014:213) regarding TB control measures among healthcare workers at Dr George Mukhari Academic Hospital in Ga-Rankuwa, South Africa. The said study consisted of 257 participants and the results indicated that the majority of participants (92%, n=197) had a good knowledge of TB control measures, with a mean-knowledge of 89.25%. The contrast was however, in a study done by Hayeh and Esena (2013) regarding infection prevention and control practices among health workers at Ridge Regional Hospital in Accra, Ghana. The said study consisted of 204 participants and the majority of participants (51%, n=102) displayed moderate knowledge. Only 19.6% of participants (n=40) had high knowledge of infection prevention and control practices (Hayeh & Esena, 2013:50). The overall knowledge scores as well as the knowledge per age and education level will be outlined in the following sections:

When scores were compared to the different age categories, the participants who obtained the highest average knowledge scores were between 46 and 55 years (average score =17) and participants who obtained the lowest average knowledge score were between 18 and 25 years as well as between 36 and 45 years (average score =15) as indicated in table 4.4 below.

*Table 4.4: Knowledge scores per age group*

| Age group | Average score |
|---|---|
| 18-25 | 15 |
| 26-35 | 16 |
| 36-45 | 15 |
| 46-55 | 17 |
| >55 | 16 |

There were very few participants aged 18-25 years participating in the current study and even if the numbers were larger, the results may not have shown much of a difference in knowledge level of the different age groups because older participants are supposedly more experienced and the younger participants are still fresh from centers of learning. Literature also supports the view that says, there is supposedly no difference in the knowledge of employees of different ages towards infection control as age is not considered a barrier to knowledge (Saini *et al.,* 2011:). However, different results were displayed by the aforementioned study done by Mndzebele and Kandolo, where age did have an influence in knowledge of TB control measures amongst the participants. Participants who were less than 39 years of age had slightly higher level of good knowledge compared with the above 39 years of age (Mndzebele *et al.,* 2014:213).

When scores were compared per education level, the participants who obtained the highest average knowledge score were in position of a degree or a diploma (average score =19) and participants who obtained the lowest average score only passed high school (average score =12) as indicated in table 4.5 below:

*Table 4.5: Knowledge scores per education level*

| Age group | Average score |
|---|---|
| Grade1-7 | 16 |
| Grade 8-12 | 12 |
| Degree/Diploma | 19 |
| Other | 15 |

Literature, however, tends to support a greater level of health knowledge being associated with a higher level of education or level of clinical training. In a study done in Iran regarding the impact of higher education levels in promoting infection control in dental practitioners. The results of showed that the mean-knowledge of dental practitioners with doctorate degrees was significantly higher than dental practitioners with a diploma (Ebrahimi, Ajami & Razaeian, 2012:427). The study consisted of 63 participants who either had a diploma, a degree, master's degree or a doctorate.

Section C of the questionnaire included questions pertaining to the practices of participants regarding occupational TB and infection control. This is outlined in the following sections.

## 4.5. PRACTICES OF THE PARTICIPANTS

Under this section of the questionnaire, questions were asked regarding the practices of the participants regarding occupational TB and occupational TB exposure, including infection control practices

### 4.5.1 Practices Regarding TB and Occupational TB Exposure

Questions that measured the practices of participants regarding TB and occupational TB exposure included opening of windows, wearing of mask, wearing of protective gown, hand-hygiene, availability of patient consultation rooms, availability of employee dining halls, as well as a question about patient transportation, which will be outlined in the following sections.

#### 4.5.1.1. Opening of windows

Controlled natural ventilation is the most common method used by healthcare facilities and it reduces the risk of spreading TB considerably. When fresh air enters a room, it dilutes the concentration of particles in room air (WHO, 2008). According to the infection control guidelines windows are supposed to be kept open at all times during working hours in specialised TB facilities. The first question with regards to the opening of window was asking if the windows are always kept open in the respective hospitals. The

correct answer for this question was “yes” and 94% of participants (n=170) reported that windows are always opened (see figure 4.11).

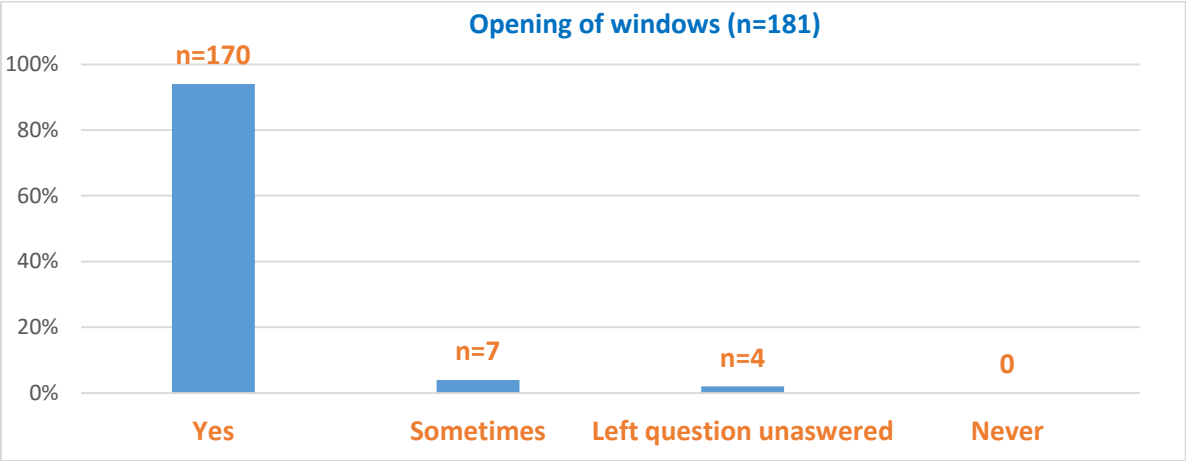


***Figure 4.12: Practices regarding opening of windows***

On the sub-question that asked to state when their institutions open the windows, slightly less than a quarter, 24% of all participants (n=43) reported that windows get opened in the mornings in their respective hospitals (table 4.5).

***Table 4.6: Times windows are opened (n=177)***

| Times for opening of windows | % |
|---|---|
| When there is only one patient in the isolation ward | 1% (n=2) |
| When it’s too hot | 3% (n=5) |
| In the mornings | 24% (n=42) |
| Don’t know | 72% (n=127) |

Reasons for not opening windows all the time included broken handles as well as the absence of a register person willing to open the windows. (See figure 4.12).

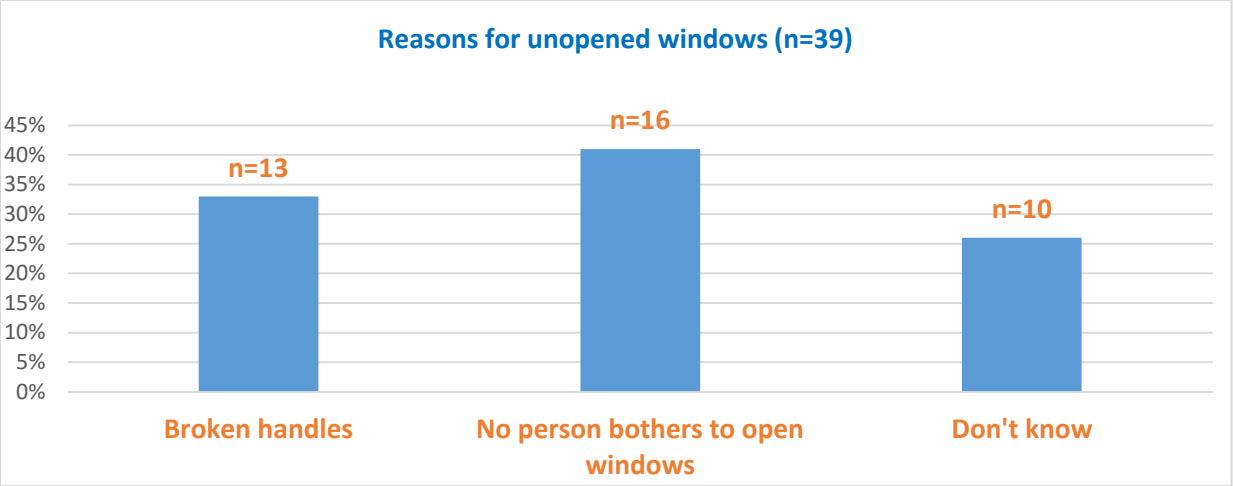


***Figure 4.13: Reasons for un-opened windows***

Despite the large number of participants who indicated that windows are always open in their respective facilities in the current study, literature suggests that opening of windows remains a challenge in health facilities as windows in many facilities have no designated person responsible for opening and closing them. In an audit done in ten PHC facilities in the Western Cape, South Africa, results revealed that none of the 10 facilities had open windows on both sides of consultation rooms for TB patients, nor in the sputum collection rooms or X-ray rooms. Other rooms in the facilities had windows half open or just one window open on one side of the room, resulting in an easy passage of contaminated air to the nursing station (Mphahlele *et al.,* 2012:4).

Furthermore, data collected through researcher observation in a study done in rural public hospitals in Vhembe district regarding factors influencing healthcare workers' implementation of ineffective TB control measures revealed that most participating hospitals of Vhembe district had windows that flipped inwards, which did not permit maximum air entry into the wards. Some windows were not opening to the environment but rather to other wards, thus there was no possible airflow (Tshitangano, 2015:149).

#### 4.5.1.2. Wearing of masks

Employees working in specialised TB hospitals are required to use an N95 respirator mask when working with TB patients. When participants were asked questions regarding

the wearing of a protective mask when in hospital premises, only half of participants (50%, n=91) reported wearing a mask all the time when in the hospital premises (see table 4.6).

*Table 4.7: Wearing of mask in hospital premises (n=181)*

| Wearing of mask all the time | % |
|---|---|
| Yes | 50% (n=91) |
| Sometimes | 45%(n=81) |
| Never | 5%(n=9) |

Question 3.1 required participants to choose the type of mask they use in their respective facilities and the majority participants (n=76%, 137) responded satisfactory by choosing the N95 respirator mask. The remaining 24% (n=43) reported using any available mask (10%, n=18), Paper mask (8%, n=14), surgical mask (5% (n=10) as well as covering the mouth and nose with clothes (n=2) (See figure 4.14).

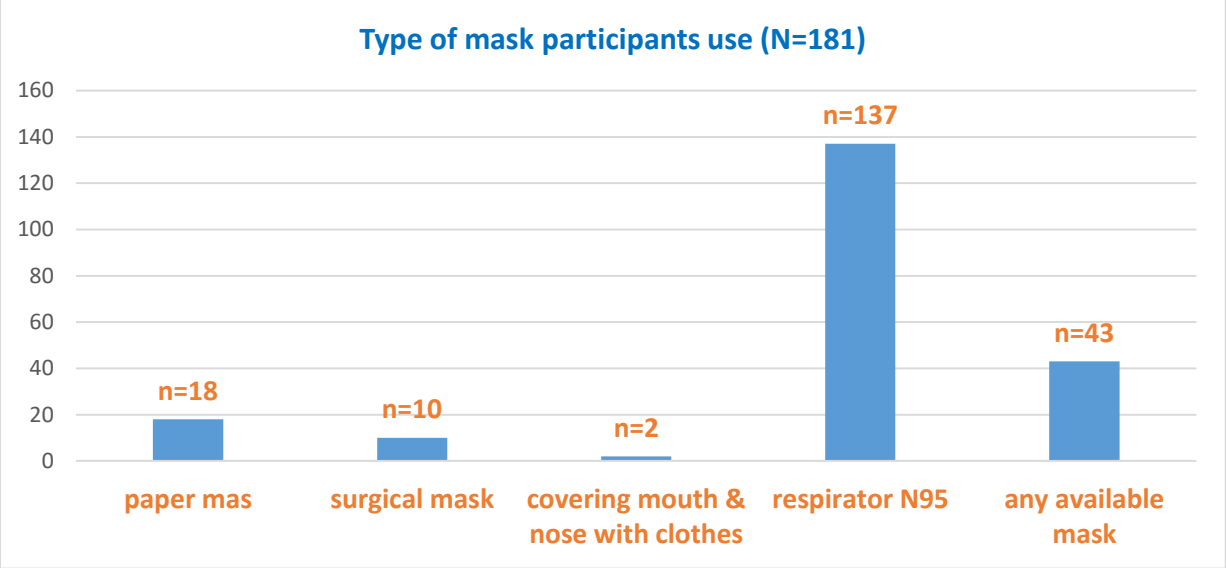


***Figure 4.14: The types of mask participants use***

In another sub-question the participants were asked to specify the exact times they wore a mask, 63% (n=114) reported wearing it when going to the wards. It is important to note that the number of participants who never wear a mask within hospital facilities increased from 5% (n=9) to 27% (49) when asked a follow-up question regarding the wearing of

mask (see table 4.7). This has led the researcher to believe that participants were not truthful in their original responses.

*Table 4.8: Times the mask is worn by participants*

| Time mask is worn | % |
|---|---|
| When going to the wards | 63% (n=114) |
| In the mornings | 4% (n=7/) |
| Before talking to a patient irrespective of time and weather | 5% (n =9) |
| When it's not too hot | 0.5%(n=1) |
| When it's available | 0.5%(n=1) |
| Never | 27% (n=49) |

Reasons for not wearing a mask ranged from not seeing its necessity, it feeling uncomfortable, generating sweat as well as its unavailability (see figure 4.15.).


***Figure 4.15: Reason for not wearing a mask***

In-line with the current study regarding the type of mask used by facilities are the results of an infection control audit done by Mphahlele (2012) in 10 PHC facilities in the Western Cape, South Africa. The audit showed that 80% (n=8) of facilities had N-95 respirators available but health-workers in only two facilities reported using N-95 respirators when collecting sputum.

Similarly, a qualitative study done by Sissolak *et al.* (2011:5) regarding TB infection prevention and control experiences of South African nurses revealed that surgical masks were available in most wards. However, some participants from general wards with no known TB patients admitted that the masks were not used at all for this purpose. The study consisted of 20 participants and most participants indicated a lack of knowledge about the appropriate use of masks and respirators. N95-respirators were available on most of the TB wards, however they were only used in the case of drug-resistance (Sissolak *et al.,* 2011:5). Additionally, a quantitative study by Malangu and Mngomezulu (2015:3) regarding evaluation of TB infection control measures implemented at primary health care facilities in Kwazulu-Natal Province of South Africa revealed that 80% (n=43) of facilities had N95 masks available to staff members.

#### 4.5.1.3. Wearing of a protective gown

These protective gowns are used to protect the skin and clothing (CDC, 2016:6) and according to CDC guidelines, employees working in specialised TB hospitals are supposed to wear a protective gown at all times when working with TB patients. In this question participants were required to state if they wore a protective gown within hospital facilities. More than 30% of participants (n=59) reported wearing a protective gown when working with TB patients, 15% of participants (n=28) reported wearing it "sometimes" whereas 13% (n=23) reported never wearing it at all and the remaining 39% (n=71) reported not working directly with TB patients. (See table 4.8).

***Table 4.9: Wearing of protective gown when in hospital (n=181)***

| Wearing of protective gown in hospital premises | % |
|---|---|
| Yes | 33% (n=60) |
| Sometimes | 15% (n=27) |
| Never | 13% (n=24) |
| don't work directly with patients | 39% (n=70) |

The responses from participants decreased on the follow up questions, as only 29% of the participants (n= 54) specified the times they wear a protective gown. The majority of the participants, 74% (n=40) reported wearing a gown before attending to a patient

irrespective of time whereas the other 26% (n=14) gave responses that ranged from wearing it only on cold days (4%, n=2), only in the mornings (11%, n= 6) or only when they remembered (11%, n=6) (See table 4.8).

*Table 4.10: Times a protective gown is worn (n=54)*

| Times a protective gown is worn | % (n) |
|---|---|
| Only on cold days | 4% (n=2) |
| Only in the mornings | 11%(n=6) |
| Before attending to a patient irrespective of time and weather | 74%(n=40) |
| When I remembered | 11%(n=6) |

Only 17% (n=31) gave reasons for not wearing a protective gown. The shared reasons ranged from not seeing the necessity to do so (42%, n=13), not liking the gown (10%, n=3), its uncomfortable 29%, (n=9) as well as sweating (19%, n=6) (see figure 4.16).

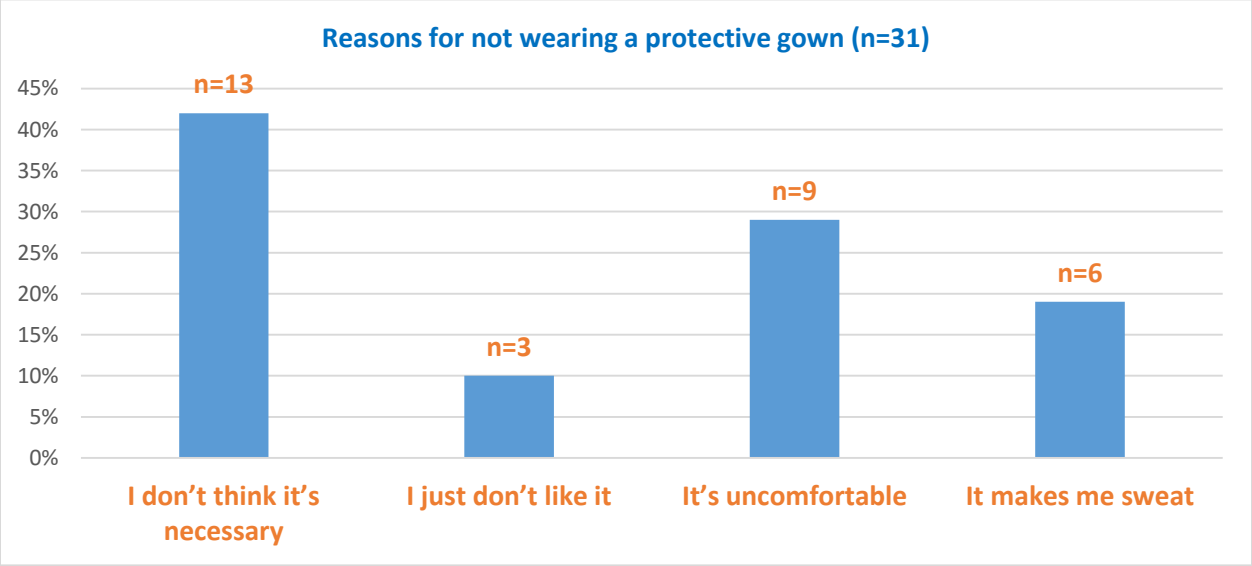


***Figure.4.16: Reasons for not wearing protective gown***

These current results are different to those obtained in a study done by Ebrahimi *et al.* (2014:427) regarding the impact of longer years of practice and higher education levels

in promoting infection control in dental practitioners. The participants (n=63) from the above study often wore gloves, protective gowns and masks. Additionally, in a survey done by White (2011:37) on the knowledge, attitudes and practices on TB among health care workers in Jamaica, only 35% of participants that answered the question (n=86) reported wearing personal protective clothing. The said study consisted of 427 participants.

#### 4.5.1.4. Hand washing

According to WHO guidelines, hand washing with adequate quantities of water and soap for 40 to 60 seconds removes more than 90% of all contaminants. Participants were asked questions regarding hand-hygiene. The majority of participants (78%, n=141) reported washing their hands after taking care of TB patients, 1.5% of participants (n=3) confessed to washing hands "sometimes", only 0.5% of participants (n=1) admitted to never washing hands and the remaining 20% (n=36) left the question unanswered (see table 4.10).

*Table 4.11: Washing of hands (n=181)*

| Hand washing after taking care of TB patients | % |
|---|---|
| Yes | 78%(n=141) |
| Sometimes | 1.5%(n=3) |
| Never | 0.5%(n=1) |
| Left question unanswered | 20%(n=36) |

Of the 40 participants who seldom or never wash hands, only 85% (n=34) answered the follow up question. Reasons for not washing hands ranged from using a sanitiser instead of washing hands (43%, n=17), wearing gloves (43%, n=17), not thinking it is necessary to do so (n=4) as well as forgetting (4% n=2) as displayed in see figure 4.17.


***Figure 4.17: Reasons for not washing hands***

Despite the huge number of participants who reported washing of hands after taking care of TB patients in the current study, literature suggests an insufficient or very low compliance with hand washing recommendations in both developed and developing countries (WHO, 2006a:156).

However, adherence of healthcare workers to recommended hand hygiene procedures has been reported as inconsistent. Healthcare workers clean their hands on average from 5 to 42 times per shift and 1.7–15.2 times per hour. In addition, the duration of hand cleansing episodes ranged on average from as short as 6.6 seconds to 30 seconds (WHO, 2009:5).

#### 4.5.1.5. Availability of patient consultation room

People with pulmonary TB release the bacteria into the air surrounding the area where they cough, sneeze or talk or otherwise disperse droplets that contain mycobacterium TB. These droplets can dry into tiny particles and remain suspended in the air for long periods of time (CDC, 2016). It is important for specialised hospitals to have patient consultation rooms to minimise the amount of time employees spend in infected areas (wards). Participants were asked about the availability of patient consultation rooms in their respective facilities. More than 50% of participants (n=97) reported availability of patient consultation rooms in their respective hospitals, 24% (n=44) were unsure and 8% (n=15) left the question unanswered (see table 4.10).

*Table 4.12: Availability of patient consultation rooms (n=181)*

| Patient consultation rooms available | % (n) |
|---|---|
| Yes | 54% (n=98) |
| No | 14% (n=25) |
| Not sure | 24% (n=44) |
| Left question unanswered | 8% (n=14) |

The 16% (n=29) who denied availability of patient consultation rooms in their hospitals reported that patients are consulted in the ward. 17% (n=31) reported on the follow up question that the nurses duty room was being used as a consultation room, 20% reported the doctor's office was being used as a consultation room (n=37) and the rest admitted to not knowing or left the question unanswered (n= 84) (see figure 4.18).

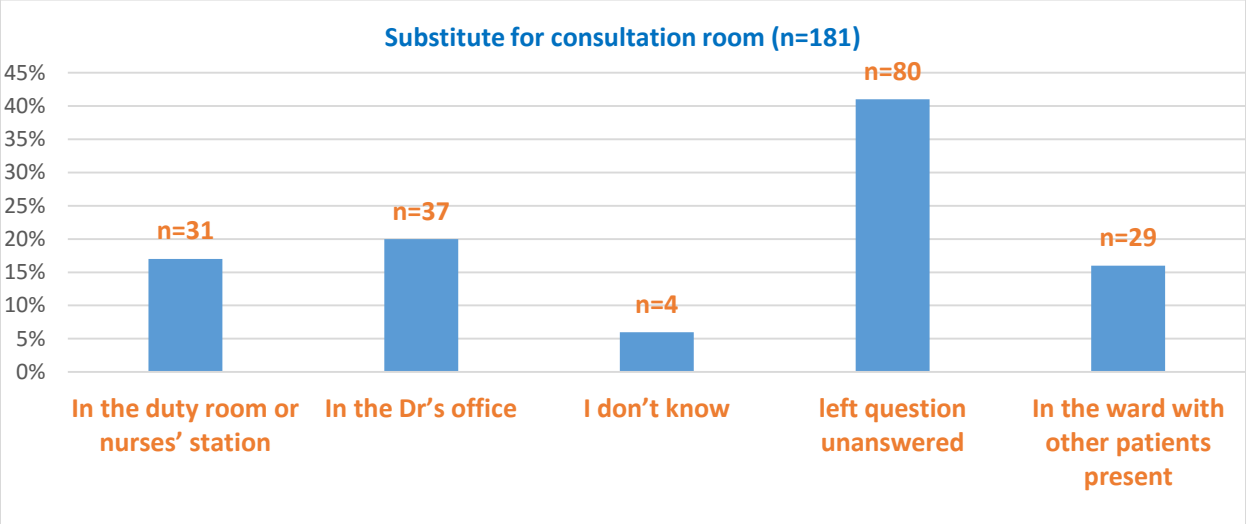


***Figure 4.18: Substitutes for patient consultation rooms***

### 4.5.1.6. Availability of staff dining hall

In section 4.5.1.6 above, it is mentioned that particles can remain in the air for long periods of time and that is the reason why it is important for specialised hospitals to have staff dining halls to prevent the employees' food from being contaminated with TB bacteria. Participants were further asked about the availability of staff dining halls in their respective facilities. More than half; of participants (67%, n=121) reported that there is a staff dining

hall in their respective hospitals, 27% (n=44) denied the presence of a dining hall, 3% (n=6) were unsure whereas another 3% (n=6) left the question unanswered (see table 4.12).

*Table 4.13: Availability of staff dining hall (n=121)*

| Staff dining hall available | % (n) |
|---|---|
| Yes | 67% (n=121) |
| No | 27% (n=44) |
| Not sure | 3% (n=6) |
| Left question unanswered | 3% (n=6) |

Of the 121 participants who reported availability of a dining hall, only 52% (n=64) reported using the dining hall during tea and lunch breaks (see table 4.13).

*Table 4.14: Participants who utilise the staff dining hall*

| participants who utilise the staff dining hall | % |
|---|---|
| Yes | 52% (n=64) |
| No | 48% (n=57) |

The rest of the participants, including those who denied the presence of a dining hall in their respective hospitals reported using different locations during tea and lunch breaks. The locations included any place they felt comfortable (43%, n=78), (the nurses' duty room or work station (32%, n=58), or their office (25%, n=45) (see figure 4.19).

There were no studies found regarding occupational TB and staff dining halls. However an infection control audit done in 10 PHC facilities in the Western Cape Province, South Africa by Mphahlele *et al.* (2012:4) covered a number of infection controls including infrastructure. In the above study, all but one PHC facility had a nurse's station in the TB clinic with no or limited infection control precautions which could be a serious risk to healthcare workers if the air flows from patient's rooms to the nurses' station.


***Figure 4.19: Substitutes for staff dining halls***

#### 4.5.1.7. Patient transportation

TB infection requires prolonged sharing of air space with a person actively spreading TB into the area (CDC, 2016) and that is why it is important for patient transportation vehicles to have an isolation glass to separate the infected individual (patient) from uninfected individual (driver and escort nurse). It is therefore recommended that in cases whereby there is no isolation glass, the patient, the driver and the escort nurse all wear a N95 respirator mask during the journey to minimise the risk of occupational exposure to TB. The findings regarding occupational exposure to TB and patient transportation are outlined in the next sections.

##### 4.5.1.7.1. Types of vehicles used for patient transportation

Participants were asked about the types of vehicles used for patient transportation in their respective facilities. The types of vehicles that are used by the hospitals range from quantums (n=115), bakkies (n=16), cars (n=76) and buses (n=17) (see figure 4.20). Participants were allowed to choose more than one type of vehicle and therefore the numbers shown on the bar chart below represent the number of respondents, not the percentages.

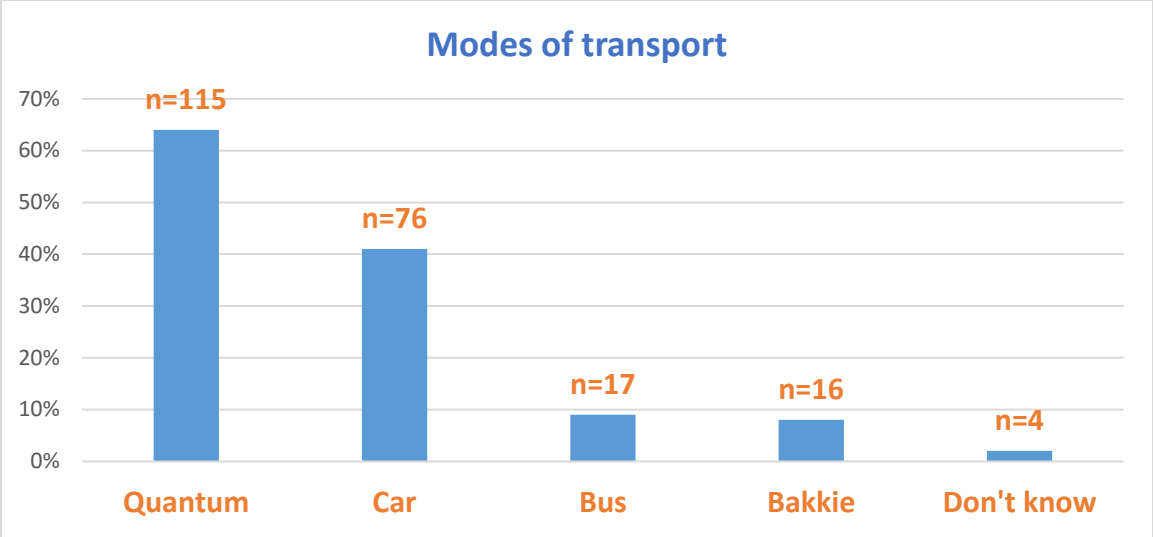


***Figure 4.20: Vehicles used for patient transportation***

#### 4.5.1.7.2. Availability of an isolation glass in the patient transportation vehicles

Participants were asked about the availability of an isolation glass in the patient transportation vehicles used by their respective facilities. The majority; of participants (76%, n=138) reported an absence of isolation glass in the modes of transport used by their respective facilities. Only 20% (n=36) reported the presence of an isolation glass in the vehicles used by their hospitals. The remaining 4% (n=7) admitted to not knowing whether there was an isolation glass or not. (See table 4.13).

***Table 4.15: Presence of isolation glass in patient transportation vehicles***

| Isolation glass present | % |
|---|---|
| Yes | 20% (n=36) |
| No | 76%(n=138) |
| Don't know | 4%(n=7) |

#### 4.5.1.7.3. Person wearing a mask during patient transportation

Lastly, participants were asked to specify the person who wears a mask during patient transportation. The majority of participants (66%, n=119) reported that both the driver and patient wear a mask during patient transportation, followed by the patient (21%, n=38), or the driver (3%%, n=6). Only 10% (n=18) of participants did not know who wears a mask during the transportation of patients (see figure 4.21).

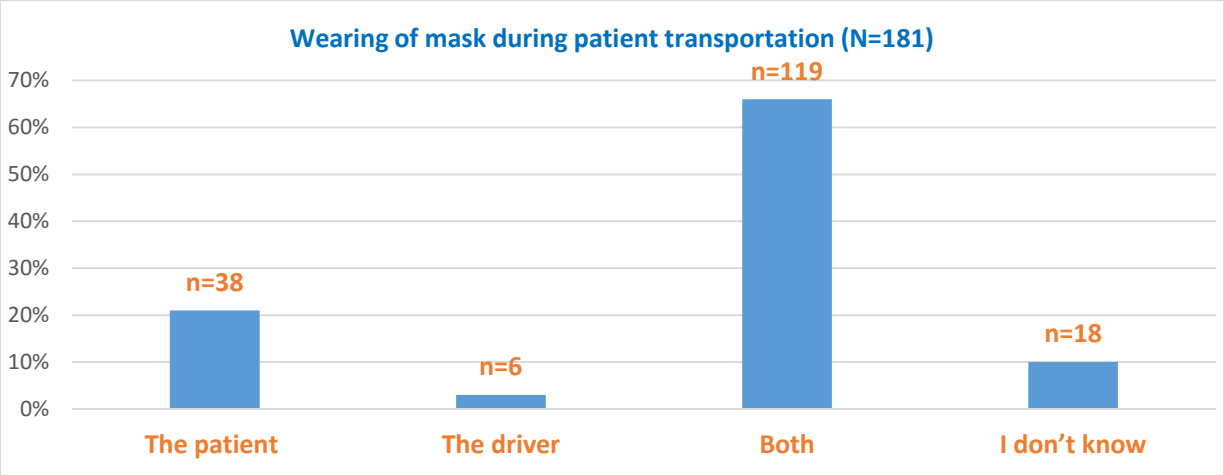


***Figure 4.21: Wearing of mask during patient transportation***

The majority of participants in the current study reported that there is no isolation glass in their respective patient transportation vehicles which means, the driver, the escort nurse and the patient sits in the same breathing space the entire journey. This therefore puts both the driver and the escort nurse at risk for acquiring TB.

No studies were found on isolation glass in patient transportation specifically, however, studies done regarding public transportation and the spread of TB revealed overwhelmingly high results. In a study done by Zamudio and Brewer (2015:5) regarding public transportation and TB transmission in a high incident setting in Peru, using buses or minibuses to work was independently associated with having active TB. Regular bus or minibus users were almost 12 times more likely to have TB than non-users. Similarly, a study done by Furukawa, Mendoza-Ticona, Alarcon-Villaverde, Montejo, Micek and Zunt (2016:1193) regarding the association between public transportation and active TB in Lima, Peru also revealed an association between public transport commuting and TB infection. However the association in the above study was not significant. Additionally, a study done by Feske, Teer, Musse and Graviss (2011:18) regarding public transportation as a risk factor for TB transmission in Houston, United States of America also revealed an association between the spread of TB and public transportation.

The overall practice scores as well as the practices as per age category will be outlined in the following sections.

### 4.5.2 Overall Practice Scores of the Participants

The results show that the majority of participants practice infection control moderately with an average score of 8, scores thus ranging 7 – 12 correctly answered. Only 10% of participants reported good infection control practices. The question that most participants provided the most satisfactory answers is the question regarding the opening of windows and the wearing of the N95 respirator mask. The question that participants the unsatisfactorily answered the most is the question regarding the availability of an isolation glass in patient transportation vehicles.

As stated above, the majority of employees obtained a moderate score for infection control practice. The questionnaire for the current study did not ask about years of experience, however, all the employees were expected to have displayed good practice of infection control in view of the fact that all three hospitals reported having an infection control officer position occupied. Part of the infection control officers duties are to conduct in-service training for employees and to update them on new developments regarding infection control. Furthermore, participants obtained a good score for questions about knowledge of infection control and are therefore expected to display good practice of infection control. It is however, important to note that only 58% of participants are trained on infection control policy and that could have impacted the total practice score obtained.

These results are in-line with those of a study done by Peta (2014:29) regarding knowledge, attitudes and practices of general assistants towards infection control at Letaba hospital. The said study revealed that the majority of employees 57% (n=55) were found to practice infection control moderately whilst only 34% (n=32) of participants displayed good infection control practices. Similarly, in a study by Bhebhe et al. (2011:3), 36.4% (n=49) of the participants self-reported inappropriate practices. Additionally, the results of a study done by Mndzebele and Kandolo (2014:214) regarding TB control measures among healthcare workers at Dr George Mukhari Academic Hospital, Ga-

Rankuwa, South Africa indicate that only 28% (n=72) of the participants had good practices related to TB control measures.

When scores were compared per age group, the participants who obtained the highest average practice score were between 36 and 45 years as well as more than 55 years (average score =12/20 respectively) and the rest of the age groups obtained an average practice score of 11/20 respectively. See table 4.15 below.

***Table 4.16: Practice scores per age group***

| Age group | Average score |
|---|---|
| 18-25 | 11 |
| 26-35 | 11 |
| 36-45 | 12 |
| 46-55 | 11 |
| >55 | 12 |

These results are in-line with those of Mndzebele and Kandolo (2014:214) research regarding TB control measures among healthcare workers at Dr George Mukhari Academic Hospital, Ga-Rankuwa, South Africa. In the above study, most participants who obtained a high score with regards to infection control practices were above 39 years of age. On a nutshell, older participants (>39 years) in Mndzebele & Kandolo's study displayed good infection control practices compared to the younger participants (<39 years) and this could be due to the different years of experience.

When scores were compared to education level, the participants who obtained the highest average practice score were those who had passed either grades 1 to 7 (average score=19/21). Participants who obtained the lowest average practice score passed high school as well as those in position of a degree or diploma (average score=9/21 respectively) as indicated in table 4.16 below. The numbers on graph indicate average scores not percentages.

*Table 4.17: Practice scores per education level*

| Education level | Average score |
|---|---|
| Grade1-7 | 9 |
| Grade 8-12 | 9 |
| Degree/Diploma | 12 |
| other | 10 |

The current study is in line with literature which tends to support a greater level of health knowledge being associated with a higher level of education or level of clinical training. In a study done in Iran regarding the impact of longer years of practice and higher education levels in promoting infection control in dental practitioners, the results of the study showed that dental practitioners with doctorate degrees were more likely to adhere to good infection control practices such as wearing of mask, protective gown and gloves (Ebrahimi, Ajami & Razaeian, 2012:427). The study consisted of 63 participants all of which had either a diploma, a degree, master's degree or a doctorate.

## 4.6. CHAPTER SUMMARY

In this chapter the results of the demographic profile of the participants were outlined, the knowledge and practices of employees regarding TB and occupational exposure to TB were presented, as well as findings related to infection control. The findings were discussed with existing studies that were previously conducted pertaining to the knowledge and practices of TB and infection control. Possible reasons for the knowledge and practice scores obtained have been explained. Chapter Five outlines the conclusions made by the researcher, the limitations of the study as well as the recommendations made to assist in improving the knowledge and practices of employees in specialised TB hospitals regarding occupational exposure TB (Ebrahimi *et al.,* 2012:427).

# CHAPTER FIVE

# RECOMMENDATIONS, CONCLUSIONS AND LIMITATIONS

## 5.1. INTRODUCTION

This chapter outlines the conclusions made by the researcher pertaining to the results of the study; limitations of the study as well as recommendations made by the researcher to assist improve knowledge and practices of infection control in specialised TB hospitals in the NMBHD.

## 5.2. STUDY SUMMARY

The study was undertaken to describe the knowledge and practices of employees working in specialised TB hospitals regarding occupational exposure to tuberculosis. The study participants were employees working in three specialised TB hospitals in the NMBHD.

The background of the study highlighted the severity of TB worldwide and in South Africa in particularly. The sources of nosocomial infections were briefly discussed. The importance of adequate knowledge, infection control training as well as good infection control practices was emphasised. A few studies regarding the prevalence of TB among healthcare workers as well as studies regarding knowledge, attitudes and practices of employees regarding occupational exposure to TB were also presented.

The problem statement was formulated to highlight the infection control discrepancies that exist in specialised TB hospitals in the NMBHD. It also gave a preview of the occupational and safety health statistics regarding tuberculosis in the three specialised TB hospitals.

The literature provided a brief introduction of the disease, the global epidemiology of the disease as well as a detailed discussion of sources of nosocomial infections. It further discussed transmission and prevention of occupational infections. The evidence of poor infection control in South Africa was presented and the factors that affect infection control

knowledge and practices were discussed. Lastly, the strategies for prevention of TB were outlined. These strategies are in line with the OHSA legislation.

A quantitative research design and methodology process, that was descriptive, and contextual in nature, was applied to address the research objectives.

The types of research techniques used in the study were the convenience sampling method, a self-administered questionnaire as a measurement tool as well descriptive statistics to analyse the data. Out of a potential 253 employees, 181 were on duty during the stage of data collection and agreed to willingly participate in the study. Validity was ensured through assessing the questionnaire for TB and infection control content and whether the measurement technique on face value measure the variable it claimed to measure. A pilot study and the use of a qualified statistician helped to ensure the reliability of the study. Quality of the study was further ensured by abiding by the ethical issues applicable to the study.

The findings of the study revealed that almost a third of employees who participated in this study were between the ages of 36 and 45 years and the majority were females. Over half of participants attended high school and less than a third of the participants had a tertiary qualification. The majority of participants had neither clinical nor nursing training.

The majority of participants displayed a good knowledge of TB with an average score of 16 out of 21 and recognised that pulmonary tuberculosis is the type of TB that spreads via the air from one person to another. Furthermore, participants recognised sputum smear as the diagnostic tool for tuberculosis and identified most of the symptoms of TB. However, there were discrepancies in that participants failed to recognise cerebrospinal fluid analysis and pleural fluid aspirate analysis as diagnostic tools for TB. Additionally, participants failed to recognise fever as one of the symptoms of TB.

When asked about the infection control policy at each hospital, most participants knew about its availability however only approximately half of the participants reported to have actually read the document. More than half of participants 58%, (n=105) had been trained

on the infection control policy. The majority of participants scored an average score of 8 out 21 on questions regarding infection control practices.

The protective gown was considered to be the least important of the infection control protective clothes. Thirty three percent, (n=60) of participants reported wearing a protective gown when working with TB patients, with 15% (n=27) stating they sometimes wear it and 13% (n=24) admitted to never wearing it.

Participants were asked about the availability of patient consultation rooms in their respective facilities. More than half of participants 54%, (n=97) reported availability of patient consultation rooms in their respective hospitals. Participants reported using the ward, the Dr's office as well as the duty room or nurses' station for patient consultation.

When asked about the availability of a staff dining hall, almost 70% of participants 67%, (n=121) reported that there are available staff dining halls in their respective hospital, however only half of participants actually use the dining hall during tea and lunch breaks. Participants reported using offices, nurses' stations, duty rooms as well as any comfortable spaces available during tea and lunch breaks.

Participants were asked about the types of vehicle used for patient transportation in their respective facilities. When participants were asked about the types of vehicles their facilities utilise, 64% (n=117) reported that their facilities use Toyota quantums, 41% (n=74) use cars, 9% (n=17) buses whereas the remaining 8% (n=115) reported that their facilities use Toyota bakkies (n=15). When asked about the availability of isolation glass in the transportation vehicles, the majority of participants reported an absence of isolation glass in the vehicles used by their respective facilities.

Recommendations have been formulated from the findings and are discussed in the section that follows:

## 5.3. RECOMMENDATIONS

Based on the results of this study, participants are knowledgeable about TB and infection control; however, they are not practising what they know. Furthermore, employees are aware of the availability of an infection control policy which is kept in the infection

controller's office; apparently employees do not deem it necessary to read it. Additionally, the lack of isolation glass is a risk factor for the driver and the escort nurse, especially on rainy days when they cannot open the vehicle windows. The following are recommended in order to improve infection control practices in specialised TB hospitals in the NMBHD. These recommendations are in line with the OHSA legislation:

### 5.3.1. Recommendations for Practice

- Ensure that staff in all units in the hospital understand their roles and responsibilities with regard to infection control by developing a protocol outlining the various activities various activities required per unit.
- Classify lack of adherence to infection control as grounds for discipline should an employee fail to comply. With this in mind a policy addressing this recommendation should be developed.
- Ensure that the requirements for the appropriate equipment necessary for an effective infection control programme, and personal protective equipment (PPE) are met by the hospital supply management team by requesting adequate funding from the national budget to ensure an adequate supply of infection control equipment such as personal protective clothing and hand washing sinks with functioning taps.
- Ensure that hospital management create awareness to employees about occupational exposure to tuberculosis

### 5.3.2. Recommendations for Infection Control Policy

- Ensure that every employee has a copy of the infection control policy to read and refer to whenever necessary.
- Provide in-service education opportunities to enable staff to learn more about infection control measures and the infection control policy in particular.

### 5.3.3. Recommendations for Education of Staff in Specialised TB Hospitals

- Development of a specific curriculum for non-nursing personnel which will consider their scope of work, level of education, level of clinical training and specific risks attached to their work environment.
- Design training material matching with the tasks and education level of non-nursing/ non-clinical employees and facilitation of opportunities to learn and read about infection control.

### 5.3.4. Recommendation for Patient Transportation Vehicles

- Isolation glass must be a compulsory specification when purchasing patient transportation vehicles.

### 5.3.5. Recommendation for Infrastructure

- Ensure availability of consultation rooms and warrant that the consultation rooms be used solemnly for consultation purposes. This will assist to minimise the amount of time employees would be required to spend in infected areas.
- Provide dedicated space to separate employee functions and patient/ employee functions such as patient care by ensuring that employee dining halls are only for staff meetings and not for patient consultation.
- The legislation by means of Hazardous Biological Agents regulations (HBA) further prohibits employees from eating, smoking, drinking and keeping food as well as beverages or permit another person from carrying such activities in infected work spaces. Therefore, it is recommended that management should put up a notice in a conspicuous place prohibiting eating, drinking, smoking and keeping food and beverages in infected work spaces. . Furthermore, hospital management and employees need to be educated on the OHSA as well as their responsibilities in respect of the legislation (OHSA, 1993).

## 5.4. CONCLUSION

Although there are limited studies done on knowledge and practice of TB and occupational TB exposure of employees working in Specialised Tb hospitals in particular, studies done in other hospitals were useful in the compilation of a suitable survey questionnaire.

Clearly adequate knowledge and practices regarding prevention of occupational TB exposure are essential to ensure that staff do not become ill with TB at their place of work. Accordingly, despite the fact that some of the questions were well answered, generally there appeared to be insufficient knowledge and practices implemented to reduce occupational TB exposure in specialised TB hospitals in the NMBHD.

## 5.5. LIMITATIONS OF THE STUDY

- Inferential statistics were not used. They would have provided required associations between the variables which would have given a more in-depth view of the knowledge and practices of all staff working in the three specialised TB hospitals in NMBHD. Regrettably, due to the fees must fall situation, statistical support was not available at the time required by the researcher, due to campus closure. The researcher tried to contact the statistician several via email with no success. Therefore only descriptive statistics could be processed by the researcher.

## 5.6. OPPORTUNITIES FOR FURTHER RESEARCH

Further opportunities for research to explore and investigate occupational exposure to TB can be undertaken on the following four topics:

1. According to literature, a person is expected to practise what they know, however in the current study participants displayed good knowledge and scored a moderate score on questions regarding practices. A study could be done to determine the effectiveness of the infection control training offered by the hospitals, particularly related to implementation of the knowledge.

2. It is suggested that this study be replicated in all specialised TB facilities in the Eastern Cape, this could be beneficial in determining the knowledge and practices of a wider population of employees in such facilities.

## 5.8. CHAPTER SUMMARY

In this chapter, the researcher put her conclusions pertaining to the study into perspectives. The limitations of the study have been unpacked in detail in order to improve the infection control knowledge and practices of employees in specialised TB hospitals in the NMBHD. Below is a list of references as well as the appendices.

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## ANNEXURE A: QUESTIONNAIRE

Self-administered questionnaire on the knowledge and practices of employees working in specialised TB hospitals regarding occupational exposure to TB.

## SECTION A: DEMOGRAPHY

***Mark the appropriate box with an X and write response in an appropriate box***

*1. Age: How old are you?*

| | |
|---|---|
| 18-25 | 0 |
| 26-35 | 0 |
| 36-45 | 0 |
| 46-55 | 0 |
| >55 | 0 |

*2. Gender*

| | |
|---|---|
| Male | 0 |
| Female | 0 |

*3. Education level*

| | |
|---|---|
| Grade 0 | 0 |
| Grade 1-7 | 0 |
| Grade 8-12 | 0 |
| Degree/diploma | 0 |
| Other (please specify) | 0 |

*4. What is your job title?*

| |
|---|
| 0 |

**SECTION B: KNOWLEDGE**

**TB and infection control**

***Mark the appropriate box with an X. More than one answer per question is allowed.***

1. *How is TB transmitted from one person to another?*

| | |
|---|---|
| Water borne | 0 |
| Air borne | 1 |
| Direct contact | 0 |
| Sexual contact | 0 |
| Blood contact | 0 |
| All of the above | 0 |
| I don't know | 0 |

2. *What are the symptoms of TB?*

| | |
|---|---|
| Cough more than or equal to 2 weeks | 1 |
| Blood in the stools | 0 |
| Loss of weight | 1 |
| Oral thrush | 0 |
| Fever | 1 |
| Chronic diarrhoea | 0 |
| Night sweats | 1 |
| I don't know | 0 |

3. *How is pulmonary TB diagnosed?*

| | |
|---|---|
| Stool culture | 0 |
| Sputum smear | 1 |
| Pleural fluid aspirate | 1 |
| Cerebrospinal fluid analysis | 0 |
| All of the above | 0 |
| I don't know | 0 |

4. *Which type of TB spreads from one person to another?*

| | |
|---|---|
| TB meningitis | 0 |
| TB pleuritic | 0 |
| TB pericarditis | 0 |
| TB lymphadenitis | 0 |
| TB spine | 0 |
| TB peritonitis | 0 |
| Pulmonary TB | 1 |
| I don't know | 0 |

5. *Indicate with an X whether if you think the following statements are either true or false.*

| | True | False | I don't know |
|---|---|---|---|
| TB is treated for at least 6 months | 1 | 0 | 0 |
| TB is preventable | 1 | 0 | 0 |
| HIV makes a person more vulnerable to TB. | 1 | 0 | 0 |
| Washing hands with soap reduces the spread of infection. | 1 | 0 | 0 |
| A person needs to wear a protective coat and gloves before entering the isolation ward or area. | 1 | 0 | 0 |
| A person needs to take off the gown and gloves before leaving work area. | 1 | 0 | 0 |
| A person needs to wash hands before leaving the isolation ward or area. | 1 | 0 | 0 |

6. *Is there an infection control policy in your hospital? Only one answer is applicable.*

| | |
|---|---|
| Yes | 1 |
| No | 1 |
| Not sure | 0 |

***If YES, answer question 6.1 and 6.2, if NO move to question 7***

*6.1. Where is it kept?*

| | |
|---|---|
| I don't know | 0 |
| In the infection control officer's office | 1 |
| I have a copy kept in my office or locker | 2 |

*6.2. Have you read it?*

| | |
|---|---|
| Yes | 1 |
| No | 0 |

*7. Did you receive any training about the infection control policy?*

| | |
|---|---|
| Yes | 1 |
| No | 0 |

***If YES, answer question 7.1 and 7.2, if NO move to Section C***

*7.1. When were you trained on infection control policy?*

| | |
|---|---|
| 0-6 months ago | 0 |
| 7-12 months ago | 0 |
| 12-24 months ago | 0 |
| Over 24 months ago | 0 |

*7.2. how were you trained*

| | |
|---|---|
| Orientation and induction | 0 |
| On the job training | 0 |
| Short course | 0 |
| Other | 0 |

## SECTION C: PRACTICES

***Mark the appropriate box with an X (only one answer is applicable)***

1. *Are windows always kept open for ventilation and sunlight in your hospital?*

| | |
|---|---|
| Yes | 2 |
| Sometimes | 1 |
| Never | 0 |
| Not sure | 0 |

***If No move to question 2.2 then proceed to question 3 and if yes or not sure, move to question 2.1 then proceed to question 3.***

*2.1. When are windows opened in your hospital? (Please indicate all the options applicable)*

| | |
|---|---|
| When there is only one patient in the isolation ward | **0** |
| When it's too hot | **0** |
| In the morning | **0** |
| I don't know | **0** |

*2.2. If NO, why are windows not always open?*

| | |
|---|---|
| The handles are broken | **0** |
| Nobody bothers to open them | **0** |
| I don't know | **0** |

3. *Do you use a mask at all times when you are in the hospital premises*?

| | |
|---|---|
| Yes | 2 |
| Sometimes | 1 |
| Never | 0 |

***If YES move to question 3.1 &3.2 then proceed to question 4, and if NEVER then move to question 3.3 then proceed to question 4.***

*3.1. Which type of mask do you use? (Please indicate all the options applicable)*

| | |
|---|---|
| Paper mask | 1 |
| Surgical mask | 1 |
| Covering nose and mouth with clothes | 0 |
| Respirator N95 | 2 |
| Any available mask | 1 |

*3.2. When do you wear a mask?*

| | |
|---|---|
| Only when going to the wards | 1 |
| Only in the mornings | 1 |
| Before talking to a patient irrespective of time and weather | 1 |
| When it's not too hot | 0 |
| When it's available | 1 |
| Never | 0 |

*3.3. If you never wear a mask, why?*

| | |
|---|---|
| I don't think it's necessary | 0 |
| It's uncomfortable | 0 |
| It makes me sweat | 0 |
| It's never available | 0 |

*4. Do you always wear a protective gown when attending to TB patients*

| | |
|---|---|
| Yes | 2 |
| Sometimes | 1 |
| Never | 0 |
| I don't work directly with TB patients | |

***If YES proceed to question 5, if SOMETIMES move to question 4.1 then proceed to question 5, if NEVER move to question 4.2 then proceed to question 5 and if YOU DON'T WORK DIRECTLY WITH TB PATIENTS then proceed to question 6***

*4.1. If sometimes, when do you wear a protective gown?*

| | |
|---|---|
| Only on cold days | 0 |
| Only in the mornings | 0 |
| Before attending to a patient irrespective of time and weather | 1 |
| When I remembered | 0 |

*4.2. If you never wear a protective gown, why?*

| | |
|---|---|
| I don't think it's necessary | 0 |
| I just don't like it | 0 |
| It's uncomfortable | 0 |
| It makes me sweat | 0 |

*5. Do you always wash your hands after taking care of TB patients?*

| | |
|---|---|
| Yes | 2 |
| No | 0 |
| Sometimes | 1 |

***If YES proceed to question 6, if SOMETIMES or NEVER move to question 5.1 then proceed to question 6.***

*5.1. If sometimes or never, why not???*

| | |
|---|---|
| I don't think it's necessary | 0 |
| I use a sanitiser/ an antiseptic hand rub | 1 |
| I forget | 0 |
| I wear gloves whenever I work with TB patients | 1 |

*6. Does your hospital have a patient consultation room in all the wards?*

| | |
|---|---|
| Yes | 2 |
| No | 0 |
| Not sure | 1 |

***If YES or not sure, proceed to question 7 and if NO, move to question 6.1 then proceed to question 7.***

*6.1. If No, where do doctors in wards with no consultation rooms consult with patients?*

| | |
|---|---|
| In the ward with other patients present | 1 |
| In the duty room or nurses' station | 0 |
| In the Dr's office | 1 |
| I don't know | 0 |

*7. Does your hospital have a staff or employee dining hall*?

| | |
|---|---|
| Yes | 2 |
| No | 0 |
| Not sure | 1 |

***If YES, move to question 7.1 then proceed to question 8. If NO or not sure, move to question 7.1.1 then proceed to question 8.***

*7.1. Do you use it every day during tea and lunch breaks?*

| | |
|---|---|
| Yes | 2 |
| No | 0 |

*7.1.1. If no, where do you eat your lunch and tea?*

| | |
|---|---|
| Nurses' duty room or work station | 0 |
| My office | 0 |
| Anywhere I'm comfortable | 0 |

*8. What kind of vehicle is used to transport patients from your hospital to other facilities?*

| | |
|---|---|
| Bakkie | 0 |
| Quantam / Taxi | 0 |
| Bus | 0 |
| Car | 0 |
| I don't know | 0 |

*9. Is there an isolation glass between the driver and the patients during the journey?*

| | |
|---|---|
| Yes | 2 |
| No, there is no isolation glass | 0 |
| Not sure | 0 |

***If YES, move to question then 9.1 proceed to question 10.***

*9.1. Who wears a mask during the journey?*

| | |
|---|---|
| The patient | 1 |
| The driver | 1 |
| Both | 2 |
| Neither | 0 |
| I don't know | 0 |

*10. Is there any additional information that you would like to add regarding knowledge and practices of employees in specialised TB hospitals and occupational exposure to TB?*

| | |
|---|---|
| Yes | 0 |
| No | 0 |

*If yes, please use space provided below:*

……

……

……

***Thank you for participating in this research project***

**ANNEXURE B: CONSENT FORM FOR PARTICIPANTS**



- **PO Box 77000**
- **Nelson Mandela Metropolitan University**
- **Port Elizabeth**
- **6031**
- **South Africa**
- www.nmmu.ac.za


**Consent form**

You have been asked to participate in a research study that aims to explore and describe the knowledge and practices of employees working in Specialised TB hospitals regarding occupational exposure to TB in order to provide recommendations to management that can help reduce the prevalence of the disease among employees.

You may contact Miss Lusanda Ndlebe at 0844044299 anytime if you have questions about the research or if you are injured as a result of the research. You are invited to contact the Nelson Mandela Metropolitan University ethics committee at ……..if you have any questions about your rights as a research subject. Your participation in this research is voluntary and you will not be panelised or lose benefits if you refuse to participate or decide to stop. You may withdraw from the study anytime without giving reason. If you agree to participate, you will be given a signed copy of this document and the participant information leaflet which is a written summary of the research.

***The information leaflet was explained to me and an opportunity to ask questions was offered by Miss Lusanda Ndlebe. I understand what will happen to me if I participate and what my responsibilities will be. I voluntarily agree to participate.***

Signature of participant…… Date……..

Witness……Date……

## ANNEXURE C: INFORMATION LETTER FOR PARTICIPANTS

### Purpose

The purpose of the study is to explore and describe the knowledge and practices of employees working in Specialised TB hospitals regarding occupational exposure to TB in order to provide recommendations to management that can help reduce the prevalence of the disease among healthcare workers.

### Data collection

The data will be collected by means of a self-administered questionnaire. Participants will be required to read the questionnaire and answer independently without consulting fellow colleagues, friends or family members. They will then be required to return the questionnaire to the researcher upon completion. The questionnaire will take approximately 15 minutes to complete.

### Duration of the study

The study will be done over a period of 8 months and the participants will only be required to spare an hour of their time where the study will be explained, questions will be answered, signing of consent form once everything is clear and then completion of questionnaire.

### Selection criteria

The participants were selected for this study population because they are:

- have worked in specialised TB facilities for at least an uninterrupted period of 6 months.

### Responsibilities

The participant is required to read the questionnaire thoroughly and to answer all questions independently and truthfully. The researcher will be responsible for explaining the research protocol, respect the participants' rights, to avoid any harm that might occur.

**The risk involved**

There is no anticipated risk or discomfort, however, participants are allowed to indicate should they feel uncomfortable and they can withdraw from the study at any stage.

**Voluntary participation**

Participation in the study is voluntary and participants can withdraw from the study at any given time without giving a reason or explanation.

**Confidentiality**

No names, or any other identifying information will be recorded on the questionnaires or data capture forms and there will be no link between the answers obtained and the participants. Data will be stored in a password protected computer and only the researcher will have access to them. All questionnaires as well as data files will be destroyed once the report has been compiled and data reporting will be done anonymously.

**Researcher's credentials**

BSc. Dietetics (4 year degree) – University of the Western Cape ***(2008)***

MA Health & Welfare Management – Nelson Mandela Metropolitan ***University (Currently busy with qualification)***

**Researcher's contact details**

Email: ndlebe.lusanda@gmail.com

Cell: 0844044299

Tel: 0419881111

***For any queries or complaints regarding your rights as a participant, contact the Nelson Mandela Metropolitan University ethics committee on the following contact details.***

## ANNEXURE D: LETTER PERMITTING USE OF ORIGINAL QUESTIONNAIRE

University of the Free State
PO Box 339
Bloemfontein 9300
South Africa
18 October 2015

Dear **Lusanda Ndlebe**

REF: **Permission to use Questionnaire for a published research: Attitudes, knowledge and practices of healthcare workers regarding occupational exposure of pulmonary tuberculosis**

This letter serves to give you permission to use part or the entire questionnaire for the research: Attitudes, knowledge and practices of healthcare workers regarding occupational exposure of pulmonary, with the condition that you should acknowledge it in your research.

Thank you for abiding by the research rules.

Yours Faithfully
Dr Lesley T. Bhebhe

Family Physcian
bhebhelt@gmail.com

On Behalf of
**Bhebhe LT, Van Rooyen C, Steinberg WJ. Attitudes, knowledge and practices of healthcare workers regarding occupational exposure of pulmonary tuberculosis. Afr J Prm Healthcare Fam Med. 2014;6(1), Art. #597, 6 pages. http://dx.doi.org/10.4102/ phcfm.v6i1.597**

## ANNEXURE E: ORIGINAL QUESTIONNAIRE

### Questionnaire

Mark the appropriate box with **X** and write response in appropriate box

**For Official Use Only**

**I. General information about the Health Care Worker**

1 Questionnaire Number ☐☐☐ 1-3

2 What is your age? ☐☐ 4-5

3 What is your sex?

☐ Male(1)

☐ Female(2) ☐ 6

4 What is your Profession?

☐ General Hand(1) ☐ 7

☐ Student Nurse(2) ☐ 8

☐ Nursing Assistant(3) ☐ 9

☐ Nursing Attendant(4) ☐ 10

☐ Registered Nurse(5) ☐ 11

☐ Medical Doctor(6) ☐ 12

5 How long have you been working in hospital?

_____ years ☐☐ 13-14

**A: Knowledge about Tuberculosis**

1 How is TB is transmitted from one individual to another?
Choose or Mark the correct option(s) with an **X**

☐ Water borne(1) ☐ 15

☐ Air borne(2) ☐ 16

☐ Direct contact(3) ☐ 17

☐ Sexual Contact(4) ☐ 18

☐ Blood Contact(5) ☐ 19

☐ All of the above(6) ☐ 20

2 What are the symptoms of TB ?
Choose or Mark the correct option(s) with an **X**

☐ Cough more than or equal to 2 weeks(1) ☐ 21

☐ Blood in the stools(2) ☐ 22

☐ Loss of weight(3) ☐ 23

☐ Oral Thrush(4) ☐ 24

☐ Fever(5) ☐ 25

☐ Chronic Diarrhoea and Vomiting(6) ☐ 26

☐ Night sweats(7) ☐ 27

*Adapted from: Bhebhe, L.T, Van Rooyen, C. Steinberg, W.J. 2014. Attitudes, knowledge and practices of healthcare workers regarding occupational exposure of pulmonary TB. African Journal of Primary Healthcare and Family Medicine; 6(1):597-606*

3 How is Pulmonary TB diagnosed?
Choose or Mark the correct option(s) with an **X**

- ☐ Stool Culture(1) ☐ 28
- ☐ Sputum Smear(2) ☐ 29
- ☐ Pleural Fluid Aspirate(3) ☐ 30
- ☐ Cerebro Spinal Fluid Analysis(4) ☐ 31
- ☐ All of the above(5) ☐ 32

4 Which type of TB can be spread from one individual to another (transmissible)?
Choose or Mark the correct option(s) with an **X**

- ☐ TB Meningitis(1) ☐ 33
- ☐ TB Plueritis(2) ☐ 34
- ☐ TB Pericaditis(3) ☐ 35
- ☐ TB Lympadenitis(4) ☐ 36
- ☐ TB Spine(5) ☐ 37
- ☐ TB Peritonotis(6) ☐ 38
- ☐ Pulmonary TB(7) ☐ 39

5 Is TB Preventable?

- ☐ Yes
- ☐ No
- ☐ Don't Know ☐ 40

6 Is TB treated for at least 6 months?

- ☐ Yes
- ☐ No
- ☐ Don't Know ☐ 41

7 Can TB be cured?

- ☐ Yes
- ☐ No
- ☐ Don't Know ☐ 42

8 Does HIV predispose one to TB?

- ☐ Yes
- ☐ No
- ☐ Don't Know ☐ 43

9 Does BCG vaccination stop an individual from getting tuberculosis?

- ☐ Yes
- ☐ No
- ☐ Don't Know ☐ 44

10 Where should patients be instructed to collect sputum?
Choose or Mark the correct option(s) with an **X**

- ☐ In the ward ☐ 45
- ☐ In the Laboratory ☐ 46
- ☐ Open air ☐ 47
- ☐ Anywhere ☐ 48

*Adapted from: Bhebhe, L.T, Van Rooyen, C. Steinberg, W.J. 2014. Attitudes, knowledge and practices of healthcare workers regarding occupational exposure of pulmonary TB. African Journal of Primary Healthcare and Family Medicine; 6(1):597-606*

**B: Attitudes**

1 Would you use a mask even though its uncomforable?
- ☐ Yes
- ☐ No
- ☐ Sometimes ☐ 49

2 Would you like to be screened for TB if you have suggestive symptoms ?
- ☐ Yes
- ☐ No
- ☐ Not Sure ☐ 50

3 If you were diagnosed with TB would you be willing to test for HIV?
- ☐ Yes
- ☐ No ☐ 51
- ☐ Not Sure

4 If you were diagnosed with TB are you willing to complete the treatment ?
- ☐ Yes
- ☐ No
- ☐ Not Sure ☐ 52

5 If you have a condition that makes you vulnerable to contractiong TB e.g HIV,are you prepared to change work enviroment to a less risky area?
- ☐ Yes
- ☐ No
- ☐ Not Sure ☐ 53

6 If you are malnourished or at risk of malnutrition are you prepared to adjust your eating habits ?
- ☐ Yes
- ☐ No
- ☐ Not Sure ☐ 54

7 Are you willing to open windows in TB ward for adequate ventilation and sunlight regardless of weather conditions?
- ☐ Yes
- ☐ No
- ☐ Not Sure ☐ 55

8 Are you willing to teach the patients and co-workers on TB prevention?
- ☐ Yes
- ☐ No
- ☐ Not Sure ☐ 56

*Adapted from: Bhebhe, L.T, Van Rooyen, C. Steinberg, W.J. 2014. Attitudes, knowledge and practices of healthcare workers regarding occupational exposure of pulmonary TB. African Journal of Primary Healthcare and Family Medicine; 6(1):597-606*

9 Are you willing to attend seminars on TB prevention?

- ☐ Yes
- ☐ No
- ☐ Not Sure
- ☐ All ready did ☐ 57

**C: Practices**

1 Do you have seperate TB ward?

- ☐ Yes
- ☐ No ☐ 58

2 Do you use a mask when you are in TB ward?

- ☐ Yes
- ☐ No ☐ 59

3 IF **YES** Which type of mask do you use?

- ☐ Paper Mask(1) ☐ 60
- ☐ Surgical Mask(2) ☐ 61
- ☐ Covering nose and mouth with cloth(3) ☐ 62
- ☐ Respirator N95 or above(4) ☐ 63
- ☐ Any available Mask(5) ☐ 64

4 Do you use gowns or gloves when attending TB patients

- ☐ Yes
- ☐ No
- ☐ Sometimes ☐ 65

5 Is the TB ward door kept closed all the time?

- ☐ Yes
- ☐ No
- ☐ Sometimes ☐ 66

6 Are windows always kept open for ventilation and sunlight in TB ward?

- ☐ Yes
- ☐ No
- ☐ Sometimes ☐ 67

7 Do you wash your hands after taking care of Pulmonary TB patients

- ☐ Yes
- ☐ No
- ☐ Sometimes ☐ 68

8 Do you wear protective clothing when disposing linen from Pulmonary TB patients

- ☐ Yes
- ☐ No
- ☐ Sometimes ☐ 69

*Adapted from: Bhebhe, L.T, Van Rooyen, C. Steinberg, W.J. 2014. Attitudes, knowledge and practices of healthcare workers regarding occupational exposure of pulmonary TB. African Journal of Primary Healthcare and Family Medicine; 6(1):597-606*

9 Where are the patients instructed to collect sputum?

| | | |
|---|---|---|
| ☐ | In the ward(1) | ☐ 70 |
| ☐ | Open air(2) | ☐ 71 |
| ☐ | In the Laboratory(3) | ☐ 72 |
| ☐ | Anywhere(4) | ☐ 73 |

10 Do you advice patients with TB to be screened for HIV?

| | | |
|---|---|---|
| ☐ | Yes | |
| ☐ | No | ☐ 74 |

11 Do you place the coughing patient in a special waiting area in outpatients department?

| | | |
|---|---|---|
| ☐ | Yes | |
| ☐ | No | ☐ 75 |

12 Do you put suspicious Pulmonary TB patients in front of the queue to be served first?

| | | |
|---|---|---|
| ☐ | Yes | |
| ☐ | No | ☐ 76 |

13 Have you attended a TB infection Control Seminar?

| | | |
|---|---|---|
| ☐ | Yes | |
| ☐ | Never | ☐ 77 |

*Adapted from: Bhebhe, L.T, Van Rooyen, C. Steinberg, W.J. 2014. Attitudes, knowledge and practices of healthcare workers regarding occupational exposure of pulmonary TB. African Journal of Primary Healthcare and Family Medicine; 6(1):597-606*

## ANNEXURE F: FPGSC APPROVAL LETTER

Nelson Mandela Metropolitan University
for tomorrow

**Copies to:**
**Supervisor: Dr M Williams**
**Co-supervisor: Dr W ten Ham-Baloyi**

**Summerstrand South**
**Faculty of Health Sciences**
Tel. +27 (0)41 504 2956 Fax. +27 (0)41 504 9324
Marilyn.Afrikaner@nmmu.ac.za

**Student number: 213410516**

**Contact person: Ms M Afrikaner**

7 September 2016

Ms L Ndlebe
5 Park Villages
1 de la Fontein Street
Young Park
Port Elizabeth
6001

**FINAL RESEARCH/PROJECT PROPOSAL:**
**QUALIFICATION:** **MA HEALTH AND WELFARE MANAGEMENT**
**TITLE OF PROPOSAL:** **OCCUPATIONAL EXPOSURE TO TUBERCULOSIS: KNOWLEDGE AND PRACTICES OF EMPLOYEES AT SPECIALISED TUBERCULOSIS HOSPITALS**

Please be advised that your final research proposal was approved by the Faculty Postgraduate Studies Committee (FPGSC) subject to the following amendments/recommendations being made to the satisfaction of your Supervisor/s:

**COMMENTS/RECOMMENDATIONS:**

1. Revise the last sentence of the second paragraph in the abstract, it seems incomplete.
2. Table of contents needs revision. Abstract was not included.
3. The definition of occupational TB on page 7 seems ambiguous. This needs clarification.
4. Last paragraph in abstract says qualitative while section 6 says quantitative, there is need for clarity and consistency.
5. Since there is a possibility of workers getting infected outside working environment, it might be necessary to clarify how the study will differentiate workers who were infected while working and those who came to work already infected.
6. It might be necessary to indicate the nature of the questionnaire before the nature of administration.
7. In the manuscript, spell out numbers under 10 (zero through nine). Correct this where applicable in the manuscript.
8. Dissemination should include publication. Currently this is lacking and should be factored in the budget.
9. Time schedule needs revision. No literature review, result interpretation etc.
10. Conclusion needs revision to capture the strong points of the proposed study not a summary of the table of contents.
11. Some references need revision. Date accessed should be included when using url.
12. Appendix 5 are two, is that correct? There is no Appendix 7. Questionnaire is Appendix 1. Correct the numbering to avoid confusion.

Please be informed that this is a summary of deliberations that you must discuss with your Supervisor/s.

FPGSC grants ethics approval. The ethics clearance reference number is **H16-HEA-NUR-025** and is valid for three years.

We wish you well with the study.

Kind regards,

**Ms M Afrikaner**
**Faculty Postgraduate Studies Committee (FPGSC) Secretariat: Faculty of Health Sciences**

## ANNEXURE G: PERMISSION TO CONDUCT RESEARCH FROM THE EASTERN CAPE DEPARTMENT OF HEALTH

Eastern Cape Department of Health


Enquiries: Madoda Xokwe
Tel No: 040 608 0830
Date: 18 November 2016
Fax No: 043642 1409
e-mail address: madoda.xokwe@echealth.gov.za


Dear Ms. L. Ndlebe

**Re: Occupational Exposure to Tuberculosis: Knowledge and Practices of Employees at Specialized Tuberculosis Hospitals (EC_2016RP28_145)**

The Department of Health would like to inform you that your application for conducting a research on the abovementioned topic has been approved based on the following conditions:

1. During your study, you will follow the submitted protocol with ethical approval and can only deviate from it after having a written approval from the Department of Health in writing.
2. You are advised to ensure, observe and respect the rights and culture of your research participants and maintain confidentiality of their identities and shall remove or not collect any information which can be used to link the participants.
3. The Department of Health expects you to provide a progress on your study every 3 months (from date you received this letter) in writing.
4. At the end of your study, you will be expected to send a full written report with your findings and implementable recommendations to the Epidemiological Research & Surveillance Management. You may be invited to the department to come and present your research findings with your implementable recommendations.
5. Your results on the Eastern Cape will not be presented anywhere unless you have shared them with the Department of Health as indicated above.

Your compliance in this regard will be highly appreciated.

SECRETARIAT: EASTERN CAPE HEALTH RESEARCH COMMITTEE

## ANNEXURE H: PROOF OF EDITING

**TOPPER**
**EDITING SERVICES**
Ph.076 162 3811 Email: Keean.Topper@nmmu.ac.za

K. Topper
25 Milner Street
Mount Pleasant
Port Elizabeth
6070

Tel. 076 162 3811
Email: Keean.Topper@nmmu.ac.za

30 January 2017

Re: Editing of Masters Treatise

This letter certifies that the treatise entitled: Occupational Exposure to Tuberculosis: Knowledge and Practices of Employees at Specialised Tuberculosis Hospitals by Ms Lusanda Ndlebe has been edited for the purposes of her Masters degree.

Yours faithfully,

K. Topper
BA (Hons), MA (Counselling Psychology)