

**ASSESSING THE EFFECTIVENESS OF TUBERCULOSIS INFECTION CONTROL  
IN PUBLIC HEALTHCARE FACILITIES IN THE KHOMAS REGION**

**A THESIS SUBMITTED IN FULFILMENT**

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**BY**

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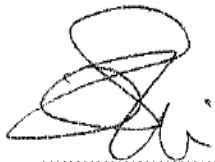
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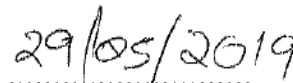
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## **DEDICATION**

Sustained support was granted to me by all my family members. This thesis is dedicated to them for their unconditional support.

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I wish to acknowledge, appreciate, and express my gratitude to the following people and institutions whose backing made it possible to initiate and finalise this study:

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## ABSTRACT

Emerging multidrug-resistant tuberculosis (MDR/XDR-TB) has become a major public health concern, placing millions at risk. Moreover, nosocomial transmission of MDR/XDR-TB places both patients and healthcare workers at an even higher risk. For these reason health facilities in high-risk settings need to implement effective tuberculosis (TB) infection prevention and control (IPC) policies/guidelines. Several studies elsewhere demonstrated that organizational processes and employee skills development are key determinants of organizational performance. The effectiveness of TB control thus implies enhanced *organizational performance of the healthcare facilities*. However, little research has been conducted in the Namibian to see the *influence of organizational processes and employee skills development on the effectiveness of tuberculosis infection control in public healthcare setting*.

The method employed to conduct in the study to address the research question, was the quantitative approach, using an evaluative and descriptive research study design for the period of 2008 to 2012. The study aimed to assess the effectiveness of TB IPC and potential key determinants in public healthcare facilities.

The population for this study comprised of nurses and doctors purposively selected from Windhoek Central Hospital and Katutura Intermediate Hospital (TB Hospital, including ten (10) Primary Health care clinics in Khomas region, in the geographical area of Windhoek district.

These facilities were selected because of their capacities, as they perform screening, treating, referring and provide DOTS to TB patients. The Donkerhoek clinic will be used for pilot study.

The sample was selected using purposive sampling technique. The sample included all categories of the nurses and medical doctors who were willing, available and legible to the study. A total of hundred (100) nurses of all categories and doctors participated in this study.

Data collection was conducted with a self-designed questionnaire which was self-administered by consenting study participants. . The duration of data collection took eight (8) months, due to the nature of the work condition of the health care workers. The response rate was 100%. No missing data were recorded. The research instrument was found to be reliable.

Data analysis technique involved the use of Statistical Package for the Social Sciences ( SPSS) a statistical software to carry out both descriptive and inferential statistics with significance set at  $P>0.05$ . As inferential statistics, the study used Partial Least Squares (PLS) regression analysis to determine the strength of each relationship hypothesized by the study model. Ethical consideration adhered to in the study.

The findings revealed a positive influence of organizational processes and employee skills development on the effectiveness of tuberculosis infection control in public healthcare facilities in the Khomas region.

In conclusion the recommendations are that the public healthcare facilities should therefore train key personnel in the aspects of TB IPC concepts. It should also implement

appropriate organizational process to ensure that the process effectively support TB IPC policy implementation.

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## ABBREVIATIONS

ACSM:	Advocacy, Communication and Social Mobilization
IPC:	Infection Prevention and Control
IPT:	Isoniazid Preventive Therapy
MDR-TB:	multidrug-resistant tuberculosis
HIV:	Human Immunodeficiency Virus
LTBI:	Latent Tuberculosis Infection
PLHIV:	People Living with HIV
PLS:	Partial Least Squares
TB:	Tuberculosis
UNAM:	University of Namibia
UVGI:	ultraviolet germicidal irradiation
XDR-TB:	extensively drug-resistant tuberculosis
WHO:	World Health Organization

## CHAPTER 1 INTRODUCTION

### 1.1 Background

Despite globally adopted strategies to control tuberculosis (TB) and globally declining incidence and mortality rates of the disease over the years, it remains a major public health problem (World Health Organization (WHO), 2012). Namibia has a small population of 2,5 million people. Namibia has one of the highest case notification rates (CNR) of TB in the world (MOHSS, 2012). 12,625 cases of TB were notified in 2010, equivalent to a CNR of 589/100,000 population. The Khomas region, the site for this study, had the highest TB burden in the country with a total of 3,102 TB patients and a CNR of 1 102/100 000 per population in 2004 (MoHSS 2006a:2). The region continued to report the highest burden although in 2006 the total number of patients had reduced to 2 616 with a CNR of 859/100 000 population. This high TB burden puts healthcare workers (HCWs) at increased risk of contracting TB in the work place and TB-infected staff put their patients at risk. In developed countries, TB infection control programmes are rigorous; it is often not possible to duplicate these protocols in resource-limited settings as they are often beyond the financial capabilities of such countries (CDC, 2005).

The distribution of the TB burden varies by region, with the most affected regions as of 2010 being Khomas and Kavango (MoHSS, 2012). Tuberculosis was included by Stop TB Partnership in the Millennium Development Goals (MDG 6) that was planned to be achieved by 191 United Nations (UN) Member States by the year 2015 (STOPTB Partnership, 2010; United Nations, 2013). The goals and targets

beyond 2015 must consider lessons from the current set of MDGs. The first step is to have broad consultations on the future goals by creating fora for local, national, and regional debate involving key stakeholders, including the governments, civil societies, private sectors and development agencies. The Sustainable Development Goals (SDG) identified 5 key lessons from the MGDs, to adapt service delivery models to further expand access, to focus resources on the right interventions for the right populations in the right place in the right way, to increase financing for HIV – related services, to ensure that pharmaceutical innovations are available, affordable and accessible to all and lastly to invest in reducing stigma and discrimination.

South Africa reports more than 100 000 TB cases yearly. This is an incidence rate of more than 500/100 000 population. The latest successful treatment completion rates, recorded in 2002, are 68, 0% with interruption rates of 13, and 0%. Overall TB prevalence among HCWs in South Africa (SA) was 5, 0% in 2009 while HIV prevalence was approximately 16, and 0% in 2002 (Joshi, Reingold, Menzies & Pai (2006).

The TB epidemic is complicated by the multidrug resistant/extensively drug-resistant tuberculosis (MDR/XDR-TB) which is a man-made disease and emerged as a result of inadequate TB treatment. MDR/XDR-TB is defined as “caused by organisms that are resistant to isoniazid and rifampicin (MDR-TB); and by organisms that are resistant to isoniazid and rifampicin as well as any fluoroquinolone and any of the second–line anti-TB injectable drugs (amikacin, kanamycin or capreomycin)” (WHO, 2013b). Once developed, drug resistant strains of TB can be transmitted directly from person to person. Treatment of drug-resistant

TB is expensive, long-term (18-24 months), complex requiring daily injections and involving serious side effects.

Another challenge in addressing TB is its interplay with HIV. People living with HIV (PLHIV) have 20 times greater risk of developing active TB than HIV-negative persons (WHO, 2013a). Out of 1.4 million people who died from TB in 2012, 430,000 deaths were among PLHIV (WHO, 2012). There is evidence of significantly higher mortality rate and short survival associated with drug-resistant TB outbreaks among PLHIV (WHO, 2012).

Therefore all HCWs allocated in the hospitals and Primary health care clinics who deal with TB patients, contacts should be well informed regarding these guidelines and they must be guided by these guidelines throughout their practice, in order to prevent the HCWs spreading the disease and contracting the disease while on duty (MOHSS, 2010).

Inadequate TB treatment regimens leading to the lower levels of success and the higher rates of default or failure have long been considered driving factors for drug-resistant TB. However, over time, dynamics of factors responsible for drug-resistant TB have changed with about 40% of MDR-TB patients having a history of defaulted or failed treatment, and about 30% of them as new cases without previous treatment history (WHO, 2011). Furthermore, recent studies show even higher proportions (about 50%) of new MDR-TB cases among people who never been treated for TB before, demonstrating direct transmission of drug-resistant strains (WHO, 2011). In addition, patients, who were previously treated for TB, acquire drug-resistant tuberculosis through transmission rather than as a consequence of non-adherence to

the previous treatment. When transmission happens in healthcare setting it is considered as nosocomial (WHO, 2011).

Rising demand from countries for guidance on TB transmission prevention and their need to understand policy gaps in TB Infection Prevention Control (IPC) led to the development of TB IPC by WHO in 2009. The document defines TB IPC as “a combination of measures aimed at minimizing the risk of TB transmission within populations, founded on early and rapid diagnosis and management of TB patients” and includes evidence-based recommendations on TB infection control in healthcare facilities, congregate settings and households (WHO, 2009). According to WHO (2009), there is evidence that implementation of IPC measures, including administrative and environmental controls; personal protection through use of N95 face masks reduces transmission of TB in healthcare facilities. Important contributing factors of nosocomial transmission as delayed diagnosis, unrecognized multi-drug resistance, inadequate isolation and infection control practices, poor ventilation and air circulation, are addressed in the WHO document. Importantly, TB IPC was neglected for many years and has been recognized as a priority issue that should be incorporated into country-level policy.

## **1.2 Statement of the Problem**

Namibia adopted a national TB infection prevention and control policy since 2010, but the incidences of TB continue growing which raise concerns about the effectiveness of healthcare-related TB IPC policy implementation. The effectiveness of healthcare-related TB IPC policy implementation simply implies organizational performance of the healthcare facilities. Effective TB IPC should be customized to the specific setting and should use an evidence-based approach.

Several general and strategic management scholars have identified organizational processes and employee skills development as key determinants of organizational performance (Dumas et al., 2013;

However, there is a lack of research in this regard in the Namibian public healthcare context. The implication of this is that, in the context of Namibian healthcare facilities, the link that is thought to be existent between these aspects is rather assumed than proven empirically. This dearth of empirical research led to the following question: *what is the influence of organizational processes and employee skills development on the effectiveness of tuberculosis infection control in public healthcare facilities in the Khomas region?* Thus, this study seeks to lessen the literature gap by addressing the question above.

### **1.3 Research Questions**

This study sought to answer the following main question: *what is the influence of organizational processes and employee skills development on the effectiveness of tuberculosis infection control in public healthcare facilities in the Khomas region?*

To answer this main research question, the following secondary questions needed to be answered:

1. What is the level of effectiveness of tuberculosis infection control in public healthcare facilities in the Khomas region?
2. What is the impact of organizational processes on the effectiveness of tuberculosis infection control in public healthcare facilities in the Khomas region?

3. What is the influence of employee skills development on the effectiveness of tuberculosis infection control in public healthcare facilities in the Khomas region?

The answers to these questions would be dependent on the accomplishment of the study's aim and objectives which are presented in the next section.

#### **1.4. Research Aim and Objectives**

The aim of this research was to understand the effect of organizational processes and employee skills development on the effectiveness of tuberculosis infection control in public healthcare facilities. Thereby, guiding as instrument for public healthcare facilities managers and policy-makers for the development of appropriate policies and programmes to enhance the effectiveness of tuberculosis infection control in public healthcare facilities. To attain this core research aim, the following objectives of the study needed to be realized:

1. To determine the level of effectiveness of tuberculosis infection control in public healthcare facilities in the Khomas region;
2. To assess the impact of organizational processes on the effectiveness of tuberculosis infection control in public healthcare facilities in the Khomas region; and
3. To gauge the influence employee skills development on the effectiveness of tuberculosis infection control in public healthcare facilities in the Khomas region.

#### **1.5 Significance of the Study**

This study will have considerable contribute to the body of knowledge in tuberculosis infection prevention and control. It will deliver a notional support on the impact of organizational processes and employee skills development on the

effectiveness of tuberculosis infection control in public healthcare facilities. Thus, it will be of substantial interest to public healthcare managers and policy-makers. In addition, the research findings will reveal opportunities for comparable studies in this under-researched field. It is thus significant to future researchers.

In addition, the research findings might reveal opportunities for comparable studies in this under-researched field. It is thus significant to future researchers.

## **1.6 Theoretical Framework**

Grounded on the problem statement and the literature reviewed, this study seeks to expand the body of knowledge in the area of TB infection prevention. The theoretical framework for this study was the organizational processes and skills development on TB IPC effectiveness which was developed by Mutuku & Mathooko (2014).

## **1.7 Research Methodology**

According to Kothari (2004), “research methodology is a way to systematically solve the research problem. It may be understood as a science of studying how research is done scientifically. In it we study the various steps that are generally adopted by a researcher in studying his research problem along with the logic behind them “The objective of this study was to assess how organizational processes and employee skills development influence the effectiveness of tuberculosis infection control in public healthcare facilities. Primary and secondary researches were conducted. A detailed discussion of the research methodology is provided in Chapter 3, but a brief description thereof is offered in this section.

### ***1.7.1 Secondary Research***

Secondary Research is based on data collected from previous researches. Secondary research is based on tried and tested data which is previously analyzed and filtered . (Galvan, 2013). (Therefore Chapter 2 presents the literature reviewed in this study.

### ***1.7.2 Primary Research***

Galvan , 2013 explained the term primary source is used broadly to embody all sources that are original. Primary sources provide first-hand information that is closest to the object of study. He further explained that primary sources vary by discipline. In the natural and social sciences, original reports of research found in academic journals detailing the methodology used in the research, in-depth descriptions, and discussions of the findings are considered primary sources of information.” Supporting the same viewpoint, Bhattacharjee (2012) and Singleton and Straits (2010) stress that this stage addresses issues such as the research population and sample, data collection method, data collection instruments, and analysis of the gathered data as discussed in subsequent subsections.

### ***1.7.3 Population and Sample***

Singleton and Straits (2010) refer to the population as “the total collection of elements about which inferences are to be made.” The population for this study comprised of nurses and doctors from Windhoek Central Hospital and Katutura Intermediate Hospital (TB Hospital, including the ten (10) Primary Health care clinics where TB patients were managed on a routine basis around Windhoek district. The researcher used all public health facilities in Khomas region being ,Katutura Intermediate hospital, Katutura TB hospital (with their respective departments;

outpatient department (OPD),casualty and medical wards), Katutura Health Centre, Donkerhoek clinic, Robert Mugabe clinic, Hakahana clinic, Wanaheda Clinic, Otjomuise clinic, Okuryangava clinic, Groot Aub clinic, Dordabis clinic and Khomasdal clinic. These facilities will be selected because of their capacities, as they perform screening, treating, referring and provide directly observed treatment short course (DOTS) to TB patients. The Donkerhoek clinic was used for pilot study on five (5) participants which were excluded from the study.

A sample of hundred (100) nurses of all categories and doctors were selected and self-designed, self-administered questionnaires were given to the participants to elicit information relevant to the research objectives. The participants consist out of professional and enrolled nurses which were sixty three (63) in total, the student nurses were nine (9). The medical doctors who participated were ten (10) in total, while the managers were eighteen (18), with the age category of 21years -50+years, see table in Chapter3. Female participants were more than male participants.

The sample was selected using purposive sampling technique. The sample included all category nurses and medical doctors who were willing, available and legible to the study. According to Palys (2008), a “purposive sample is a non-probability sample that is selected based on the characteristics of a population and the objective of the study.” A homogeneous purposive sampling method was used for this study as the selected participants had a shared characteristic or set of characteristics (Palys, 2008); they were all public health employees rendering services to TB patients.

#### ***1.7.4 Data Collection***

The primary data were collected using a self-administered questionnaire survey. This method was preferred because it is quicker, cheaper, and allows participants to comfortably respond to the questionnaire at their own convenient time (Brink, 2013). The researcher distributed the questionnaires her self during the course of the data collection period, to all respective public health facilities between December 2015 and July 2016. Some questionnaires were delivered to participants and collected the same day, while other questionnaires were collected the next day. The duration of data collection took eight (8) months, due to the nature of the work condition of the health care workers. The response rate was 100%. No missing data were recorded.

#### ***1.7.5 Research Instruments***

The various variables in the study were measured using a 6-point Likert scale questionnaire. The questionnaire requested the participants to rate their agreement or disagreement with statements, which made the questions easy to answer. The research instrument was developed by the researcher as per Namibian TBIC guidelines (2014) piloted and modified during the pilot phase.

#### ***1.7.6 Data Analysis***

The data were analysed using the SPSS application. Data were described through the use of statistics, including mean and standard deviations. Given that ordinal data were collected, the relationships among the study variables were assessed using Spearman's correlation (Maitra & Yan, 2008,). As inferential statistics, the study used Partial Least Squares (PLS) regression analysis to determine the strength of each relationship hypothesized by the study model. The preference for this

regression method was motivated by the fact that it is an appropriate method when the study variables are numerous and characterised by a high level of collinearity. Moreover, the method does not necessitate a vast sample or data which is normally distributed (Maitra & Yan, 2008; Abdi & Williams, 2013,).

### **1.8 Limitations of the Study**

Inherently, the study design has some limitations. Given that only employees of public health facilities in the Khomas region were included, the outcomes cannot be generalised to all other public health facilities in and/or outside Namibia. The inherent limitations of a survey research design also apply to this study; participants' reluctance to disclose information that they consider sensitive or confidential is expected.

### **1.9 Definition of Key Concepts Used in the Study**

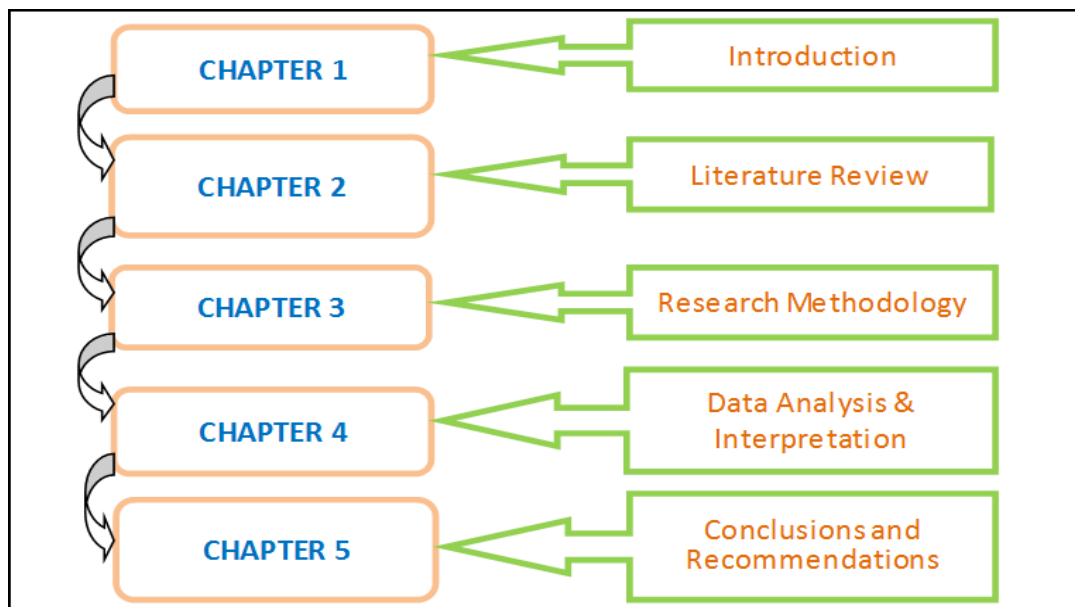
In this section, key terms that are used frequently in this thesis are defined. In this study, the effectiveness of TB infection prevention and control *is assessed by the organizational performance* of the concerned public healthcare facilities. *Organizational performance* refers to “a set of financial and nonfinancial indicators which offer information on the degree of achievement of objectives and results” (Jenatabadi, 2015). The potential key determinants of organizational performance advanced in the study are defined below:

- ***Organizational processes:*** refers to the “structured, measured sets of activities that together - and only together - transform inputs into outputs” (Dumas, La Rosa, Mendling, & Reijers, 2013).

- **Employee skills development:** defined as “planned and systematic modification of behaviour through learning events, programmes and instruction, which enable individuals to achieve the levels of knowledge, skill and competence needed to carry out their work effectively” (Jehanzeb & Bashir, 2013).

## 1.10 Organisation of the Study

A depiction of the study outline is presented in Figure 1.1.



**Figure 1-1 Study outline**

**Source:** Developed by the research (Morris&Sexton, 1996) cited in Scheepers (2007).

According to Morris & Sexton, 1996 as cited in Scheepers (2007), the outline of the study was designed. The first chapter presents an introduction and orientation of the study. It presents the background, the statement of the problem, the research question, the objectives of the study, the significance of the study and the methodology used in the study, where the secondary and primary sources related to the research problem are introduced. This is then followed by the limitations of the study, structure of the thesis and definitions of key concepts.

The second chapter discusses prior studies and underpinning theories on the different variables in the study.

The third chapter provides “the methodology and design of the research. It elaborates on the sample, measurement instruments and data collection process. It also provides an overview of the statistical analyses performed” (Scheepers, 2007).

The fourth chapter presents the empirical results. “The findings refer to the descriptive statistics and the various relationships between variables” (Scheepers, 2007).

The fifth chapter “draws conclusions and provides recommendations in light of the findings of the study. Limitations of the study are highlighted and recommendations for future research made” (Scheepers, 2007).

### **1.11 Chapter Summary**

This chapter has introduced the study and presented the orientation thereof. It presented the background, the statement of the problem, the research question, the objectives of the study, and the significance of the research. A brief explication of the study methodology was also presented. Lastly, the study limitations, the thesis outline, and definitions of key concepts were presented. The literature review is presented in the next chapter below.

## **CHAPTER 2      LITERATURE REVIEW**

### **2.1 Introduction**

The literature on different variables emphasised in the study is reviewed in this chapter. In this study, the effectiveness of TB infection prevention and control is assessed by the organizational performance of public healthcare facilities. Hence, in light of prior studies, this chapter first defines organizational performance and then discusses the key determinants thereof – namely organizational processes and employee skills development.

### **2.2. Defining Organizational Performance**

According to Jenatabadi (2015) organizational performance can be generally defined as “a set of financial and nonfinancial indicators which offer information on the degree of achievement of objectives and results.” In terms of TB infection and prevention control, organizational performance refers to the level of achievement of different TB infection and prevention objectives and goals by ensuring that primary TB is prevented by strict contact tracing with treatment of infected contacts. Prevention of re-activation TB is accomplished by screening for, and treatment of, latent tuberculosis infection (LTBI) (Nardell & Dharmadhikari, 2010). Elaborating on this perspective, Gandhi, Weissman, Moodley, Ramathal, Elson, Kreiswirth, & Shah (2013) underline that enhanced organizational performance in this regard can be achieved by assigning responsibilities for the control programmes, conducting regular TB risk assessments through developing written control plans e.g. early detection and treatment of TB-related cases, personal protection through population education, laboratory and treatment availability, and screening of high risk groups.

On their part, O'Donnell, Jarand, Loveday, Padayatchi, Zelnick, Werner, & Dheda (2010) stated that for any control programme to be successful, it must ensure early detection e.g. airborne precautions and treatment of both suspected and confirmed diagnosed TB cases. Farley, Tudor, Mphahlele, Franz, Perrin, Dorman, & Van der Walt (2012) concur and underscore the needed for periodic guideline revision for each community high-risk group including Group 1 - indirect exposure to TB patients (e.g. healthcare employees in hospital departments) or Group 2 - indirect exposure (e.g. travellers and preventing occupational TB). Several scholars (e.g. Dumas, La Rosa, Mendling, & Reijers, 2013; Jenabati, Huang, Ismail, Satar, & Radzi, 2014; Jehanzeb & Bashir, 2013; Hameed & Waheed, 2011) have demonstrated that organizational performance is positively influenced by organizational processes and employee skills development, which are discussed in the next sections.

### **2.3 Organizational Processes**

Organizational processes are defined as “structured, measured sets of activities that together - and only together - transform inputs into outputs” (Dumas et al., 2013). By providing adequate information flow – both vertically and horizontally, organizational processes are a vital element in ensure that an organization’s goals are effectively achieved (Dumas et al., 2013). In terms of TB infection prevention and control, organizational processes mainly include (i) facility-level TB infection controls; (ii) administrative controls; (iii) environmental controls; and (iv) effective use of personal protective equipment (WHO, 2009).

The goal of the Uganda tuberculosis (TB) infection control guidelines is to guide management staff and health care workers, congregate settings managers and

household heads to minimize the risk of TB transmission at Ugandan facilities in the whole country. This guideline has been designed to address this gap and therefore is an addendum to the 2005 national infection control guideline (UNTBIC, 2005).

*Facility-level TB infection controls* activities constitute the framework for setting up and implementing the other controls at facility level. These managerial activities should ensure political commitment and leadership at facility level as well as at national level (Nardell & Dharmadhikari 2010). They include identification and strengthening of local coordinating bodies and development of a facility plan (including human resources) for implementation of TB infection control. The plan should also include policies and procedures to ensure proper implementation of the administrative controls, environmental controls and use of particulate respirators. Rethinking the use of available spaces to optimize the implementation of infection control measures is also crucial. Other facility-level managerial activities include on-site surveillance of TB disease among health workers and assessment of facility, ACSM (for patients, staff and visitors), monitoring and evaluation, and participation in research efforts, in line with the national research agenda (WHO, 2009).

*Administrative controls* should be implemented as the first priority because they have been proven to reduce transmission of TB in health-care facilities. They play a crucial role in ensuring that people with TB symptoms can be rapidly identified and, if infectious, can be separated into an appropriate environment and treated promptly. Potential exposure to people who are infectious can be minimized by reducing or avoiding hospitalization where possible, reducing the number of outpatient visits, avoiding overcrowding in wards and waiting areas, and prioritizing community-care approaches for TB management (WHO, 2009). The administrative controls should be

complemented by the environmental controls and personal protective equipment, because evidence shows that these measures also contribute to a further reduction of transmission of TB (WHO, 2009).

The *environmental controls* implemented will depend on building design, construction, renovation and use, which in turn must be tailored to local climatic and socioeconomic conditions. However, installation of ventilation systems should be a priority, because ventilation reduces the number of infectious particles in the air. Natural ventilation, mixed-mode and mechanical ventilation systems can be used, supplemented with ultraviolet germicidal irradiation (UVGI) in areas where adequate ventilation is difficult to achieve (WHO, 2009).

In addition to administrative and environmental controls, the use of *personal protective equipment* (particulate respirators) is recommended for health workers when caring for patients or those suspected of having infectious TB (WHO, 2009). Visitors should also wear particulate respirators when in enclosed space with infectious cases. Considering the risk of stigma that the use of particulate respirators may generate, there should be a strong focus on behaviour-change campaigns for health workers, patients and communities. Particulate respirators should not be used by patients or people suspected of having infectious TB; rather, surgical masks are appropriate in such cases, to ensure proper cough etiquette. In particular, health workers should use particulate respirators: (i) during high-risk aerosol-generating procedures associated with high risk of TB transmission (e.g. bronchoscopy, intubation, sputum induction procedures, aspiration of respiratory secretions, and autopsy or lung surgery with high-speed devices); and/ or when providing care to

infectious MDR-TB and XDR-TB patients or people suspected of having infectious MDR-TB and XDR-TB (WHO, 2009).

This study is focused on administrative controls, environmental controls, and personal protective equipment, which should be implemented together because they complement one another. The link between organizational processes and organizational performance has been evidenced by a number of researchers such as Jenabati et al. (2014) and Dumas et al. (2013), hence the need to investigate this relationship in the context of the Namibian public healthcare which is under-researched in this regard.

#### **2.4 Employee Skills Development**

Skills development denotes the “planned and systematic modification of behavior through learning events, programmes and instruction, which enable individuals to achieve the levels of knowledge, skill and competence needed to carry out their work effectively” (Jehanzeb & Bashir, 2013). Many healthcare employees may lack the ability to engage in continuous reflective practice to deal emerging TB infection control challenges due to a lack of sustained skills development opportunities. Moreover – with regard to personal protective equipment – a comprehensive training programme is recommended healthcare workers in the use of particulate respirators should be implemented, because correct and continuous use of respirators involves significant behaviour change on the part of the health worker (WHO, 2009).

According to Hameed & Waheed (2011) and Jehanzeb & Bashir (2013) skills development is concerned with the development of people’s expertise and knowledge. What is interesting is the planned characteristic of process, which is

underlined by Hameed & Waheed (2011) with regards attitude modification, knowledge improvement, and skill or behavior adjustment through learning involvements for the achievement of enhanced performance. Through the process of skills development, employees acquire new - and enhance their existing - skills, practices and approaches which help them to establish and maintain their jobs. Skills development has also been defined as a situation where an expert works with a learner to transfer to them certain area of knowledge and skills in order to improve current job (Hameed & Waheed, 2011). Skills development is also viewed as a “planned effort by an organization to facilitate employees learning of the job-related competencies” (Jehanzeb & Bashir, 2013).

Irrespective of how long one has been working for a certain organization, sustained skills development can be a crucial element for the enhancement of employee’s effectiveness (Jehanzeb & Bashir, 2013). The focus of several programs of employee skills development is novel skills, methods, and notions that may have unknown or unavailable at the time of initial recruitment. However, effective programs in this regard not only focus on job-related skills but also emotional reinforcement to handle wide-ranging circumstances (Hameed & Waheed, 2011). For example, one important aspect that should be emphasized is healthcare workers’ confidence-building and reflective practice as this can be beneficial in all aspects of one’s life. It has been demonstrated that organizations that invest adequately in programs of employee skills development enjoy improved organizational performance (Jehanzeb & Bashir, 2013; Hameed & Waheed, 2011).

## 2.5 Literature Gap

Despite heightened interest by scholars in exploring the influence of organizational processes and employee skills development on organizational performance (e.g. Dumas, La Rosa, Mendling, & Reijers, 2013; Jenabati et al., 2014; Jehanzeb & Bashir, 2013; Hameed & Waheed, 2011), there is a dearth of literature in this regard in the Namibian public healthcare context. Hence the need to alleviate this literature gap. By proposing a model of organizational performance and its key determinants in the Namibian public healthcare facilities, this study offers a notional support and contributes to fill the prevailing research gap in this regard.

## 2.6 Chapter Summary

In light of prior studies, the chapter discussed working organizational performance and its key determinants, namely organizational processes and employee skills development. In this study, the effectiveness of TB infection prevention and control *is assessed by the organizational performance* of the concerned public healthcare facilities, which was defined as “a set of financial and nonfinancial indicators which offer information on the degree of achievement of objectives and results” (Jenatabadi, 2015). *Organizational processes* were defined as “structured, measured sets of activities that together - and only together - transform inputs into outputs” (Dumas et al., 2013). And *employee skills development* was defined as “planned and systematic modification of behaviour through learning events, programmes and instruction, which enable individuals to achieve the levels of knowledge, skill and competence needed to carry out their work effectively” (Jehanzeb & Bashir, 2013). The chapter that follows discusses the methodology followed to achieve the objectives of the study.

## CHAPTER 3 RESEARCH METHODOLOGY AND DATA ANALYSIS

### 3.1 Introduction

The aim of this research was to understand the effect of organizational processes and employee skills development on the effectiveness of tuberculosis infection control in public healthcare facilities, and in so doing serve as a guiding instrument for public healthcare facilities managers and policy-makers for the development of appropriate policies and programmes to enhance the effectiveness of tuberculosis infection control in public healthcare facilities. To attain this research aim, the following objectives of the study needed to be realized:

- To determine the level of effectiveness of tuberculosis infection control in public healthcare facilities in the Khomas region;
- To assess the impact of organizational processes on the effectiveness of tuberculosis infection control in public healthcare facilities in the Khomas region; and
- To gauge the influence employee skills development on the effectiveness of tuberculosis infection control in public healthcare facilities in the Khomas region.

Meeting the research objectives requires that the researcher follow a well-thought-out research methodology. The methodology followed in this study is presented in this chapter. According Morris & Sexton (1996) cited in Scheepers (2007), this chapter needs to “elaborate on the sample, measurement instruments and data collection process. Statistical analyses performed are also presented here”.

Bhattacharjee (2012) underlines that “enough details need to be provided in this chapter to evidence the understanding by the researcher of the chosen methodology and to allow any other reasonably knowledgeable future researcher to be capable of replicating the study if he/she so desires.”

### **3.2 Research Model and Hypotheses**

When a suggestion is advanced as a statement for empirical examination, it is called a “hypothesis”. Bhattacharjee (2012) posits, “Hypotheses are educated guesses about a problem’s solution, or expectations about groups in a population expressed in empirical testing”. In addition, Scheepers (2007) notes that “the functions of hypotheses are to provide a framework for and give direction to the study, and create certain boundaries or limits within which a problem should be examined.”

Grounded on the problem statement and the reviewed literature, this study seeks to expand the body of knowledge in the area TB infection prevention and control by advancing and testing a model, which postulates organizational processes and employee skills development as determinants of the effectiveness of tuberculosis infection control in public healthcare facilities. The research model is presented in Figure 3-1.

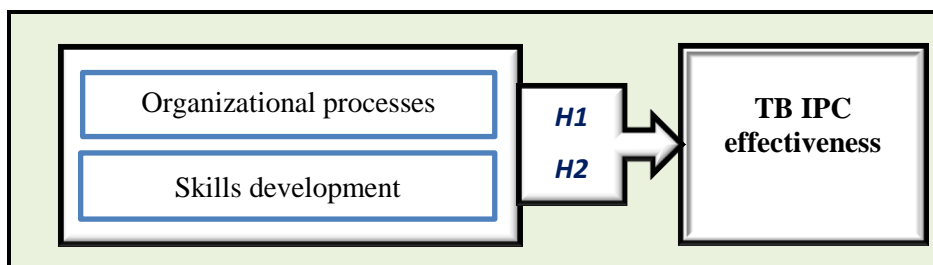
Several scholars (Dumas et al., 2013; Jenabati et al., 2014) have demonstrated a positive association between organizational processes and organizational performance. It therefore stands reasonable to assume that this is also the case in the context of the Namibian public healthcare sector. Consequently, the first hypothesis is formulated:

- **H1:** *A positive association exists between organizational processes and the effectiveness of tuberculosis infection control in public healthcare facilities in the Khomas region.*

Given that employee skills development has been proven by a number of researchers (Azara & Sye, 2013; Johanson & Adam, 2012; Poorhosseinzader & Subramanian, 2012) to positively influence organizational performance, the second hypothesis is thus deduced:

- **H2:** *There is a positive relationship between employee skills development and the effectiveness of tuberculosis infection control in public healthcare facilities in the Khomas region.*

**Figure 3-1 Research model: Organizational processes and skills development on TB IPC effectiveness**

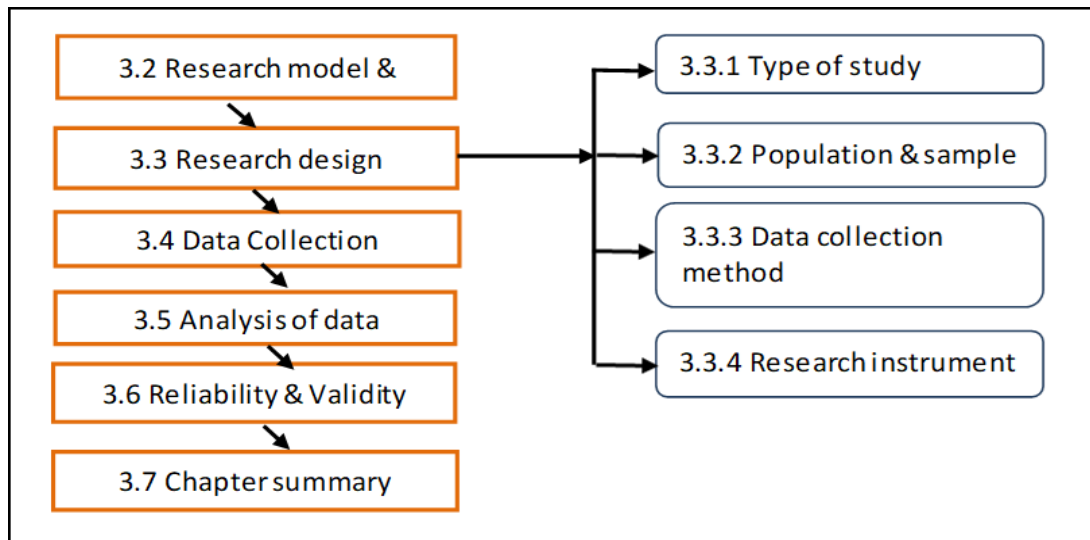


**Source:** Developed by the researcher based on Mutuku & Mathooko (2014).

### 3.3 Research Design

Bhattacharjee (2012) refers to a research design as “a framework or detailed blueprint to guide a research project towards its objectives”. Bhattacharjee (2012) emphasizes that “the methodology addresses the following decision stages: the type of study, the target population and sample, the data collection method, the research instruments used, and how the collected data are analysed”.

The structure and layout of the research methodology are depicted in Figure 3-2.



**Figure 3-2. Structure of the research methodology**

**Source:** Developed by the researcher based on Scheepers (2007, p.15)

### ***3.3.1 Type of Study***

This study used a quantitative, descriptive, evaluative approach to assess the influence of organizational processes and employee skills development on the effectiveness of tuberculosis infection control in public healthcare facilities in the Khomas region. In a *quantitative study*, behaviours, attitudes, and perceptions are quantified through the generation of numerical data, and findings from a larger population sample are generalized (Bhattacharjee, 2012; Singleton & Straits, 2010). The main aim of descriptive research is to provide an accurate and valid representation of (encapsulate) the factors or variables that pertain / are relevant to the research question.

Such research is more structured than exploratory research. The gathering of data in this regard is usually done using methods which mainly include a variety of survey types “such as mail/e-mail, (self-administered) questionnaires, personal face-to-face

interview, administered questionnaires, and a telephone interview” (Bhattacharjee, 2012). The population and sample, data collection, and data analysis methods are discussed below.

### ***3.3.2 The Population and Sample***

A population is “the total collection of elements about which inferences are to be made” (Singleton & Straits, 2010)). The population for this study comprised nurses and doctors from Windhoek Central Hospital and Katutura Intermediate Hospitals (TB hospital) and all ten (10) public Primary health care clinics where TB patients were managed on a routine basis in Windhoek district. A sample of hundred (100) nurses and doctors were selected and a questionnaire survey was administered to them. The following categories were included in the study; the management level, medical doctors, nurses, student nurses ranging between the age of 21years to 50 years plus.

The sample was selected based on *purposive sampling*. According to Palys (2008), a “purposive sample is a non-probability sample that is selected based on characteristics of a population and the objective of the study.” A homogeneous purposive sampling was used for this study as the selected participants had a shared characteristic or set of characteristics (Palys, 2008) – they were all public health employees.

### ***3.3.3 Data Collection Approaches and Methods***

According to Bhattacharjee (2012), a “variety of collection methods could be used to collect data, such as observation, testing, analysis of secondary texts and surveys.” Bhattacharjee (2012) further notes that “three methods may be used to collect data in

surveys: mail (self-administered) questionnaires, personal face-to-face interview-administered questionnaires, and a telephone interview.” Each one of these approaches has its strong points and flaws, which have to be taken into consideration in light of the study. Data were collected between December 2015 and July 2016, within all the public healthcare facilities.

Singleton and Straits (2010) note that “self-administered questionnaires are generally economical (needing limited resources in terms of cost and staff) and quicker to complete than face-to-face interviews or administered questionnaires.” Moreover, the approach allows the participants to provide the required responses at the time of their own convenience but within the deadline. However, there is a risk of participants’ reluctance to avail certain information that they might consider confidential. Furthermore, some answers to certain questions may be omitted if participants encounter problems in remembering certain aspects in this regard (Bhattacharjee, 2012; Singleton & Straits, 2010).

The advantage of interview-administered questionnaires is that “they turn out fewer incomplete questionnaires, the correct respondent can more easily be identified, the questions may be clarified and it is a more effective method than self-administered questionnaires for collecting confidential information” (Scheepers, 2007). In addition, “data collectors are able to make important observations based on the quality of interaction - whether the respondent had difficulty in answering certain questions or was hostile, and so on” (Singleton & Straits, 2010). The main weakness is that this approach is costly and time-consuming.

In light of the appraisal of advantages and disadvantages on these different methods, and because participants were in geographically dispersed locations, a decision was taken to use a self-administered questionnaire survey.

### 3.3.4 The Measurement Instrument

Based on the literature, the measurement instrument was developed to assess the different variables of the research model. The variables were measured using a 6-point Likert scale, which provided response categories for participants to rate their answers to statements, making the questions simple to answer. The questionnaire is summarized and presented in detail in Appendix 1.

#### 3.3.4.1 Scales of Measurement

There are “four scales of measurement [which] can be used when designing a questionnaire: *nominal, ordinal, interval, and ratio*” (Bhattacharjee, 2012). Ordinal scales were used for this study. In an ordinal scale, “the relative position of items on a characteristic can be indicated, but not the magnitude of the difference between the positions” (Bhattacharjee, 2012).

**Table 3-2 Summary of the variables, type of questions, question numbers and scale**

QUESTIONS	APP <sup>1</sup> & QUESTION NUMBER.	SCALE
<b>Organizational Processes</b>		
Prompt identification of people with TB symptoms (triage), separation of infectious patients, control of the spread of pathogens (cough etiquette and respiratory hygiene) and minimization of time spent in health-care facilities; Provision of a package of prevention and care	<i>App 1:</i> P1 to P20	Ordinal

<sup>1</sup> “App” is used as an abbreviation for “Appendix” in table 3.1.

interventions for health workers including HIV prevention, antiretroviral therapy and isoniazid preventive therapy for HIV-positive health workers; Minimization of diagnostic delays; Use of ventilation systems; Use of upper room or shielded ultraviolet germicidal irradiation fixtures; and Use of particulate respirators.		
<b>Skills Development</b>		
Exposure to contemporary TB control methods; training support for relevant personnel; opportunity for career development within the organization; opportunities for employees to cross-train and learn new skills; training and development opportunities linked to organization's strategic direction; and comprehensive & systematic training programme for health workers in the use of particulate respirators.	<i>App 1:</i> SD1 to SD6	Ordinal
<b>TB IPC Effectiveness</b>		
Commendable outputs such as TB IPC goals, quality of service, cost-effectiveness, and task performance; Effectiveness ensured by adequate people and processes; Good work atmosphere; High level of employee job satisfaction; Adequate capacity to react appropriately and expeditiously to change; Adequate internal strength (financial resources; physical assets and materials supply; and quality and diversity of staff); Good reputation for service delivery; and Stakeholder satisfaction.	<i>App 1:</i> OP1 to OP8	Ordinal

**Source:** Developed by the researcher (Morris & Sexton, 1996) cited in Scheepers (2007)

Table 3-1 above presents the constructs used to measure each variable. The operationalization of the variables is done below.

#### ***3.4.4.2 Operationalising the Variables***

The research instrument was designed to measure the following:

- Dependent variable: TB IPC effectiveness (refer to Appendix 1, questions OP1 to OP8).

The research model presents TB IPC effectiveness as the dependent variable, which is assessed by organizational performance of public healthcare facilities. In Section 1.10, *organizational performance* was defined as “a set of financial and nonfinancial indicators which offer information on the degree of achievement of objectives and results” (Jenatabadi, 2015).

- Independent variables:
  - Organizational processes (refer to Appendix 1, questions P1 to P20).
  - Employee skills development (refer to Appendix 1, questions SD1 to SD6).

The key determinants of TB IPC effectiveness – organizational processes and employee skills development – are the independent variables and they are briefly reviewed:

*Organizational processes* were defined as “structured, measured sets of activities that together - and only together - transform inputs into outputs” (Dumas et al., 2013).

*Skills development* was defined as “planned and systematic modification of behaviour through learning events, programmes and instruction, which enable individuals to achieve the levels of knowledge, skill and competence needed to carry out their work effectively” (Jehanzeb & Bashir, 2013).

Having designed the research instrument and decided on the appropriate method for collecting the data, the collection of data was undertaken as discussed in Section 3.4 below.

### **3.4 Data Collection**

The implementation of the survey methodology and the collection of data were done during this stage. Data were collected using a self-administered questionnaire survey. The researcher distributed the questionnaires herself during the course of the data collection period, to all respective public health facilities between December 2015 and July 2016. Some questionnaires were delivered and collected to participants same, while some questionnaires were collected the next day. The duration of data collection took eight (8) months, due to the nature of the work condition of the health care workers.

This method was preferred because it is quicker, cheaper, and allows participants to comfortably respond to the questions at their own convenient time, within the deadline (Brink, 2013). The response rate was 100%. No missing data were recorded.

### **3.5 Pilot Study**

Pilot study is a small –scale trial run of an actual research according to Brink, Vd Walt & Van Rensburg (2013). The population for the pilot study was conducted at the Primary Health care clinic Donkerhoek with five (5) participants during the period of 5<sup>th</sup> December 2016 to investigate the feasibility of the study. The findings helped the researched to modify the questionnaires.

### **3.5 Data Analysis**

The conversion of the gathered data into an informative format in line with the research problem is done at this phase. Singleton and Straits (2010), as well as Bhattacharjee (2012), advance that when data are processed, they need to be

tabulated and then analysed. Data preparation is the process of extracting data from questionnaires so that they can be read and manipulated by computer software. Preparing data involves validating, editing, coding, entering and then cleaning the data. To analyse the gathered data, this study made use of descriptive statistics and inferential statistics. The relevant statistical tests used for the measurement scales are presented in Table 3-2 below

**Table 3-1 Summary of the descriptive and inferential statistical tests used in the study**

Measurement Scale	Permissible Statistics	
	Descriptive Statistics	Inferential Statistics
Ordinal Scales	Frequency, Mean, Standard Deviation, Correlation analysis	Partial Least Squares

**Source:** Adapted from van Elst (2015)

As table 3-2 indicated, two options are available to researchers when it comes to data analysis. The description of data was done using descriptive statistics, which are used to describe data, and the strength of the relationships between the variables is assessed using inferential statistics.

### ***3.5.1 Descriptive Statistics***

Descriptive statistics “describe the characteristics of the participants, as illustrated below. The table below illustrated that more nurses participated than any other health category, with the age category from 21 -50+ years. Female participants dominated the male participants.

**Table: 3-3 Summary of the categories of HCWs and age categories**

Category	21-25	26-30	31-35	36-40	41-45	46-50	50+	Total
Nurse	4	6	16	7	6	17	7	63
Student nurse	6	1	1	0	1	0	0	9
Doctor	0	2	1	3	2	1	1	10
Management	0	2	1	3	5	4	3	18
Total	10	11	19	13	14	22	11	100

Descriptive statistics use frequencies, means, modes, medians, standard deviations, and the coefficient of variation to summarise the characteristics of large sets of data” (van Elst, 2015). This study made use of the following descriptive statistics:

- **Frequencies:** This “refers to actual number or percentage of responses to certain questions” (van Elst, 2015).
- **Mean:** A mean is “the sum of the values for all observations of a variable divided by the number of observations. It measures the central tendency, i.e. the average response of participants” (van Elst, 2015).
- **Standard deviation:** The “standard deviation is the measure of average dispersion of the values in a set of responses around their mean” (van Elst, 2015).

The description of the various relationships between the variables was done using a correlation analysis.

### ***3.5.1.1 Correlation Analysis***

According to van Elst (2015), correlation analysis “refers to the degree to which changes in one variable are associated with changes in another.” It seeks to establish the potential existence of a linear connection between variables. Two correlation types are commonly utilised by researchers: “*Pearson product moment correlation* and *Spearman correlation coefficient*” (Hair, Black, Babin & Anderson, 2006). The

Pearson correlation is habitually utilised when interval or ratio scales are involved. When the data is ordinal, the Spearman correlation is utilised, as it was the case in this study.

As stated by van Elst (2015), “the descriptive measure coefficient or correlation ( $r$ ) is a measure of the degree of association between two variables and indicates the estimated extent to which the changes in one variable are associated with changes in the other on a range of +1.00 to -1.00”, with +1.00 designating a perfect positive association, and -1.00 indicating a perfect negative connection. A score of 0.00 means that there is no link whatsoever between the variables. Elaborating on this, Maitra and Yan (2008) note that “in case of a positive correlation between two variables, a higher score of one variable tends to indicate a higher score on the other. For a negative correlation, a higher score on one variable tends to indicate a lower score on the second variable.” The correlation scores for this study are presented in Chapter 4.

### ***3.5.2 Inferential Statistics***

According to van Elst (2015), “inferential statistics allow researchers to make inferences about the true differences in the population on the basis of the data. A basic principle of statistical inference is that it is possible for numbers to be different in a mathematical sense, but not significantly different in a statistical sense”. A certain significance level is chosen to define the statistical differences. The most commonly used significance levels are the range of 5% to 1%. This range was deemed appropriate for this study.

Inferential statistics are also utilised to test hypotheses. The “aim of a hypothesis test is to determine the probability that the difference between the value of a variable, as estimated from a sample, and the value of that same variable, as estimated from another sample, is the result of random characteristics of the sample” (Scheepers, 2007).

The study used *Partial Least Squares* (PLS) regression analysis to determine the strength of each relationship hypothesized by the study model. The preference for this regression method was motivated by the fact that it is an appropriate method when the study variables are numerous and characterised by high levels of collinearity. Moreover, “the method does not necessitate a vast sample or data which is normally distributed” (Maitra & Yan, 2008; Abdi & Williams, 2013). The following section provides a further discussion on the Partial Least Squares regression.

### ***3.5.2.1 Partial Least Square***

In the words of Abdi and Williams (2013), “Partial Least Squares (PLS) is a method for constructing predictive models when the factors are many and highly collinear”. Abdi and Williams (2013), stress that there is a difference between this method and other regression analysis methods. Abdi and Williams (2013) underline that in the PLS context, the meaning of the term ‘latent’ is not the same as in other regression analysis methods. According to Maitra and Yan (2008):

“PLS regression finds components from X that are also relevant for Y. Specifically, PLS regression searches for a set of components (called latent variables) that perform a simultaneous decomposition of X and Y with the

constraint that these components explain as much as possible the covariance between X and Y”.

To assess the paths’ and path coefficients’ significance, bootstrap confidence intervals are utilised.

### ***3.5.2.2 Bootstrap Confidence Intervals***

The aim of the bootstrap is to carry out familiar statistical calculations, such as standard errors, biases, confidence intervals among others, in an unfamiliar way by purely computation means, rather than using mathematical formulas (Maitra & Yan, 2008; Abdi & Williams, 2013 ). While the bootstrap concept has been developed based on comprehensive mathematical notions, this is past this study scope. Abdi and Williams (2013) stress that “the bootstrap interval’s lower and upper limits should not include 0”.

A detailed discussion about the descriptive and inferential statistics that this study used was provided in this section. The section that follows elaborates on how the reliability and validity of the research instrument were evaluated.

## **3.6 Validity and Reliability**

The importance of evaluating the research instrument based on the “validity and reliability” criteria has been underscored (Cooper & Schindler, 2006). As stated by Scheepers (2007), “the data gathered in a research survey needs to be reliable and valid if the survey results are to be credible”.

### **3.6. 1. Validity**

According to Cooper and Schindler (2006), “validity refers to the extent to which a measure or set of measures correctly represent the constructs of the study. It is thus concerned with how well the construct is defined by the measure(s).” A further definition is provided by Bhattacharjee (2012) who suggests that validity “could be defined as the extent to which differences in observed scale scores reflect true differences between objects on the characteristics being measured, rather than systematic or random error surveys”. In other words, “validity is the extent to which a set of measured items actually reflects the theoretical latent construct that those items are designed to measure” (Hair, Black, Babin, Anderson, & Tatham, 2006). In order to ensure validity the researcher distributed the questionnaires among the senior professionals to review the questionnaire. The feedback from the senior managers were incorporated in the questionnaire.

For this study, face validity was realized through the use of notional definitions and corroborated measuring instruments (Bhattacharjee, 2012; Scheepers, 2007). During the pilot testing the data collection instrument was piloted and modified. According to Maitra and Yan (2008), “face validity is established when the measurement items are conceptually consistent with the definition of a variable, and this type of validity has to be established prior to any theoretical testing”. At an elementary level, the establishment of face validity is realized through the development of measures based on well-founded theory surveys (Bhattacharjee, 2012; Scheepers, 2007).

Construct validity determines how well a test measures a theoretical construct (Lapan and Quartorali, 2009).

### 3.6.2. Reliability

According to Maitra and Yan (2008), “reliability reflects that the research instrument would yield the same findings if used at different times or if administered to the same group over and over again”. Every measurement is prone to some degree of error and the amount of obtainable information is determined by this. In light of the above, Scheepers (2007) argues “reliability refers to the consistency and stability of a score from a measurement scale, i.e. whether the results in the survey could be duplicated in similar surveys.” The reliability of variables in the research instruments is only confirmed by their clear ability to produce stable responses over several measurements of the instrument surveys (Bhattacharjee, 2012; Scheepers, 2007).

This study made use of Cronbach’s alpha coefficient to assess the internal consistency-reliability of the scale used. Cronbach’s alpha is “a measure of internal reliability for multi-item summated rating scales, and its values range between 0 and 1, where the higher the score, the more reliable the scale” (Scheepers, 2007). At a minimal level, scores ranging from 0.5 to 0.6 are deemed acceptable, while scores above 0.6 mean that the instrument is highly reliable (Bhattacharjee, 2012; Scheepers, 2007). The scores summarized in Table 3-4 below show that the scale utilized was reliable.

**Table 3-4 Reliability statistics for the scale used in this study**

<b>Construct</b>	<b>Cronbach’s Alpha</b>	<b>Number of items</b>
Organizational Process	0.87	20
Skills Development	0.72	6
TB IPC Effectiveness	0.79	8

Source: SPSS reliability results.

### **3.7 Ethical consideration**

According to Stommel and Wills (2004), ethics deals with morality which is related to issues of right and wrong and how human being behaves. The purpose of the study was explained. Informed consent is the major ethical issue in conducting research. According to Armiger (2009)"it means that a person knowingly, voluntarily and intelligently, and in a clear and manifest way, gives his consent." Informed consent is one of the means by which a patient's right to autonomy is protected.

The issue of confidentiality and anonymity is closely connected with the rights of beneficence, respect for the dignity and fidelity. The ethical principle of beneficence refers to the Hippocratic "be of benefit, do not harm". Beauchamp and Childress (2010), suggested that "the principle of beneficence includes the professional mandate to do effective and significant research so as to better serve and promote the welfare of our constituents".

Respect of those for the participants is maintained and they were offered the opportunity to withdraw from the study at any time, and were ensured of no ill effects (Brink et al, 2013).

UNAM postgraduate research committee granted permission to conduct the study as well as the ethical committee. The MoHSS also granted permission to conduct the study in their respective public health facilities, as well as the hospital and unit managers. Lastly, the participants also consented to take part in the study. The consent form included the aim, objectives and well as the duration of the study.

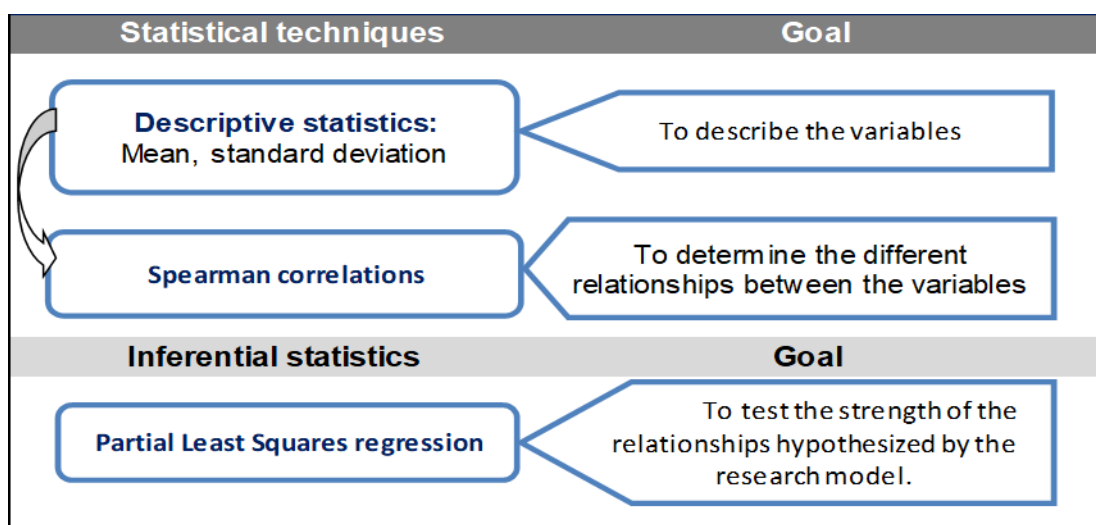
### **3.8 Chapter Summary**

The methodology used in the study was discussed in this Chapter. The research model and hypotheses were presented. The research hypotheses were that a positive association exists between organizational processes and the effectiveness of tuberculosis infection control in public healthcare facilities in the Khomas region; and that there is a positive relationship between employee skills development and the effectiveness of tuberculosis infection control in public healthcare facilities in the Khomas region. The participants were nurses and doctors from the Windhoek Central Hospital and Katutura Intermediate Hospitals, TB Hospital including ten (10) Primary health care clinics in Windhoek district. The research instrument was found to be reliable.

## CHAPTER 4 RESULTS, INTERPRETATION AND DISCUSSION

### 4.1 Introduction

This chapter reports the findings of the study. Descriptive statistics, including mean and standard deviation, are presented in the first part of the chapter. Given that ordinal data was collected, the relationships among the study variables were assessed using Spearman's correlation. As inferential statistics, the study used *Partial Least Squares* (PLS) regression analysis to determine the strength of each relationship hypothesized by the study model. The preference for this regression method was motivated by the fact that it is an appropriate method when the study variables are numerous and characterized by high levels of collinearity. Furthermore, “the method does not necessitate a vast sample or data which is normally distributed” (Maitra & Yan, 2008, ; Abdi & Williams, 2013). Figure 4.1 shows the statistical techniques used in this chapter and the intended outcome of each technique.



**Figure 4-1** Statistical techniques used in the study

**Source:** Adapted from van Elst (2015)

## 4.2 Descriptive Analysis

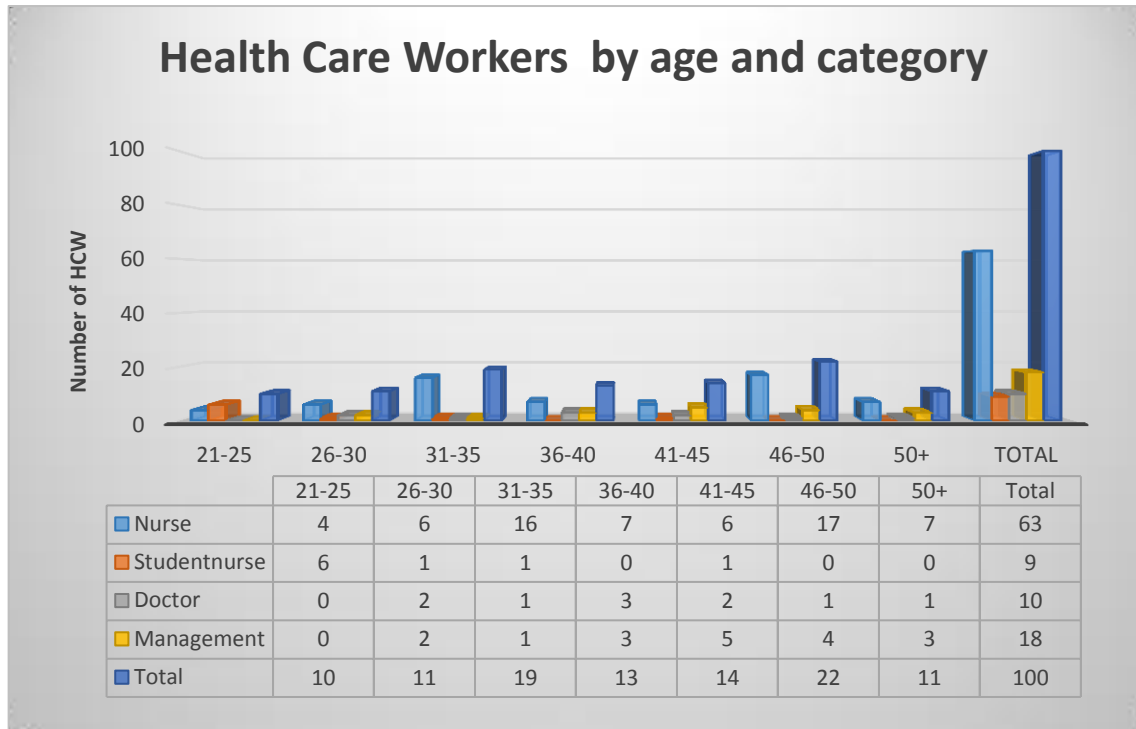
This section describes the perceptions about organizational processes, employee skills development, and organizational performance. The first step was to compute a composite score for each variable. To do this, the individual scores were totalled and an average score was calculated. Descriptive statistics of the composite variables are summarized in table 4.1.

**Table 4-1 Descriptive statistics of the composite variables (n=100)**

	N	Minimum	Maximum	Mean	Std. Deviation	Average %
Organizational Processes	100	2.450	5.450	4.327	0.742	79.39%
Skills Development	100	1.333	6.000	4.178	1.162	69.64%
TB IPC Effectiveness	100	1.375	6.000	4.333	1.141	72.21%
Valid N (listwise)	100					

**Source:** SPSS results

The minimum and maximum scores are different for different constructs as shown in Table 4.1. For instance, the minimum for organizational was 2.450, while it was 1.333 for skills development. The meaning of this is that on a scale of 1 to 6, the lowest score for organizational processes was 2.450 while 1.333 was the lowest score for skills development. In the subsequent sections, each variable is explored in line with the mean scores and data dispersion.



**Figure 4-2: Descriptive statistics of the composite variables (n=100) by age and category**

The participants were (n) = 100 in total as depicted in Figure 4.1.1. The age category varied between the ages of 21 years to 50 years plus, represented by different categories among health care workers (HCWs) or instance, the minimum age category was the student nurses followed by the medical doctors, while the maximum category was the nurses. The study was dominated by female (80) compared to male (20) participants. Even though men are the minority in the nursing profession, they still viewed themselves as leaders and being highly respected by their peers (Henle, 2007). Men are viewed as assertive, and have a sense of dominance. On the other hand, health care administrators and the general public view female nurses as caring and nurturing.

Health care workers (HCW) serve on the front lines of the battle against TB, and the risk of infection among HCWs is high. Several studies from India demonstrate that

Indian HCWs have much higher rates of TB infection and disease as compared to the general population. Extra pulmonary disease is the most common form of TB in HCWs (Pai, Kalantri, Aggarwal, Menzies & Blumberg, 2006). Among all HCWs, young trainees are the most vulnerable. Their rates of infection and diseases are exceptionally high.

Three to eight most young trainees (e.g. medical and nursing students) are exposed to TB (and presumably are infected) during their earliest clinical rotations, and some progress to active TB within the subsequent few years. In a systematic review of studies from low and middle income countries, the annual risk of Latent TB infection (LTBI) was found to vary between 0.5% to 14.3% in HCWs, while the annual incidence of TB disease ranged from 69–5,780 cases per 100 000 HCWs ( Joshi , Reingold , Menzies & Pai , 2006 ).

#### ***4.2.1 Dependent Variable: TB IPC Effectiveness***

In this study, TB IPC effectiveness was assessed by organizational performance of public healthcare facilities. *Organizational performance* was defined as “a set of financial and nonfinancial indicators which offer information on the degree of achievement of objectives and results” (Jenatabadi, 2015). It was evaluated by the participants’ perceptions on whether the healthcare facility enjoys sustained commendable outputs such as TB IPC goals, quality of service, cost-effectiveness, and task performance; effectiveness ensured by adequate people and processes; good work atmosphere; high level of employee job satisfaction; adequate capacity to react appropriately and expeditiously to change; adequate internal strength (financial resources; physical assets and materials supply; and quality and diversity of staff);

good reputation for service delivery; and client/stakeholder satisfaction. The maximum score was **6** and the mean score was **72.21%** as shown in table 4.1.

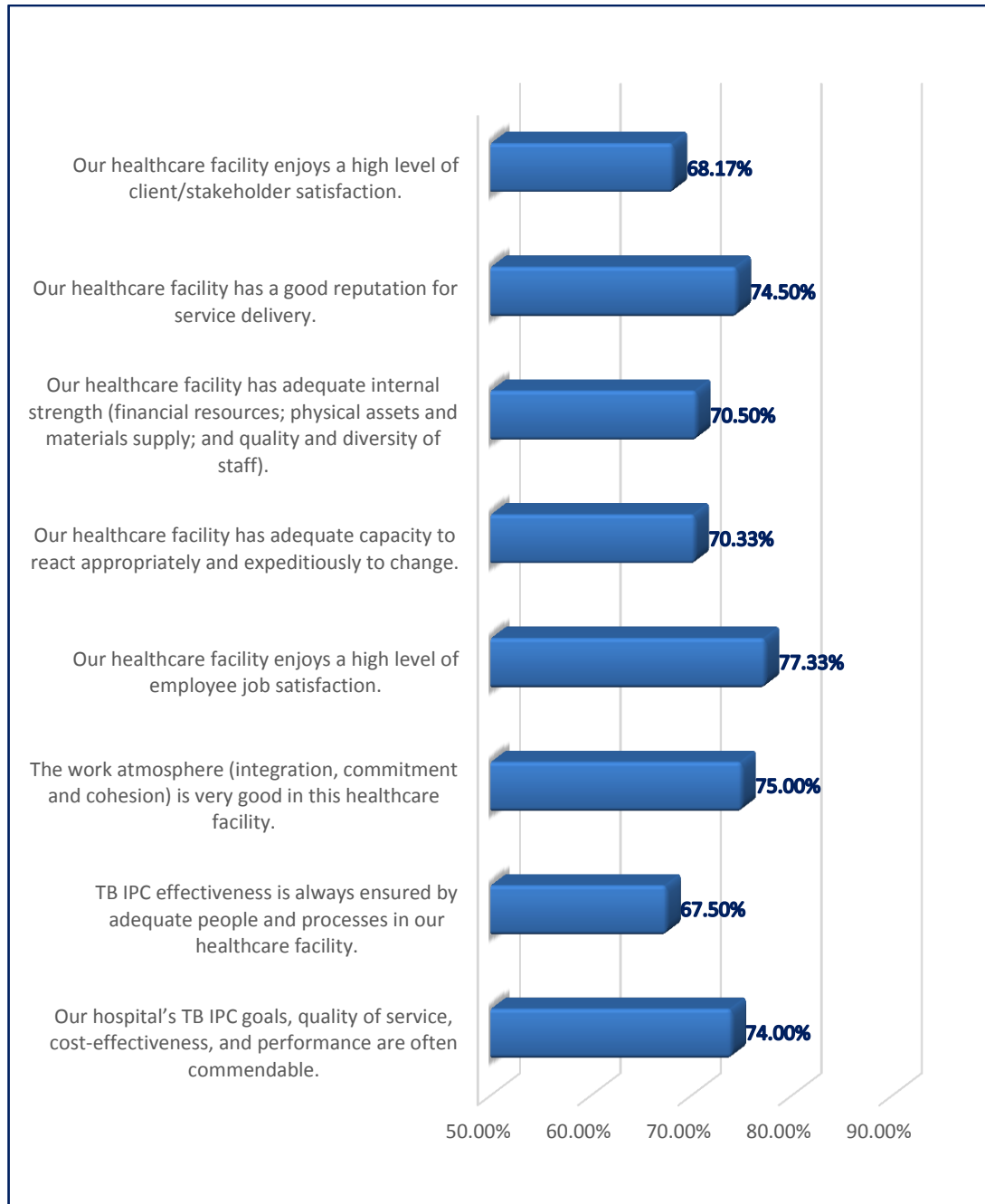
This means that 72.11% of participants were satisfied with the effectiveness level of the current TB IPC practices. Table 4.2 presents the descriptive statistics for the constructs of TB IPC effectiveness.

**Table 4-2 Descriptive statistics for the constructs of TB IPC effectiveness**

	N	Minimum	Maximum	Mean	Std. Deviation	Average %
Our hospital's TB IPC goals, quality of service, cost-effectiveness, and performance are often commendable.	100	1.000	6.000	4.440	1.459	74.00%
TB IPC effectiveness is always ensured by adequate people and processes in our healthcare facility.	100	1.000	6.000	4.050	1.445	67.50%
The work atmosphere (integration, commitment and cohesion) is very good in this healthcare facility.	100	1.000	6.000	4.500	1.586	75.00%
Our healthcare facility enjoys a high level of employee job satisfaction.	100	1.000	6.000	4.640	1.389	77.33%
Our healthcare facility has adequate capacity to react appropriately and expeditiously to change.	100	1.000	6.000	4.220	1.599	70.33%
Our healthcare facility has adequate internal strength (financial resources, physical assets and materials supply; and quality and diversity of staff).	100	1.000	6.000	4.230	1.563	70.50%
Our healthcare facility has a good reputation for service delivery.	100	1.000	6.000	4.470	1.598	74.50%
Our healthcare facility enjoys a high level of client/stakeholder satisfaction.	100	1.000	6.000	4.090	1.688	68.17%
Valid N (listwise)	100					

**Source:** SPSS results.

The mean score percentages for the constructs of TB IPC effectiveness are depicted in figure 4.2. These scores are a representation of participants who **are satisfied** with each construct. The figure above reported that the health facilities has a high level of client satisfaction as well as a good reputation for service delivery. A study done by Zinatsa (2018) found that strategies to improve TB IPC including training to improve behavioural skills and the destigmatisation of TB/HIV among HCWs and patients. HCWs are therefore always receiving refresher trainings on the importance of the IPC guidelines.



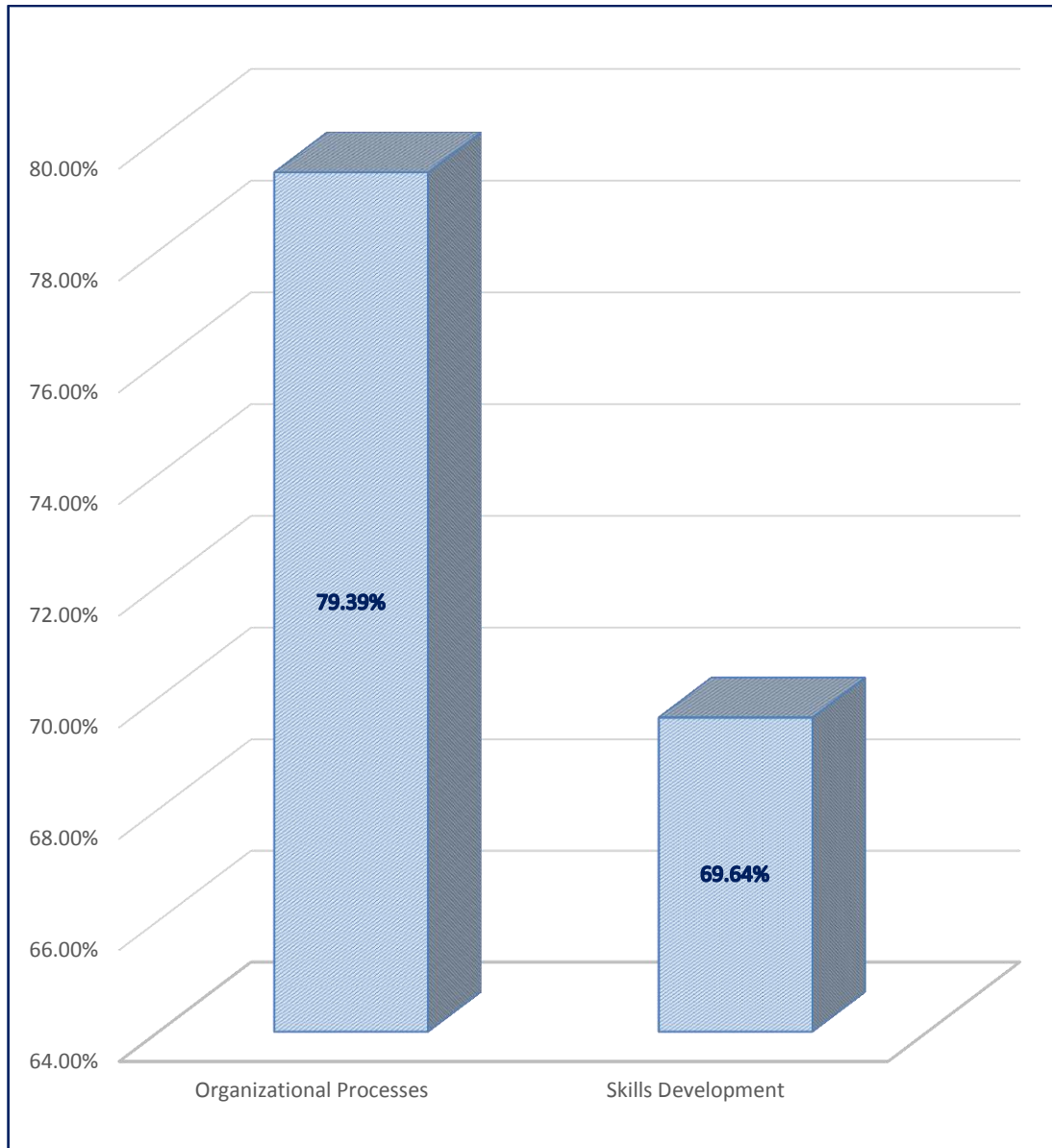
**Figure 4-3 Mean score percentages for TB IPC effectiveness**

Source: SPSS results

#### ***4.2.2. Independent Variables***

The independent variables were organizational processes and skills development.

Figure 4.3 depicts the mean score percentages for the independent variables which are discussed below.



**Figure 4-4: A bar chart of the mean score percentage for independent variables**

**Source:** SPSS results

#### ***4.2.2.1 Organizational Processes***

Organizational processes refer to “structured, measured sets of activities that together - and only together - transform inputs into outputs” (Dumas et al., 2013). As table 4.1 shows, the maximum score for cash management was 5.450 and the mean score was 79.39%. This means that **79.39%** of participants were satisfied with the existing organizational processes.

This variable was measured by the participants' perceptions about prevalence of prompt identification of people with TB symptoms (triage), separation of infectious patients, control of the spread of pathogens (cough etiquette and respiratory hygiene) and minimization of time spent in health-care facilities; provision of a package of prevention and care interventions for health workers including HIV prevention, antiretroviral therapy and isoniazid preventive therapy for HIV-positive health workers; minimization of diagnostic delays; use of ventilation systems; use of upper room or shielded ultraviolet germicidal irradiation fixtures; and use of particulate respirators.

A cross sectional study was conducted in Nepal in 28 health facilities by Shretha, Thapa & Bhattara (2018), found 190 HCWs were assessed in knowledge, attitudes and practices, 65% of the HCWs were found to be concerned about being infected with TB. Use of respirators among the HCWs was limited and triage of TB suspects was also lacking, overall knowledge and practices of HCWs on TB infection was not satisfactory. Therefore effective infection control measures including regular skills based on training and orientation for all categories of HCWs can improve infection.

#### ***4.2.2 Employee Skills Development***

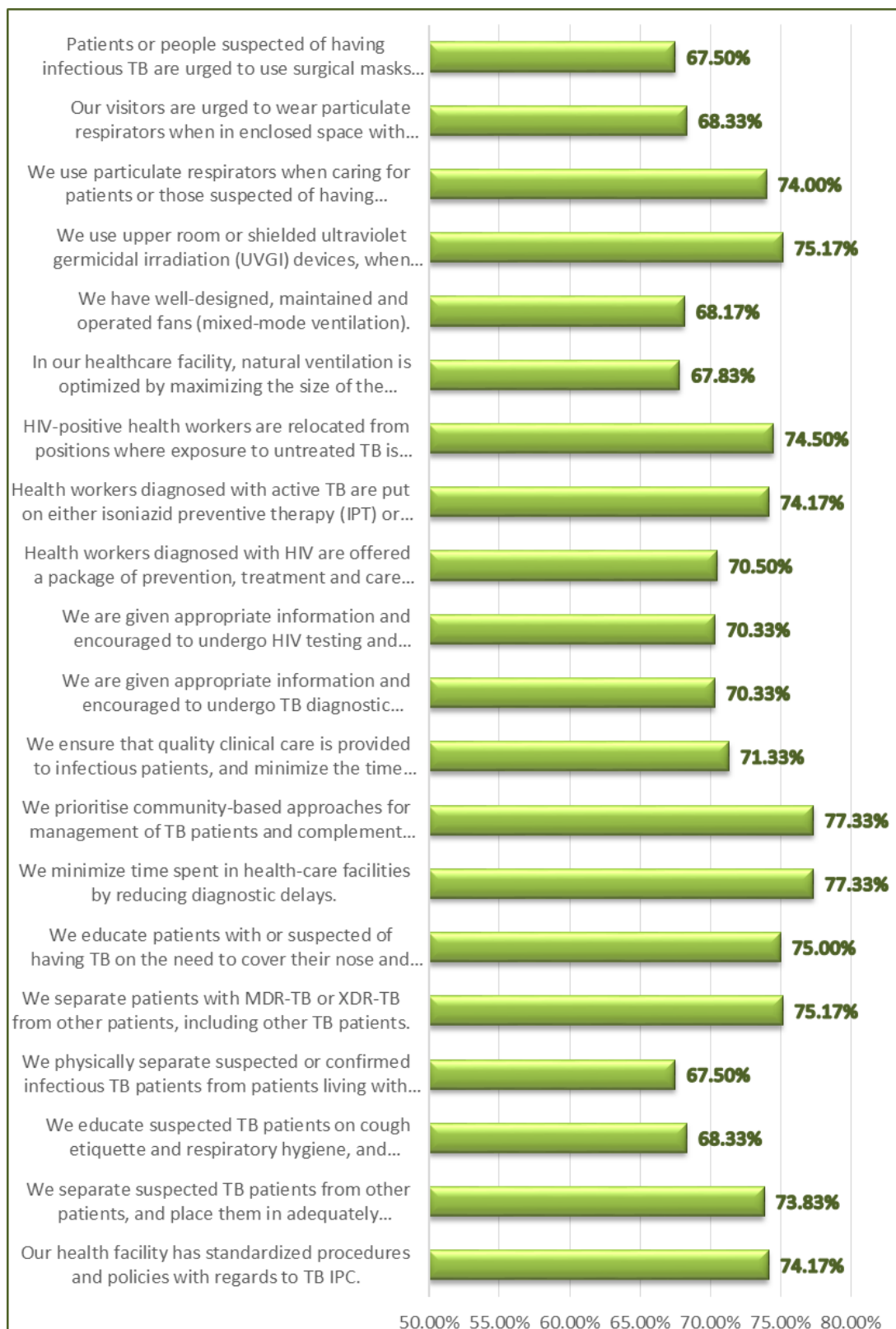
The maximum score for skills development was 6 and the mean score 69.64%, which means that 69.64% of the participants were satisfied with the current employee skills development practices. In this study, employee skills development was defined as “planned and systematic modification of behaviour through learning events, programmes and instruction, which enable individuals to achieve the levels of knowledge, skill and competence needed to carry out their work effectively” (Jehanzeb & Bashir, 2013). It was assessed by the participants' perceptions regarding

the prevalence of exposure to contemporary TB control methods; training support for relevant personnel; opportunity for career development within the organization; opportunities for employees to cross-train and learn new skills; training and development opportunities linked to organization’s strategic direction; and comprehensive & systematic training programme for health workers in the use of particulate respirators. The descriptive statistics for the constructs of skills development are presented in table 4.4 and figure 4.4 below.

**Table 4-4 The descriptive statistics for the constructs of skills development**

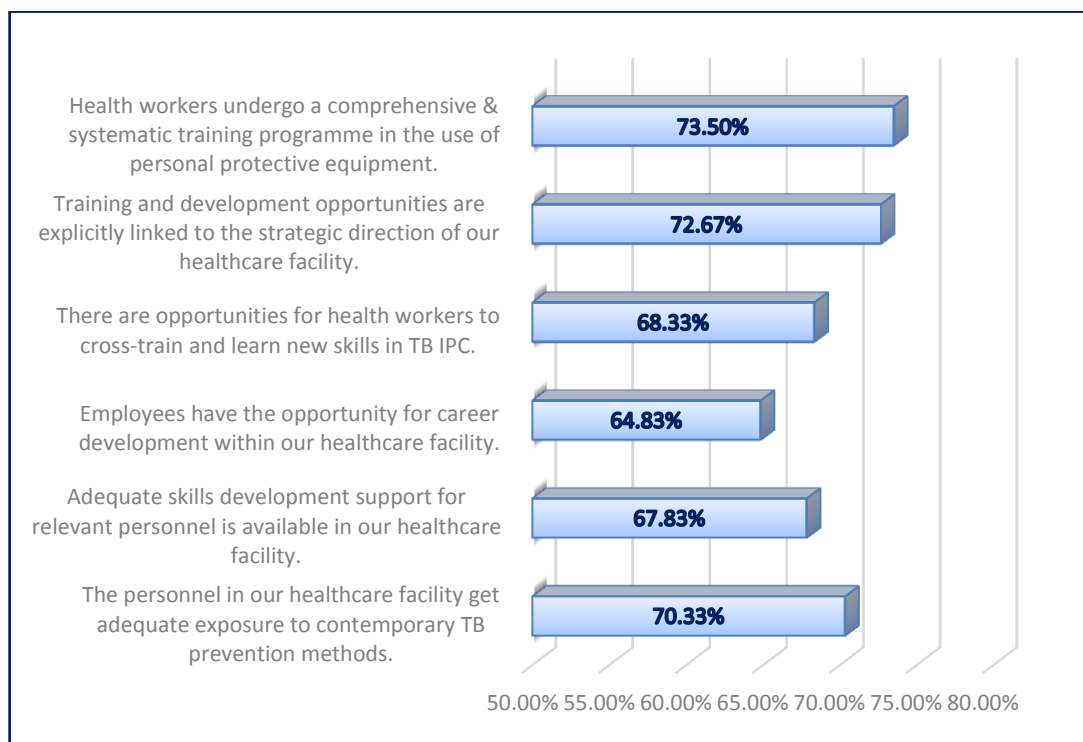
	N	Minimum	Maximum	Mean	Std. Deviation	Average %
The personnel in our healthcare facility get adequate exposure to contemporary TB prevention methods.	100	1.000	6.000	4.220	1.643	70.33%
Adequate skills development support for relevant personnel is available in our healthcare facility.	100	1.000	6.000	4.070	1.653	67.83%
Employees have the opportunity for career development within our healthcare facility.	100	1.000	6.000	3.890	1.797	64.83%
There are opportunities for health workers to cross-train and learn new skills in TB IPC.	100	1.000	6.000	4.100	1.720	68.33%
Training and development opportunities are explicitly linked to the strategic direction of our healthcare facility.	100	1.000	6.000	4.360	1.655	72.67%
Health workers undergo a comprehensive & systematic training programme in the use of personal protective equipment.	100	1.000	6.000	4.410	1.640	73.50%
Valid N (listwise)	100					

**Source: SPSS result**



**Figure 4-5: Mean score percentages for the constructs of organizational processes** Source: SPSS results

The figure above illustrated the importance of TB IPC. TB infection control is a combination of measures designed to minimize the risk of TB transmission within populations. Guidelines suggest a three-level hierarchy of controls including administrative control, environmental control, and personal protection. Administrative control decreases TB exposure risk by rapid detection, isolation, and treatment of TB patients. Environmental control reduces the concentration of airborne infectious droplets nuclei. Personal respiratory protection includes the use of respiratory masks. The third level of the TB control hierarchy is the use of personal respiratory protection equipment. Respirators are used by HCWs in certain situations in which the risk for exposure to *M. tuberculosis* may not be controlled by administrative or environmental measures alone (Jensen,2005).



**Figure 4-6: Mean score percentages for the constructs of skills development**

**Source:** SPSS results

The similar study was conducted nurses expressed concerns about the possible risk of TB transmission to both patients and staff. Factors influencing TB-IPC, and increasing the potential risk of nosocomial transmission, emerged in interconnected overarching themes. Influences related to the healthcare system included suboptimal IPC provision such as the lack of isolation facilities and personal protective equipment, and the lack of a TB-IPC policy. Further influences included inadequate TB training for staff and patients, communication barriers owing to cultural and linguistic differences between staff and patients, the excessive workload of nurses, and a sense of duty of care. Influences related to wider contextual conditions included TB concerns and stigma, and the role of traditional healers. Influences related to patient behaviour included late uptake of hospital care owing to poverty and the use of traditional medicine, and poor adherence to IPC measures by patients, family members and carers (Marais& Mehtar, 2011).

### 4.3 Correlations

The relationships among the study variables were assessed using Spearman's correlation. Table 4.7 summarises the Spearman correlation coefficients ( $\rho$ ) and p-values for the different variables.

**Table 4-3 A summary of the Spearman correlation coefficients and p-values (n=100)**

Variable 1	Variable 2	Spearman correlation ( $\rho$ )	P-value
Organizational Processes	TB IPC Effectiveness	0.834**	<0.01
Skills Development	TB IPC Effectiveness	0.640**	<0.01

*\*\*Correlation is significant at the 0.01 level (2-tailed)*

**Source:** SPSS results

Table 4.7 shows the statistically significant positive correlation between organizational processes and TB IPC effectiveness ( $\rho = 0.834$ ); and between skills development and TB IPC effectiveness ( $\rho = 0.640$ ).

#### 4.4 Partial Least Squares (PLS) regression analysis

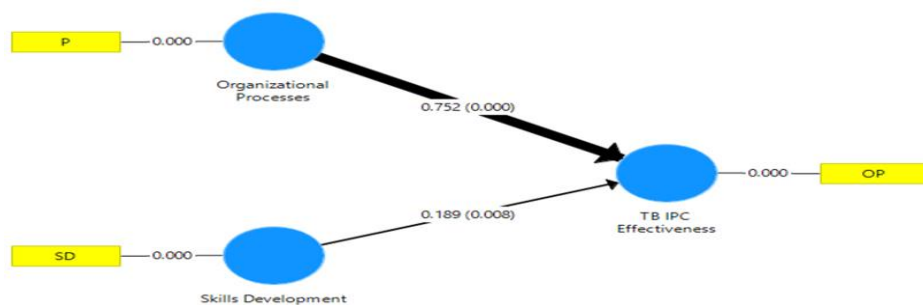
The study made use of Partial Least Squares (PLS) regression analysis to determine the strength of each relationship hypothesized by the study model (Maitra & Yan, 2008; Abdi & Williams, 2013). The bootstrap confidence intervals utilised to gauge the statistical significance for the paths and path coefficients are presented in table 4.8 below.

**Table 4-4 Bootstrap confidence intervals and paths coefficients (PLS, n=100)**

Path	Bootstrap lower (2.5%)	Bootstrap upper (97.5%)	Bootstrap mean	Path coefficients
Organizational Processes ->TB IPC Effectiveness	0.635	0.856	0.750	0.752
Skills Development ->TB IPC Effectiveness	0.051	0.321	0.189	0.189

**Source:** Smart PLS results

The paths and path coefficients determined using the Partial Least Squares regression analysis are depicted in figure 4.8 below.



**Figure 4-7 Path, strength and significance of the path coefficients assessed by PLS (n=100)**

**Source:** Smart PLS results

The first hypothesis – namely that a positive association exists between organizational processes and the effectiveness of tuberculosis infection control in public healthcare facilities in the Khomas region – is confirmed by strong statistically significant path coefficients ( $\gamma = 0.752$ ).

Finally, the second hypothesis – which suggested that there is a positive relationship between employee skills development and the effectiveness of tuberculosis infection control in public healthcare facilities in the Khomas region – is also confirmed by statistically significant path coefficients ( $\gamma = 0.189$ ).

#### **4.5 Chapter Summary**

The findings of the study were reported in this chapter. The description of the gathered data was done using descriptive analysis through the comparison and discussion of the mean scores. A statistically significant positive correlation analysis was found between organizational processes and the effectiveness of tuberculosis infection control; and between skills development and the effectiveness of tuberculosis infection control.

Finally, PLS regression analysis was used to determine the strength of each relationship hypothesized by the study model. The implications of the PLS results are that the effectiveness of tuberculosis infection control is positively influenced by organizational processes and employee skills development in public healthcare facilities in the Khomas region. This is consistent with the literature reviewed in Chapter 2, which underscored a positive relationship between these variables.

## **CHAPTER 5      CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS**

### **Introduction**

As elucidated in Chapter 1, the objective of the study was to determine how the effectiveness of TB IPC is influenced by organizational processes and employee skills development in public healthcare facilities in the Khomas region. This chapter summarizes the study findings, draws conclusions and provides relevant recommendations.

### **Aim and Objectives of the Study**

The aim of this research was to understand the effect of organizational processes and employee skills development on the effectiveness of tuberculosis infection control in public healthcare facilities. Thus, in so doing serve as a guiding as instrument for public healthcare facilities managers and policy-makers for the development of appropriate policies and programmes, to enhance the effectiveness of tuberculosis infection control in public healthcare facilities. To attain this core research aim, the following objectives of the study needed to be realized:

- To determine the level of effectiveness of tuberculosis infection control in public healthcare facilities in the Khomas region;
  - To assess the impact of organizational processes on the effectiveness of tuberculosis infection control in public healthcare facilities in the Khomas region;
- and

- To gauge the influence employee skills development on the effectiveness of tuberculosis infection control in public healthcare facilities in the Khomas region.

## **5.2 Theoretical Overview**

A review of literature was undertaken to build a theoretical model of TB IPC effectiveness and its determinants. On the basis of this, hypotheses were developed to evaluate how these determinants (organizational processes and employee skills development) are likely to influence the effectiveness of tuberculosis infection control in public healthcare facilities in the Khomas region. Thus, Chapter 2 analysed and discussed the research paradigms in line with prior studies.

In this study, TB IPC effectiveness was assessed by organizational performance of public healthcare facilities. *Organizational performance* was defined as “a set of financial and nonfinancial indicators which offer information on the degree of achievement of objectives and results” (Jenatabadi, 2015). It was evaluated by the participants’ perceptions on whether the healthcare facility enjoys sustained commendable outputs such as TB IPC goals, quality of service, cost-effectiveness, and task performance; effectiveness ensured by adequate people and processes; good work atmosphere; high level of employee job satisfaction; adequate capacity to react appropriately and expeditiously to change; adequate internal strength (financial resources; physical assets and materials supply; and quality and diversity of staff); good reputation for service delivery; and client/stakeholder satisfaction.

Organizational processes were defined as “structured, measured sets of activities that together - and only together - transform inputs into outputs” (Dumas et al., 2013). This variable was measured by the participants’ perceptions about prevalence of

prompt identification of people with TB symptoms (triage), separation of infectious patients, control of the spread of pathogens (cough etiquette and respiratory hygiene) and minimization of time spent in health-care facilities; provision of a package of prevention and care interventions for health workers including HIV prevention, antiretroviral therapy and isoniazid preventive therapy for HIV-positive health workers; minimization of diagnostic delays; use of ventilation systems; use of upper room or shielded ultraviolet germicidal irradiation fixtures; and use of particulate respirators.

Employee skills development was defined as “planned and systematic modification of behaviour through learning events, programmes and instruction, which enable individuals to achieve the levels of knowledge, skill and competence needed to carry out their work effectively” (Jehanzeb & Bashir, 2013). It was assessed by the participants’ perceptions regarding the prevalence of exposure to contemporary TB control methods; training support for relevant personnel; opportunity for career development within the organization; opportunities for employees to cross-train and learn new skills; training and development opportunities linked to organization’s strategic direction; and comprehensive & systematic training programme for health workers in the use of personal protective equipment.

#### **5.4 Research Methodology**

This study used a quantitative approach, using an evaluative and descriptive research study design for the period of 2008 to 2012. The population for this study comprised nurses and doctors from Windhoek Central Hospital and Katutura Intermediate Hospital (including TB Hospital) and ten (10) public Primary health care clinics around Windhoek district where TB patients were managed on a routine basis. A

sample of hundred (100) nurses and doctors was selected and a self-administered questionnaire.

The gathered data were analysed using the SPSS application. Data were described through the use of descriptive statistics and PLS regression analysis was utilized to determine the strength of each relationship hypothesized by the study model. Reliability and validity issues were addressed in Section 3.6.

## **5.5 Summary of Key Findings**

This section summarizes the key findings of the study, in light of the hypotheses

### ***5.5.1 Influence of Organizational Processes on TB IPC Effectiveness***

The first hypothesis – namely that a positive association exists between organizational processes and the effectiveness of tuberculosis infection control in public healthcare facilities in the Khomas region – was confirmed by strong statistically significant path coefficients ( $\gamma = 0.752$ ). These findings are consistent with the literature in Chapter 2. The managerial implications are that ensuring prompt identification of people with TB symptoms (triage), separation of infectious patients, control of the spread of pathogens (cough etiquette and respiratory hygiene) and minimization of time spent in health-care facilities; provision of a package of prevention and care interventions for health workers including HIV prevention, antiretroviral therapy and isoniazid preventive therapy for HIV-positive health workers; minimization of diagnostic delays; use of ventilation systems; use of upper room or shielded ultraviolet germicidal irradiation fixtures; and use of particulate respirators, will lead to effective TB infection prevention and control in public healthcare facilities in the Khomas region.

### ***5.5.2 Influence of Employee Skills Development on TB IPC Effectiveness***

The hypothesis that there is a positive relationship between employee skills development and the effectiveness of tuberculosis infection control in public healthcare facilities in the Khomas region was also confirmed by statistically significant path coefficients ( $\gamma = 0.189$ ). This means that ensuring appropriate exposure to contemporary TB control methods; training support for relevant personnel; opportunity for career development within the organization; opportunities for employees to cross-train and learn new skills; training and development opportunities linked to organization's strategic direction; and comprehensive & systematic training programme for health workers in the use of personal protective equipment, will contribute to effective TB infection prevention and control in public healthcare facilities in the Khomas region. This is also in line with the literature reviewed in Chapter 2.

## **5.6 Conclusions**

Despite considerable efforts by the Namibian public authorities and the development of a national TB IPC policy, numerous cases of new TB infection and MDR-TB/XDR-TB continue to be experienced in public health facilities. This raises questions as to whether or not the WHO's TB IPC policies are being properly implemented and effectively adapted to the local context. Given the shortage of literature in this regard in the context of Namibian public healthcare context, this study has contributed in supplementing the body of knowledge in the field of TB infection control by gauging the influence of organizational processes and employee skills development on the effectiveness of tuberculosis infection control in public healthcare facilities, and it is expected to serve as a guiding instrument for public

healthcare facilities managers and policy-makers for the development and implementation of appropriate policies and programmes to enhance the effectiveness of tuberculosis infection control.

The findings of this study show that the effectiveness of TB IPC is positively influenced by organizational processes and employee skills development. The implementation of TB-IC measures in health facilities should therefore be a priority. Most of the TB-IPC measures and work practices outlined in this document also apply to airborne IC in general. The purpose of these guidelines is to guide efforts aimed at reducing TB transmission in health facilities, congregate settings such as prisons and holding cells, military barracks, hostels, households and the community, through the implementation of rational, affordable and cost-effective TB-IPC measures (MOHSS,2014). The study also found that the participants were generally satisfied with the current state of affairs in terms of organizational processes, skills development, and TB IPC effectiveness. However, with limited sustained organisational strategies aimed at enhancing these factors, the effective achievement of TB IPC objectives and goals will continue to raise concerns in the public healthcare facilities. These aspects are measurable and therefore manageable. Public healthcare managers and policy-makers should therefore ensure due improvement in this regard, and thus they will require relentless support from researchers and other pertinent stakeholders.

## **5.7 Recommendations**

Based on the findings of this study, managerial interventions should focus on enhancing organizational processes and employee skills development. Although the findings of the study indicated high participants' satisfaction level with the current

state of affairs in terms of organizational processes, skills development, and TB IPC effectiveness, there is always room for improvement. Steps that can be immediately taken to address the current situation can include but are not limited to the following: strategic planning incorporated into all stages and aspects of TB IPC implementation/management ; ensuring that key personnel have the required and relevant academic or professional training in the aspects of TB IPC; comprehension of contemporary TB IPC concepts and principles by the top management of relevant departments; objectively measuring performance in terms of TB IPC implementation activities; and ensuring that there is appropriate equipment to effectively support TB IPC policy implementation contemporary.

These recommendations will only be effective if there is a strong desire and commitment on the part of the public healthcare managers and policy-makers to actively work towards improvement in this regard. It is the hope of this study that by evaluating the present TB IPC practices in public healthcare facilities, an avenue for change and transformation is possible.

### **5.8 Limitations of the Study and Opportunities for Future Research**

Grounded on this research results, the following limitations are identified and opportunities for future research are drawn:

- Only employees of public health facilities in the Khomas region were studied, therefore the findings cannot be generalised to all other public health facilities in and/or outside Namibia. Future research should cover other public health facilities in and/or outside Namibia.

- It would be worthwhile to replicate this study in other countries to establish the extent to which TB IPC effectiveness is influenced by organizational process and employee skills development in these countries' public healthcare sector, especially developing countries.
- Future researchers should use the measurement instrument developed and verified in this study as it was shown to be reliable. Nevertheless, a refinement of the instrument through the use of bigger samples and enhanced measures may lead to improved results.

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## APPENDIX 1: RESEARCH QUESTIONNAIRE

### ASSESSING THE EFFECTIVENESS OF TUBERCULOSIS INFECTION CONTROL IN PUBLIC HEALTHCARE FACILITIES IN THE KHOMAS REGION

The aim of this research is the body of knowledge in the TB infection prevention and control by assessing the effectiveness of TB IPC and potential key determinants in public healthcare facilities, and in so doing serve as a guiding instrument for public healthcare facilities managers and policy-makers for the development of appropriate policies and programmes to enhance the effectiveness of tuberculosis infection control in public healthcare facilities. This research forms part of the requirements for the Degree of Master in Public Health at the University of Namibia. Your responses will be treated as confidential and the information will not be used for commercial purposes or any other purpose.

For each of the statements below, please rate your answer and mark with (x) the appropriate box as follows:

*Strongly disagree (1); Disagree (2); Disagree moderately (3); Agree moderately (4); Agree (5); Strongly agree (6).*

There are no “right or wrong” answers to these questions; so please be as honest and thoughtful as possible in your responses. All responses will be kept strictly confidential.

		1	2	3	4	5	6
<b>Organizational Processes</b>							
P1	Our health facility has standardized procedures and policies with regards to TB IPC.						
P2	We separate suspected TB patients from other patients, and place them in adequately ventilated areas.						
P3	We educate suspected TB patients on cough etiquette and respiratory hygiene, and diagnose them as a matter of priority.						
P4	We physically separate suspected or confirmed infectious TB patients from patients living with HIV or with strong clinical evidence of HIV infection, or with other forms of immunosuppression.						
P5	We separate patients with MDR-TB or XDR-TB from other patients, including other TB patients.						
P6	We educate patients with or suspected of having TB on the need to cover their nose and mouth when sneezing and or coughing.						
P7	We minimize time spent in health-care facilities by reducing diagnostic delays.						
P8	We prioritise community-based approaches for management of TB patients and complement them with education of household members and other close contacts on TB infection control.						
P9	We ensure that quality clinical care is provided to infectious						

	patients, and minimize the time spent with such patients in areas that are overcrowded or poorly ventilated.								
P10	We are given appropriate information and encouraged to undergo TB diagnostic investigation if we show signs and symptoms suggestive of TB.								
P11	We are given appropriate information and encouraged to undergo HIV testing and counselling.								
P12	Health workers diagnosed with HIV are offered a package of prevention, treatment and care that includes regular screening for active TB and access to antiretroviral therapy.								
P13	Health workers diagnosed with active TB are put on either isoniazid preventive therapy (IPT) or a full regimen of anti-TB treatment.								
P14	HIV-positive health workers are relocated from positions where exposure to untreated TB is high to a lower risk area.								
P15	In our healthcare facility, natural ventilation is optimized by maximizing the size of the opening of windows.								
P16	We have well-designed, maintained and operated fans (mixed-mode ventilation).								
P17	We use upper room or shielded ultraviolet germicidal irradiation (UVGI) devices, when appropriate.								
P18	We use particulate respirators when caring for patients or those suspected of having infectious TB.								
P19	Our visitors are urged to wear particulate respirators when in enclosed space with infectious cases.								
P20	Patients or people suspected of having infectious TB are urged to use surgical masks to ensure proper cough etiquette.								
<b>Skills Development</b>									
SD1	The personnel in our healthcare facility get adequate exposure to contemporary TB prevention methods.								
SD2	Adequate skills development support for relevant personnel is available in our healthcare facility.								
SD3	Employees have the opportunity for career development within our healthcare facility.								
SD4	There are opportunities for health workers to cross-train and learn new skills in TB IPC.								
SD5	Training and development opportunities are explicitly linked to the strategic direction of our healthcare facility.								
SD6	Health workers undergo a comprehensive & systematic training programme in the use of personal protective equipment.								
<b>Organizational Performance</b>									
OP1	Our hospital's TB IPC goals, quality of service, cost-effectiveness, and performance are often commendable.								
OP2	TB IPC effectiveness is always ensured by adequate people and processes in our healthcare facility.								
OP3	The work atmosphere (integration, commitment and cohesion) is very good in this healthcare facility.								
OP4	Our healthcare facility enjoys a high level of employee job satisfaction.								

OP5	Our healthcare facility has adequate capacity to react appropriately and expeditiously to change.						
OP6	Our healthcare facility has adequate internal strength (financial resources; physical assets and materials supply; and quality and diversity of staff).						
OP7	Our healthcare facility has a good reputation for service delivery.						
OP8	Our healthcare facility enjoys a high level of client/stakeholder satisfaction.						

## APPENDIX 2: UNAM APPROVAL LETTER

University of Namibia, Private Bag 13301, Windhoek, Namibia  
340 Mandume Ndemufayo Avenue, Pioneerspark  
☎ +264 61 206 3111; URL: <http://www.unam.edu.na>



19 February 2015

**TO WHOM IT MAY CONCERN**

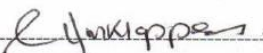
**RE: RESEARCH PERMISSION LETTER**

1. This letter serves to inform that student: **Teopolina Mulokoshi** (Student number: **8800456**) is a registered student in the School of Nursing and Public Health at the University of Namibia. Her research proposal was reviewed and successfully met the University of Namibia requirements.
2. The purpose of this letter is to kindly notify you that the student has been granted permission to carry out postgraduate studies research. The School of Postgraduate Studies has approved the research to be carried out by the student for purposes of fulfilling the requirements of the degree being pursued.
3. The proposal adheres to ethical principles.


Thank you so much in advance and many regards.

Yours truly,

Name of Main Supervisor: **Dr J M Kloppers**

Signed: -----

**Dr. C. N.S. Shaimemanya**

Signed: -----

**Director: School of Postgraduate Studies**

Tel: 2063523

**E-mail:** [cshaimemanya@unam.na](mailto:cshaimemanya@unam.na)

### APPENDIX 3: REQUEST LETTER TO THE MOHSS

To: The Ministry Of Health and Social Services  
P.O. Box 13198  
Windhoek

March 09, 2015

Subject: Request for permission to carry out a research for academic purposes

Dear Sir /Madam

I am a final year Master of Public Health student at the University of Namibia (UNAM). Doctor J.Kloppers is the supervisor and Doctor Penny Angula the co-supervisor. In partial fulfillment of my MPH, I am conducting a research to assess the Compliance to Tuberculosis Infection Control Guidelines in Public Health facilities in the Khomas Region, Namibia (A copy of the study approval is attached).

I require at least 9 clinics, a Health centre, TB Unit and the Katutura intermediate Hospital with their respective departments, as they perform screening, treating, referring and provide DOTS to TB patients.

The HCWs will complete self-administer questionnaires regarding the compliance to the TBIC guidelines while researcher will assess the KAP of HCWs with the structured checklist regarding caring and treating TB suspects, TB patients and contacts in public health facilities while observing the environment in the public health facilities.

In conclusion, I will appreciate it if you can furnish me with a letter of permission. I thank you for participating in this study.

Should you have any questions or require further information relating to the above study, kindly do not hesitate to contact me. I can be reached at the following contact numbers: (061) 212981 (after hours) or (061) 203 2437 (during office hours).

Thanking you in anticipation.

Yours sincerely

MST MULOKOSHI



## APPENDIX 4: PERMISSION LETTER GRANTED BY THE MOHSS



### REPUBLIC OF NAMIBIA

#### Ministry of Health and Social Services

Private Bag 13198  
Windhoek  
Namibia

Ministerial Building  
Harvey Street  
Windhoek

Tel: 061 – 203 2125  
Fax: 061 – 222558  
E-mail: [msimasiku@mhss.gov.na](mailto:msimasiku@mhss.gov.na)

#### OFFICE OF THE PERMANENT SECRETARY

Ref: 17/3/3

Enquiries: Mr. M. Simasiku

Date: 19<sup>th</sup> August 2015

Ms. Teopolina Mulokoshi  
P.O.Box 61698  
Katutura  
Namibia

Dear Ms. Mulokoshi

**Re: Compliance to Tuberculosis Infection control guidelines in Public Health facilities in the Khomas region, Namibia.**

1. Reference is made to your application to conduct the above-mentioned study.
2. The proposal has been evaluated and found to have merit.
3. **Kindly be informed that permission to conduct the study has been granted under the following conditions:**
  - 3.1 The data to be collected must only be used for academic purpose;
  - 3.2 No other data should be collected other than the data stated in the proposal;
  - 3.3 Stipulated ethical considerations in the protocol related to the protection of Human Subjects should be observed and adhered to, any violation thereof will lead to termination of the study at any stage;
- 3.4 A quarterly report to be submitted to the Ministry's Research Unit;
- 3.5 Preliminary findings to be submitted upon completion of the study;
- 3.6 Final report to be submitted upon completion of the study;
- 3.7 Separate permission should be sought from the Ministry for the publication of the findings.

Yours sincerely,  
  
Andrew Ndlishishi (MB)  
Permanent Secretary  
Ministry of Health and Social Services  
REPUBLIC OF NAMIBIA

## APPENDIX 5: LETTER OF CONSENT FOR PARTICIPANTS

Dear Participant

I am a final year Master of Public Health student at the University of Namibia. In partial fulfilment of my MPH, I am conducting a research to assess the compliance to Tuberculosis Infection Control Guidelines in Public Health facilities in the Khomas Region, Namibia.

Study title: Compliance to Tuberculosis Infection Control Guidelines in Public Health facilities in the Khomas Region, Namibia.

Purpose

The objective of this study: The objectives of the study are to assess the compliance to the TB-IC guidelines in the public health facilities in Khomas Region and to assess the knowledge, attitudes and practices (KAP) of the HCWs in TB control and preventive measures in public health facilities in Khomas Region.

Ethical Measures

I wish to request for your participation in this study.

Your participation will involve responding to a nine page questionnaire. The questionnaire is a face to face interview, and structured checklist will be filled in by the interviewer. Your participation in this study is voluntary. You can choose not to participate or to withdraw from the study at any time.

Confidentiality and anonymity will be ensuring. I assure you that the information you provide will be anonymous but the results may be published.

You will be informed of outcome.

The study findings will further contribute to minimize TB infection in the public health facilities to HCWs and to the community at large. That improvement would be made based on the study findings and recommendations.

Thank you.

Ms T Mulokoshi

Signature: 

Date: