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ASSESSMENT OF KNOWLEDGE AND FACTORS AFFECTING STUDENT NURSES' COMPLIANCE REGARDING STANDARD PRECAUTIONS FOR PREVENTING TUBERCULOSIS AND HIV IN ESWATINI UNIVERSITY

By

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ABSTRACT

Introduction and background: Tuberculosis (TB) and Human Immunodeficiency Virus (HIV) are among the top ten causes of death globally. To prevent the spread of these infections in a hospital setting, health care workers and students should apply a set of principles called “standard precautions”. However, student nurses were found not complying to the standard precautions for prevention of Tuberculosis and Human Immunodeficiency Virus when allocated for clinical practice in the Eswatini healthcare setting. Many studies from different countries have shown non-use of protective clothing and students' failure to adhere to standard precautions. The knowledge of student nurses on standard precautions and the factors affecting their compliance regarding standard precautions had not been determined in-depth in the past.

Aim of the study: The aim of this study was to assess knowledge and factors affecting student nurses’ compliance to standard precautions with the intention of recommending measures that can be taken to facilitate this compliance among student nurses.

Methodology: A non-experimental quantitative approach was used to conduct a survey on senior student nurses of Eswatini University using questionnaires. The total population of third, fourth- and fifth-year students was selected through census sampling method. A Statistical Package for Social Science version 26 software was used to analyze the data.

Findings: Among the student nurses asked, 91% were found to have adequate knowledge on standard precautions but they did not comply on washing hands and wearing gloves, safety glasses and aprons. Factors which influence compliance among student nurses were found to be: adequate knowledge, students’ willingness to take measure, hospital support through training and infection control policies, supportive nurses, availability of the post-exposure prophylaxis, the university’s continuous support, lack of resources and poor role-modelling.

Recommendations: The researcher recommends that TB and HIV prevention skills be demonstrated to student nurses in the skills laboratory and that clinical facilitators should accompany students in the clinical area. In the hospitals, ordering and monitoring of supplies should be done well to eliminate shortage of resources and preceptors should be exempted from other duties so that they can be able to supervise student nurses.

Key concepts: compliance, HIV, knowledge, standard precautions, student nurses, tuberculosis

Declaration regarding plagiarism

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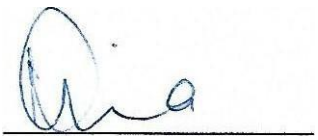
Signature  **Date: 8 December 2020**

Dedication

This study is dedicated to all nurses, preceptors and nurse educators who work very hard to save people's lives and to sustain the nursing profession.

Acknowledgements

I am grateful to God who has sustained me and allowed me to complete this study. I would also like to thank the following people who played a major role in the success of this research.

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TABLE OF CONTENTS

LIST OF ABBREVIATIONS AND ACRONYMS	
BBFs	Blood and body fluids
BCG	Bacille CalmetteGuérin
CDC	Centers for Disease Control
CINAHL	Cumulative Index of Nursing and Allied Health Literature
CLE	Clinical Learning Environment
EMTCT	Elimination of mother-to-child transmission of HIV
HAI	Healthcare associated infections
HIV	Human Immunodeficiency Virus
PPE	Personal Protective Equipment
PEP	Post Exposure Prophylaxis
PrEP	Pre-Exposure Prophylaxis
SANC	South African Nursing Council
SPSS	Statistical Package for Social Science
TB	Tuberculosis
UNAIDS	United Nations Programme on HIV/ AIDS
UNESWA	University of Eswatini
VMMC	Voluntary medical male circumcision
WHO	World Health Organization

List of figures

CHAPTER 1

OVERVIEW OF THE STUDY

1.1 INTRODUCTION AND BACKGROUND

The prevention of Healthcare Associated Infections (HAIs) has become an increasing challenge in the world (Centers for Disease Control & Prevention, 2018:1). According to Haile, Engeda & Abdo (2017:1), HAIs are considered to be a leading risk factor for patients, healthcare workers and students for morbidity and mortality in healthcare environments. One of the most essential measures used to control HAIs is the application of Standard Precautions. According to the Ministry of health (2014: 15), Standard Precautions are a group of infection control precautions used to reduce the risk of micro-organisms from both recognized and unrecognized sources of infections in health facilities. Healthcare workers and students, including student nurses should comply with Standard Precautions to protect themselves and the patients from diseases such as TB & HIV.

Tuberculosis (TB) and Human Immunodeficiency Virus (HIV) are amongst infections that student' nurses are at risk of acquiring during their clinical practice in the healthcare setting. Tuberculosis is one of the infectious diseases that is burdening the world (Brunner & Suddarths 2014:586). According to Carlsson, Johansson, Eale, & Kaboru (2014:1), TB is the second greatest killer worldwide after HIV and AIDS. According to statistics from the World Health Organization (WHO, 2018:1) in 2017, "TB caused an estimated 1.3 million deaths (range, 1.2–1.4 million) among HIV-negative people and there were an additional 300 000 deaths from TB (range, 266 000–335 000) among HIV-positive people". In Eswatini, many people are infected with HIV, the prevalence rate being at 31% among persons between ages 18-49 years (Mchunu, van Griensven, Hinderaker, Kizito, Sikhondze, Manzi et al., 2016:105). Among the countries with the highest burden of TB, Eswatini has the highest estimated incidence of TB which is 398 cases per 100,000 population and the largest number of HIV-associated TB cases with 70% of TB patients estimated to be HIV-positive (Pathmanathan, Pasipamire, Pals, Dokubo, Preko, Ao et al., 2018:2). According to Rahiman, Chikte and Hughes (2018:20) the increased prevalence of TB and HIV puts nurses, especially student nurses in sub-Saharan Africa in particular, at a higher risk of acquiring these illnesses whilst providing care to the infected population. Every day while caring for patients, student nurses are at risk for exposure to blood borne pathogens which result in infections.

Student nurses are found to be at higher risk than other categories of nurses because of knowledge deficiency as they are still learning. Student nurses according to the Nursing Act of 2005 Act No:33 are persons studying towards a nursing qualification at a university or college or any private institution accredited by the South African Nursing Council (SANC) and Council of Higher Education (Republic of South Africa 2005:6). Since nursing is mostly based on practice, student nurses require to be trained and supervised by experienced nurses through different nursing specialties to function independently and competently.

Ensuring student nurses' competence and safety is very crucial as they are considered the future competent nursing staff. However, different studies reveal that a considerable percentage of students lack knowledge and skills regarding prevention of exposure to infections and diseases such as TB and HIV whilst in training (Behnaz, Mohammadzade, Mousavi-e-Roknabadi & Mohammadzadeh, 2014:82; Earl (2010:333); Rahiman, Chikte & Hughes (2018:20). One such study of Montagna, Napoli, Tafuri et al (2014:2) which revealed that undergraduate health care students face significant exposure to TB and are at high risk of contracting TB whilst gaining clinical experience. Moreover, infection control and prevention measures also referred to as standard precautions are at the heart of the nursing training institutions and clinical facilities principals of nursing practice. The objectives of standard precautions are designed to protect healthcare workers from acquiring occupational infections and to reduce and prevent transmission of infections (El-Greeb, Ahmed, Atia & Abdel- Mouty, 2018:57; WHO, 2013; Johnson, Asuzu & Adebiyi, 2013:21).

Standard precautions are practiced in the care of all patients in health care settings, regardless of their diagnoses or infection status. These precautions include proper hand hygiene, wearing of protective clothing such as apron, gloves, masks, proper waste disposal and use of personal protective equipment. However, many studies globally have reported lack of compliance to standard precautions (El- Greeb et al., 2018:58; Liz, 2012:9). The authors further suggested that undergraduate health care students should be taught on how to prevent contraction of TB whilst at the clinical area, before being placed in the healthcare facilities. Of major significance are the various activities and teaching methods used by educators and experienced nurses to assist students to correlate theory and practice, in particular to the current study is to prevent contraction of TB and HIV infection whilst providing care to the patients. According to Xiong, Zhang, Wang, Wu, Hall & Society (2017: 389) mixed media education intervention is effective in improving knowledge, attitude, and compliance with standard precautions. In addition, supervision and follow-up on compliance of strategies and methods of prevention should be done.

Dorgahm and Obied (2016:122) are of the opinion that knowledge, self-efficacy, culture, economic and social factors are among various factors that influence the level of compliance. Furthermore, Jeong, Cho and Park (2008:742) proved that compliance with standard precautions correlates with nurses' perception of risk, type of training received, their level of practice, and the work setting's nature. Therefore, student nurses must be taught well on the importance of compliance to standard precautions and the dangers of not complying to them.

Students face various challenges in the clinical learning environment (CLE), which negatively affect their learning and non-compliance to practice standard precautions. Tong, Morulane, Mabina & Makhado (2018:3) revealed that there is actual limited supervision of students regarding handling of TB and HIV in clinical practice from professional nurses and clinical preceptors. The author further argues that there is lack of equipment in the clinical areas to accommodate both the health workers and the student nurses. Other healthcare workers reported that lack of knowledge on properly using protective barriers, lack of training, forgetfulness, lack of resources needed, facility and time limitation are other reasons for non-compliance (Yousafzai, Janjua, Siddiqui & Rozi, 2015:396). TB and HIV knowledge, clinical supervision, conducive environment and necessary precautionary materials and measures are important and should therefore be emphasized among student nurses.

Student nurses in Eswatini, just like the rest of sub-Saharan Africa, are also exposed to TB and HIV daily as they practice in the CLE. How much these student nurses know on TB and HIV prevention and what affects their compliance has in the past not been investigated at length. In addition, Haumba, Dlamini, Calnan, Ghazaryan, Smith-Arthur, Preko & Ehrenkranz (2015:103) alluded that Eswatini has the highest estimated incidence of TB in the world (1382 cases per 100 000 population) and also has the highest prevalence of HIV in the world (31% of adults aged 18-49 years) that might put student nurses more at risk of contracting TB and HIV infections. Hence, it is important to assess knowledge and factors affecting student nurses' compliance with standard precautions to prevent Tuberculosis and HIV infections to enable training institutions to design more effective strategies to improve compliance in the clinical area and protect nurses from TB and HIV infections.

1.2 PROBLEM STATEMENT

One of the University of Eswatini (UNESWA) objectives, Faculty of Health Sciences, is to create, preserve, transmit and increase skills and knowledge in the area of health and associated disciplines through practice, education, research and administration (University of Swaziland, 2019:1). This means that the university has the responsibility to empower students with knowledge including the knowledge of how students can protect themselves against TB and HIV/AIDS infection in the CLE. Hence, student nurses are taught basic nursing care procedures and skills to perform those procedures, including precautionary measures in the skills laboratory prior to real clinical exposure. Supervision and follow-up of student nurses, when placed in the clinical area, is a continuous teaching and evaluation of compliance to what was taught in the theory and simulation classroom, as well as integration of theory to practice.

However, as a clinical preceptor, the researcher observes that there is a gap in knowledge translation of what was done in theory and the simulation classroom. Although, hospitals in Eswatini provide a safe environment and basic safety clothing such as gloves, masks and aprons, student nurses when faced with reality of practice in the clinical area, have a tendency of handling contaminated linen with bare hands, do not wash hands regularly, do not wear N95 respirators when caring for patients with TB, do not clean the stethoscope between patients and they accidentally prick themselves with used needles. Within a period of one year, student nurses accounted for 27% of health workers who reported to have been exposed to blood and body fluids whether by splashing or by needle stick injuries while practicing in the CLE (Ministry of Health 2019:44).

This raises the concern of whether student nurses are knowledgeable about measures to protect themselves or they are ignorant. Of note, a study done in Nigeria showed a lot of non-use of protective clothing among student nurses in the CLE (Jonah, Bewerang and Emmanuel 2014: 62). This failure of student nurses to integrate and apply theory and simulation knowledge and skills into practice in the clinical area can lead to transmission of infectious diseases such as TB and HIV amongst student nurses and have negative effects on the recruitment and training of nurses in the country.

Adherence to standard precautions among student nurses is critical to prevent the spread of HIV and TB in the CLE. Student nurses at different levels of study are severely prone to TB and HIV exposure as they are in the frontline of healthcare provision (Tong, Morulane, Mabina & Makhado 2018:12). It reflects badly in the nursing profession and learning institution when students get infected by TB and HIV while practicing and still learning. Therefore, it is important to determine factors affecting student nurses' compliance with standard precautions for preventing Tuberculosis and HIV in Eswatini University.

1.3 SIGNIFICANCE OF THE STUDY

Findings from this study will not only be beneficial to student nurses and educators but will benefit patients and the nursing profession at large. This study will help with improvement of compliance to standard precautions among student nurses. The safety of student nurses is very important, so they need to protect themselves from TB/HIV infection as they practice in the CLE. The educators need to know the factors affecting student nurses' compliance to standard precaution so that they can assist and support them to comply.

This study in the long run will improve patients' safety during their stay in the hospital where students practice. Students are future health professionals. Teaching them well today will benefit the nursing profession as the country will have knowledgeable nurses in the future.

1.4 PURPOSE OF THE STUDY

To assess knowledge and factors affecting compliance with standard precautions for TB and HIV prevention in the clinical area among student nurses in Eswatini.

1.5 RESEARCH QUESTIONS/ HYPOTHESIS

This study was done to attempt to answer the following research questions:

- What is the knowledge of UNESWA student nurses regarding standard precautions for prevention of Tuberculosis and HIV?
- What are the factors affecting UNESWA student nurses' compliance with standard precautions for preventing Tuberculosis and HIV?

- What is the level of compliance to standard precautions amongst UNESWA student nurses in prevention of Tuberculosis and HIV?

1.6 RESEARCH OBJECTIVES

- To determine the knowledge of UNESWA student nurses regarding standard precautions for prevention of Tuberculosis and HIV.
- To identify the factors affecting UNESWA student nurses' compliance with standard precautions for preventing Tuberculosis and HIV.
- To determine the compliance of UNESWA student nurses with standard precautions for the prevention of Tuberculosis and HIV.

1.7 CONCEPTS CLARIFICATION

1.7.1 Student nurses

The SANC Nursing Act of 2005 Act No:33 (Republic of South Africa 2005:6) defines a student nurse as a person studying at a university or college or any private institution accredited by the SANC and Council of Higher Education. The term in this study refers to 3rd, 4th and 5th year student nurses studying in the University of Eswatini.

1.7.2 Clinical learning environment

A clinical learning environment is a location where nursing practice takes place which includes direct patient care ranging from preventative care to chronic care to end of life care (Warshawsky and Havens 2011). In the current study, it is the clinical setting, which includes the hospitals, health centres and clinics where student nurses are placed for clinical experience.

1.7.3 Compliance

It is the level of precision and constancy in following prescribed standard protocols to achieve the desired outcomes (Dorgahm & Obied 2016:122). In this study it is the implementation and application of the strategies and methods taught to prevent TB and HIV infection in the clinical area.

1.7.4 Standard Precautions (SPs)

According to Minnaar (2008:7) Standard Precautions mean a basic level of infection control in the treatment of every patient, regardless of their diagnosis or infection status. In this study it is the strategies and methods of practice used to prevent transmission of infection, in particular TB and HIV while providing health care to patients.

1.7.5 Knowledge

Knowledge is the fact of knowing or being acquainted with a thing, person, etc.; acquaintance; familiarity gained by experience (Dictionary 2015). The author continues to say they are facts, information, and skills acquired through experience or education. The term in this study will be used to describe the cognitive and affective information student nurses have on TB and HIV prevention.

1.7.6 Tuberculosis (TB)

According to WHO (2018:6) TB is an infectious disease caused by the bacillus Mycobacterium tuberculosis which typically affects the lungs (pulmonary TB), but can also affect other sites (extra Pulmonary TB). In this study TB refers to one of the infectious disease student nurses need to protect themselves from as well as protect the patients under their care as they practice in the CLE.

1.7.7 HIV

Human Immunodeficiency Virus is a virus that causes AIDS or attacks the human immune defense system thus resulting to susceptibility to other infections and is transmitted through direct contact with infected blood and body fluids (US Department of Health & Human Services 2019). In this study HIV refers to a virus in which student nurses should practice standard precautions in order to protect themselves from and prevent it from spreading among patients as they practice in the CLE

1.8 RESEARCH METHODOLOGY

1.8.1 Research Design

A non-experimental quantitative descriptive research design was used to assess knowledge and factors affecting compliance with standard precautions for TB and HIV prevention in the clinical area among student nurses in Eswatini. A full detailed description of the research design is offered in Chapter 3.

1.8.2 The research setting

The study took place in the University of Eswatini (UNESWA), Faculty of Health Sciences found in a town called Mbabane in the Hhohho region of Eswatini. Eswatini is located in the southern part of Africa and consists of four regions, of which Hhohho is one of them. The researcher chose this university because it is the largest and oldest tertiary institution in Eswatini, which means it has a larger population for the study.

1.8.3 Population and Sampling

The target population for this study was senior student nurses studying at UNESWA. The researcher in this study selected year three, four and year five students because they have a sufficient knowledge base and experience with TB and HIV prevention. The total number of student nurses in senior classes in the year 2019/2020 was 144. There were 58 third year, 64 fourth years and 22 fifth years students. A total population sampling method was used in this study. A total population sampling method was chosen because the size of the population of interest was small.

Table 1.1: Sample framework of student nurses who participated in the study

No	Class of Students	Total number per class	Sample	Respondents
1.	Third year	58	58	29
2.	Fourth year	64	64	57
3.	Fifth year	22	22	19
	Total	**144**	**144**	**105**

1.8.4 Data collection instrument

A questionnaire was used to collect data in this study. Construction of the questionnaire was done by reviewing literature and using questions asked from similar studies. The researcher also ensured that adherence to the objectives of this study was done to make sure that the questionnaire is relevant. There was also assistance received from the supervisor and the statistician during the formulation of the questionnaire.

1.8.5 Data Collection Process

The questionnaires were delivered and distributed to the students by the researcher and the students were allowed to take them home and hand them back as soon as they could. Students were asked to return the completed questionnaires to their class representatives, in the absence of the researcher, to ensure anonymity. The researcher collected the questionnaires a week later, from the day of issuance.

1.8.6 Data analysis

Data was entered into Microsoft excel and the Statistical Package for Social Science (SPSS) software version 26 was used to analyze the data. Graphs, frequency tables, percentage distribution and pie diagrams were used to analyze and present the demographics, as well as the different questions in the questionnaire. Respondents' self-report were used to identify student's knowledge and factors influencing compliance to standard precautions. A statistician was involved during the data analysis process.

1.9 RIGOR/ QUALITY CONTROL

1.9.1 Validity

According to Grove, Gray & Burns (2015: 224) validity is how trustworthy and accurate the findings obtained from the study are. In this study, the researcher constructed questions from the literature related to the topic and also consulted experts of standard precautions to ensure content validity of the instrument. The constructed questionnaire was given to the supervisors and biostatistician to evaluate and validate if the contents of the instrument measures the objectives to be studied. The concepts or variable used were not only defined but their implication and application in this study was explained. Internal validity was ensured by questioning how well the items in the questionnaire measure characteristics of the variables and asking if there is a relationship between the variables and findings. External validity was done by comparing results from this study to other similar studies which were done under a similar context.

1.9.2 Reliability

According to Pruzan (2016:122) reliability is a standard which shows that a measurement is consistent. This means that consistent stable results should be found when the same object is being measured repeatedly. In this study, a statistician was consulted to review the questionnaires and a pilot study was done to ensure reliability.

1.10 ETHICAL CONSIDERATIONS

The researcher ensured that ethical principles of beneficence, respect for human dignity and justice were observed while conducting this study. To assure that this study would not cause harm to any individual, it went through the ethics committee for approval. Results from this study will not directly benefit the students who will participate in it but will benefit the students who will come after them, the educators, patients, and the nursing profession. It was explained to the participants that they can be involved according to their willingness and they can choose to withdraw from the study at any point. The researcher in this study formulated a consent form which was signed by the participants before filling the questionnaire. Student who did not want to participate were asked not to sign the consent form. This form contained information about the purpose and the scope of the study, the respondents' benefits for participating in the study, and their right to withdraw if they wish to do so. It was assured that all potential participants of this study were within the consenting

age and were of right mental capacity to consent for themselves. In this study participants were chosen because they are relevant to the problem being studied and they were treated with respect and fairness.

1.11 DELINEATION

This study covered what student nurses in the UNESWA know on standard precautions, the factors that influence their compliance and how much they comply. As much as there are many studies which show that qualified nurses, doctors and other support staff also have compliance problems on this issue (Sarani, Balouchi, Masinaeinezhad & Ebrahimitabas 2015), this study was only be limited to student nurses.

1.12 DURATION OF THE STUDY

The ethics approval letter from the University of Pretoria was received on the 28th February 2020. The research protocol clearance certificate from the Eswatini Health and Human Research Review Board was received on the 2nd July 2020. The permission to conduct a study in UNESWA was received on the 23rd July 2020. Data was collected from the 24th July 2020 to the 12th September 2020. The data was then captured and analyzed between September and October 2020.

1.13 CHAPTURE OUTLINE

Chapter 1: Orientation to the study.
Chapter 2: Literature review.
Chapter 3: Research design and methodology.
Chapter 4: Analysis, presentation and interpretation of research results
Chapter 5: Discussion of results.
Chapter 6: Conclusion, limitations and recommendations

1.14 CONCLUSION

This chapter contains the overview of the study. The study was introduced, its significance, purpose, research questions, objectives, the problem statement and concepts to be used in the study were clarified. The research design and methodology were briefly described.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

Chapter 1 presented the overview of the current study. Its purpose, objectives and significance were clarified. Furthermore, concepts to be used in the study were defined and the problem statement was discussed. Chapter 2 provides a comprehensive literature review of the study.

A literature review is a process of finding what other researchers have investigated about a certain topic and it helps researchers to find a knowledge gab with the purpose of explaining how the current study contributes in building up to existing knowledge (Grove, Gray & Burns 2015:163). Literature review in research is important because it aids researchers to know if the topic was researched before and gives researchers new ideas, perspectives, and approaches (Leedy & Ormrod 2015:70). In this study, the researcher started by exploring the concept of standard precautions, HIV and TB: its prevention and the current statistics. A literature review was done to explore different perspectives pertaining to compliance to standard precautions among student nurses: their knowledge, practices and the factors affecting compliance. The researcher also took interest in studies pertaining to qualified nurses as it may impact the student nurses being studied.

2.2 SCOPE OF THE LITERATURE REVIEW

The scope of the literature review will cover all relevant literature referring to the assessment of knowledge and factors affecting student nurse's compliance regarding standard precautions for preventing.

2.3 METHODOLOGY

The methodology will be discussed under the following headings: search strategy for peer-reviewed journals, the inclusion and exclusion criteria and data extraction.

2.3.1 Search strategy for peer-reviewed journals

To prepare the literature review for this study, research publications were extracted between 2008 and 2018 using the following key concepts: student nurses, compliance, standard precautions, knowledge, tuberculosis, and HIV/AIDS. The researcher used the following databases to do a literature search: Cumulative Index of Nursing and Allied Health Literature (CINAHL), PubMed, WorldCat.org and Wiley Online Library database. Some information was also found on Google and Google Scholar using website from WHO, UNAIDS and the Center for Disease Control. Textbooks, as well as brochures, were also used to get in depth information on TB, HIV and standard precautions. After reviewing these databases, a total number of 17 articles were found on knowledge and factors affecting student nurse's compliance with standard precautions for preventing Tuberculosis and HIV infections. To get a broad perspective on this issue first HIV and TB were discussed briefly, their prevention, how they are connected to each other and then Standard Precautions for prevention of HIV and TB were discussed in depth. The literature review was also done on studies conducted globally, sub-Saharan Africa and Southern Africa pertaining knowledge and factors affecting nurses and student nurse's compliance with standard precautions.

2.3.2 Inclusion and exclusion criteria

The following inclusion and exclusion criteria will be followed:

Inclusion criteria

- To be published in English to avoid the high cost of interpreting
- To use articles and data published from 2008 to 2018
- To discuss knowledge and factors affecting student nurse's compliance with standard precautions for preventing Tuberculosis and HIV infections globally, in sub-Saharan Africa and Southern Africa

Exclusion criteria

- Article on Doctors, student Doctors and other health care workers

2.4 DISCUSSION OF FINDINGS FROM LITERATURE REVIEW

The discussion of findings will be covered under the following headings: HIV/AIDS and its prevention, Tuberculosis and its prevention, Tuberculosis and HIV, Standard Precautions, Hand washing, decontamination (cleaning) and sterilization of medical devices between each patient use, compliance to standard precautions, factors affecting student nurse's compliance with standard precautions and knowledge and practice of standard precautions among qualified nurses.

2.4.1 HIV /AIDS and its prevention

Human Immunodeficiency Virus is a virus that causes AIDS or attacks the human immune defense system thus resulting to susceptibility to other infections and is transmitted through direct contact with the infected blood and body fluids (US Department of Health and Human Services 2019). AIDS, on the other hand, is the most advanced stage of HIV, which can take from 2 to 15 years to develop depending on the individual (WHO 2018). HIV is initially characterized by signs and symptoms such as swollen lymph nodes, weight loss, fever, diarrhea and cough. Without treatment, they could also develop severe illnesses such as tuberculosis, cryptococcal meningitis, severe bacterial infections and cancers such as lymphomas and Kaposi's sarcoma (WHO 2018).

HIV prevention has advanced over the years. Instead of just abstinence and condom usage, WHO has introduced new ways of reducing the risk of HIV infection which are: voluntary medical male circumcision (VMMC), Pre-Exposure Prophylaxis (PrEP) for HIV-negative partners, Post-Exposure Prophylaxis for HIV (PEP), Elimination of Mother-to-Child Transmission of HIV (EMTCT) as well as moving from voluntary testing and counselling to provider-initiated testing and counselling (WHO 2018).

Compliance to standard precautions plays an important role in the prevention of HIV and AIDS in the clinical setting. The principle of hand washing after touching blood or body fluids, contaminated items; immediately after removing gloves; and between patient contacts is important (Daniels & Nicoll 2012:227). Standard precautions also advocate for personal protective equipment which act as a barrier preventing the virus in blood and body fluids to infect or be transmitted by health care workers (Potter, Perry, Hall & Stockert 2017:461). Transmission of the virus is also prevented in the clinical setting through proper handling, cleaning and disinfecting of contaminated equipment and linen; proper disposal of infected waste and sharps as well as through environmental cleaning (Ministry of Health 2014:15).

2.4.2 Tuberculosis and its prevention

WHO (2018:6) defines TB as an infectious disease caused by the bacillus Mycobacterium tuberculosis which typically affects the lungs (pulmonary TB), but can also affect other sites including the meninges, kidneys, bones, and lymph nodes (extra pulmonary TB). According to Daniels & Nicoll (2012: 858) TB is a chronic lung infection which enters to the body through droplets which are inhaled in to the alveoli. The authors further say that a person with TB may present with a periodic fever, cough, night sweats, fatigue, and pleuristic chest pains. As much as TB is categorized among the top ten deadly conditions globally (WHO, 2015), it is both preventable and curable. Besides the good practices of opening windows, avoiding smoking, avoiding alcohol consumption, a healthy diet, avoiding overcrowding and using the coughing etiquette there is a Bacille CalmetteGuérin (BCG) vaccine which can effectively prevent TB in children (WHO 2018:6). Unfortunately, there is no vaccine for preventing TB among adult whether before or after exposure to TB infection.

TB prevention is also done through complying with the standard precaution. Hand washing is very important to everyone especially to the coughing patients to minimize spreading of the bacteria. Potter, Perry, Hall & Stockert (2017:458) emphasizes that clients should be taught hand hygiene so that they even practice it at home. Health care workers should wear the N95 mask when working in a TB ward or any department where there is a possibility of TB infection. According to Minnaar (2008:8) TB patients should be put in a private room and if ever they have to move out a surgical mask should be worn by the patient if possible. Patients should also be taught to cover their nose and mouth with a tissue when coughing and sneezing and that tissue should be discarded in a nearby waste container (Potter, Perry, Hall & Stockert 2017:459). Proper handling and disposal of the sputum and other soiled items and linen is important to prevent cross-infection.

2.4.3 Tuberculosis and HIV

TB and HIV has affected a lot of people globally and has claimed a lot of lives, 35 million people have died of HIV so far (UNAIDS 2018: WHO, 2018) and in 2017 1.6 million people died of TB. Globally there were 36.9 million people living with HIV in 2017 and 6.7 million people were reported to the national TB program and WHO to be infected with TB (UNAIDS 2018; WHO 2018: 67). In Africa, where the burden of HIV-associated TB is highest, a total of 464633 TB cases were reported among HIV-positive people (WHO, 2018). Most of the people being affected by HIV and TB are found in the low to middle income countries. Approximately 66% are living in Sub-Sahara

Africa; among this group 19.6 million are living in East and Southern Africa which saw 800,000 new HIV infections in 2017(UNAIDS, 2018). After studying the different ways HIV and TB are transmitted, one can conclude that these countries are a target for this epidemic due to the poor living conditions, poor sanitation, overcrowding, lack of resources for medical attention and scarcity of health facilities.

Eswatini has the highest HIV prevalence in the world with 27.4% of adults living with HIV and one in 100 people is estimated to develop active TB every year (UNAIDS, 2018). However, the reduction in the incidence of HIV in Eswatini has been promising. The number of new people being infected with HIV has dropped since the 2011 statistics from 2.48% to 1.39% (Phia project ,2017). This is owing to the HIV control interventions expanded in the country which are: HIV testing, the increased in the number of people living with HIV on antiretroviral therapy and the HIV preventive measure which are: VMMC, EMTCT, PrEP and PEP as discussed earlier (Phia project, 2017; WHO, 2018).

TB and HIV are not separable. HIV has been identified by in the Swazi TB Report (2017) as the main driver for the TB epidemic. According to Carlsson, Johansson, Eale, and Kaboru (2014:2) people living with HIV have 30% greater chances of developing active TB compared to HIV negative people. Eswatini has the TB burden estimated to be about 1380 incident cases per 100 000 occurring annually (WHO, 2014). To reduce the burden of TB among people living with HIV, the WHO has recommended a set of collaborative TB/HIV activities including TB preventive therapy, intensified TB case finding, and infection control (WHO, 2012). Infection control does not only apply in the prevention of re-infection among people living with HIV but also ensures that other patients, relatives and health workers including student nurses do not get infected with TB and HIV during their stay or while caring for patients in the health setting. According to the Ministry of Health (2014:15) one very important aspect of infection prevention and control are standard precautions which will be discussed at length in this study.

2.4.4 Standard Precautions

The hospital is not a safe place. According to the Dictionary (2019) a hospital is a place where people who are ill or injured are treated and taken care of by doctors and nurses. It is very ironic how the place where people come for their health needs can be a very dangerous place with infections which can cause illness to the people who work there, relatives of patients and the very people who are seeking health. But it does not have to be like that, thanks to standard precautions. The hospital can be a safe place again.

According to the Ministry of Health (2014: 15), Standard Precautions are a group of infection control precautions used to reduce the risk of micro-organisms from both recognized and unrecognized sources of infections in health facilities. Minnaar (2008) describes standard precautions as a basic level of infection control in the treatment of every patient, regardless of their diagnosis or infection status. Standard precautions are ways suggested and put in place in an attempt to prevent and control the spread of infections among patients, from patients to health workers and visitors or vice versa. WHO (2011) also recommended standard and isolation precautions during their Report on the Burden of Endemic Health Care-Associated Infection Worldwide as well as environmental cleaning, water and sanitation in health-care settings, sterilization and disinfection procedures, and infectious waste and sharp disposal.

According to the Ministry of Health (2014:15) the national infection control guidelines of Eswatini outlined standard precautions as:

- Hand washing and antiseptic (hand hygiene)
- Use of appropriate protective clothing/ equipment
- Appropriate handling of patient care equipment and soiled linen
- Prevention of needle sticks/ sharp injuries
- Environmental cleaning and spills management
- Appropriate handling of waste
- Decontamination (cleaning) and sterilization of medical devices between each patient use.

A lot has been said on these different aspects of standard precautions. Researchers have also done studies specifically on handwashing practices in the health care setting and needle sticks/ sharp injuries.

2.4.4.1 Hand hygiene

Hand washing and disinfecting is very important in the health care setting to reduce the spread of infection. Ideally, hands should be washed with soap and water or an anti-microbial agent after being in contact with blood and body fluids, secretions, excretions and soiled items, regardless of wearing gloves (Minnaar,2008: 8). The WHO guidelines for handwashing (WHO, 2009:26) also indicate five moments where health care workers should wash their hands: '(1) before touching a patient, (2) before clean/aseptic procedures, (3) after body fluid exposure/risk, (4) after touching a patient and (5) after touching patient surroundings.'

Figure 2.1: 5 Moments of hand hygiene (WHO 2009)

However, this is not always the case when it comes to practice. A study done in India on Hand Washing in Hospitals indicated that on observation, compliance of health care workers to hand washing in the private neonatal unit was 44% while in the public neonatal unit it was 12%(Tyagi, Hanson, Schellenberg, Chamarty & Singh 2018). The issue of non-compliance becomes worse among student nurses since they are still learning and have not received proper role-modelling from their seniors. A study done in Turkey revealed that student nurses did not use the correct technique to wash hands in sufficient number and duration and usually washed their hands to protect themselves (Avsar, Kasikci & Yagci, 2015).

2.4.4.2 Use of appropriate protective clothing/ equipment

Based on the task being performed, health care workers should have personal protective clothing readily available for use namely: gowns, masks or respirators, protective eye wear and gloves (Potter et al., 2017:461).

- **Gowns**

According to CDC (2018) health care workers should use gowns to protect themselves and the patient from the transmission of microorganisms through blood and body fluids. Potter, Perry, Hall

& Stockert (2017:461) further add that, gowns are made with fluid resistant material to act as a protective barrier and should be changed immediately they are damaged or heavily contaminated.

- **Masks and respirators**

There are different masks available for health workers to use and choosing which one to use depends on the reason for putting on the mask. A N95 respirator mask is used when caring for someone with known or suspected to have TB and a surgical mask for protecting both the wearer and the patient form infection during aseptic procedures, such as wound dressing (Potter, Perry, Hall & Stockert 2017:464).

- **Protective eye wear**

Health care workers should use glasses, goggles or face shields to protect themselves when doing procedures with the possibility of body fluids being sprayed or splashed in the eyes (Daniels & Nicoll 2012:526).

- **Gloves**

According to Minnaar (2008:8) gloves should be worn when touching blood, body fluids, excretions, secretions, contaminated items, mucous membranes and non-intact skin. However, according to Daniels & Nicoll (2012:526) there is a possibility of becoming contaminated during their removal, so it is very important to wash and disinfect hands after wearing gloves.

This equipment forms a protective barrier to prevent soiling, splashing or spraying one with blood or body fluids (CDC, 2018). However, the importance of using them the right way and with caution can never be over emphasized. Cross-infection can still occur if a health worker goes with an already soiled gown to assist another patient. Surgical masks and N95 respirator should be worn the right way. As a preceptor, the researcher has seen students and even qualified health care workers wearing masks and leaving the nose out, which is incorrect use. When doing a surgical procedure, it is important for health care workers to avoid using contaminated gloves even if they were accidentally contaminated by just touching something unsterile. When the protective clothing is used well, both the patients and health workers are safe from infection.

2.4.4.3 Appropriate handling of patient care equipment and soiled linen

Soiled linen and used equipment are another source of infection, so they should be handled with care by health care workers. Potter, Perry, Hall & Stockert (2017:458) state that when carrying soiled linen and equipment, health workers should make sure it is away from touching their clothes or they should use fluid resistant linen bags. The authors continue to state that laundry hampers should be kept closed and should not be left until they are overloaded before they are emptied.

2.4.4.4 Prevention of needle sticks/ sharp injuries

The general principle is that needles, scalpels or any other sharp object should be immediately discarded in a puncture-resistant container after use (Potter, Perry, Hall & Stockert, 2017:459). This means that health care workers should make it a point to always carry a sharps container when using sharp object to avoid moving across the room to discard the object and increasing the risk of injury. When health care workers practice these needle-stick preventive measures, needle-stick injuries are less likely to occur. However, if this accident occurs health workers need to immediately wash the injury site with soap and water, report the incident to the supervisor and then seek medical treatment (CDC, 2016).

As much as health care workers are taught on prevention and management of needle sticks injuries, it does not mean they always practice the preventive measures nor do they always report the injuries and get help. A cross-sectional study was done in South Africa on 202 nurses in a regional hospital on needle stick injuries by Kruger, Joubert& Jimoh (2012), where they found 90.1 % of these nurses admitted that they know the hospital needle stick policy; 18.8% of them sustained needle stick injuries within a period of a year and only 50% of these incidences were reported. Another study was done in Namibia on 198 student nurses where 17% students also sustained needle stick injuries but only 55% of these injuries were reported (Small, Pretorius, Walters & Ackerman, 2011). This just shows that a lot still needs to be done on improving the safety of health care workers in as far as needle stick injuries are concerned.

2.4.4.5 Environmental cleaning and spills management

According to Potter, Perry, Hall & Stockert (2017455) cleaning is the use of water and a detergent to mechanically remove organic or inorganic soiling from an object or surface. This is very necessary for the reduction of microorganisms in surfaces we all touch and objects which are

shared. Ministry of Health (2014:58) alludes that surfaces which are contaminated with blood or body fluids should be immediately cleaned with a detergent and water.

2.4.4.6 Appropriate handling of waste

Health care waste is a potential source of pathogenic microorganisms and should be handled well and discarded safely (Ministry of Health (2014:58). In order to break the cycle of infection, what is generated during the care of the patients as waste should be discarded efficiently, otherwise it will infect other people who will come back to the health setting and the cycle will never end. Potter, Perry, Hall & Stockert (2017:465) state that nurses should use special bagging procedures to remove waste from the patient's environment. According to the National infection control guidelines, waste in the health care setting should be segregated as it is being generated and be placed on color coded plastic bags before being discarded: red for infectious waste and black for general or domestic waste (Ministry of Health (2014:63).

2.4.4.7 Decontamination (cleaning) and sterilization of medical devices between each patient use.

Contaminated equipment should be cleaned prior to sterilization and disinfection to remove any debris that might act as a barrier to the sterilizing and disinfecting (Daniels & Nicoll 2012:523). According to Potter, Perry, Hall & Stockert (2017:455) when cleaning, disinfection and sterilization is done properly it can reduce and even eliminate all microorganisms. The authors continue to describe sterilization as using steam under pressure, ethylene oxide gas and other chemicals to eliminate and destroy all microorganisms and spores. So, equipment that is re-used such as delivery packs, dressing packs and speculums should go through this process to avoid spread of infection.

Standard Precautions have been put in place to prevent the spreading infections such as TB and HIV in the hospitals and learning environment. However, standard precautions won't work if student nurses do not know them, if they have a negative attitude towards implementing them and if there are barriers in the clinical area such as lack of support and equipment. Student nurses need to comply with all the standard precautions in order for them to be safe in the CLE as well as to provide safe nursing care to the patients. There is a lot that is said by other researchers on student nurses and compliance to standard precautions. It is worth noting that the problem of non-compliancy to standard precautions is not only in Eswatini nor in Africa, but it has been noted globally. However, in Africa it can worsen the high prevalence of TB and HIV as stated earlier.

2.4.5 Knowledge of student nurse's regarding standard precaution

Knowledge of standard precautions is very important to student nurses because they are exposed to infection through blood and body fluids and they practice in the CLE. Different researchers vary on their findings pertaining the knowledge of student nurses on standard precautions.

2.4.5.1 Global perspective

A study was done in the University of Ferrara on the knowledge and behavior of nursing students on the prevention of healthcare-associated infections, standard precautions and hand washing (Brosio, Kuhdari, Stefanati, Sulcaj, Lupi, Guidi et al., 2017). The features regarding the adoption of standard precautions and the risk of contamination with biological fluids (standard precaution section) were well known by students of all three years of course with correct response rates very close or up to 100%.

Contrary to this study, Earl (2010:333) did a study that revealed that 37% of the Thailand students indicated they did not know how to use universal precautions as a method for preventing HIV transmission. In addition to this, 27% of those nursing students responding indicated they would not care for HIV-positive patients, and 35% were not sure if they would. Forty-one percent of the participants reported they were "scared" by the thought of contracting HIV/AIDS at work.

2.4.5.2 Sub-Saharan Africa

Jonah, Bewerang & Emmanuel (2014: 61) did a study in Nigeria and found that 96.1% of student nurses were aware of standard precautions, their sources of information being school (63%), mass media (television and radio) (8.2%), hospital (24.7%) and others like seminars (4.1%). These findings however differ from the ones found by Rahiman, Chikte & Hughes (2018:20) in a cross-sectional study done in the Western Cape on 301 students which revealed that students' level of knowledge on infection control and guidelines was 47.4%.

2.4.5.3 Local perspective

In Eswatini, there is limited reliable data relating to the knowledge of student nurses on standard precautions. However, the university of Eswatini does empower student nurses with relevant information regarding standard precautions even though it differs within their different level of

education.

2.4.6 Compliance to standard precaution

According to Kale, Gholap & Shinde (2014: 1867) among the 50 participants 20% had a satisfactory level of performance of standard precautions. The authors continue to say that 66% of the students did not perform the handling and disposal of sharps as per the guideline; 70% did not cover eyes and mouth during procedures which carries risk of splashing body fluids and 50% did not wash hands after removing gloves. Most researchers have observed that no matter how much students know about standard precautions it does not necessarily mean that they will practice them. Knowledge does not always co-relate with practice.

Labrague, Rosales & Tizon (2012: 84) also did a cross-sectional study on knowledge of and compliance with standard precautions among student nurses which showed high compliance to standard precaution. Most students achieved high compliance scores (up to 94.8%) on hand washing, using glove, wear masks, goggles and protective suit as well as disposal of used needles.

2.4.7 Factors affecting student nurse's compliance with standard precautions

Cheung, Chan, Chang, Chu, Fung, Kwan et al. (2015) conducted a study on predictors for compliance of standard precautions among nursing students. Their findings showed that the 5 predictors of compliance to standard precautions among student nurses were: knowledge of standard precautions, perceived barriers, adequacy of training, management support, and influence of nursing staff. Another study done by Hinkin & Cutter (2014:196) on how university education and clinical experience influence pre-registration nursing students' infection control practice, found that knowledge, workload, time, and availability of facilities and equipment also contributed to the adoption of infection control precautions. In a study done in South Korea, on clinical experience of student nurses in relation to standard precautions by Kim and Oh (2015:111). Their study explored four themes and nine subtopics which were barriers in the use of standard precautions: (a) attitudes (knowledge deficit, sensitivity) (b) subjective norms (negative role models, classroom and in-field gaps, blind spots) (c) perceived behavioral control (psychological barriers, physical barriers, lack of information) (d) intention (changes in compliance awareness).

Tong, Morulane, Mabina & Makhado (2018:10) on their study on 'TB/HIV exposure among nursing

students in the clinical practice environment' alluded that usually exposure to HIV came from needle pricks, blood splash and open contact with other body fluids and this is because lack of knowledge on standard precautions. The authors continued to say that clinical support and availability of precautionary resources were also issues that influence TB exposure among student nurses.

2.4.8 Knowledge and practice of standard precautions among qualified nurses

Of interest are the numerus studies that reveal insufficient knowledge and practice of standard precaution among qualified professional nurses. A cross-sectional study done in Nigeria showed that out of the 300 healthcare workers who participated in the study only 18% of them had adequate knowledge and 19.7% exhibited optimum practice (Uchenna, Johnbull, Chinonye, Christopher & Nonye 2015:1). Another study done on knowledge, attitude and practice of nurses about standard precautions for hospital-acquired infection in teaching hospitals affiliated to Zabol University of Medical Sciences also had disappointing results (Sarani, Balouchi, Masinaeinezhad & Ebrahimitabas, 2015). It showed that 43% of the participants in the study had poor knowledge, 42% had average practice, and 37% had a moderate attitude about hospital infection. This clearly shows that nurses in the hospitals do not comply to standard precautions.

One may wonder if non-practice to standard precautions among student nurses is related to poor role modeling or not. In accordance with this observation, Ward (2010:1533) studied nursing and midwifery students' experiences on infection control in clinical placement. During the interviews conducted in this study, students verbalized that they identified practices that they had observed from qualified nurses and benchmarked these against what they had been taught at university. Students were reluctant to report poor practice due to fear of failing placements and not wanting to be identified negatively by staff.

2.5 SUMMARY OF LITERATURE REVIEW

Standard precautions are a good concept, otherwise the health setting wouldn't be a safe place in this TB and HIV pandemic. Most literature that has been reviewed show that students have sufficient knowledge on standard precautions, but their compliance rate is low. The literature reviewed also shows that a lot has been said on factors affecting compliance regarding standard precaution in other countries. There is still a knowledge gab in Eswatini thus the researcher

intended to discover these factors and how much student nurses in Eswatini know about standard precaution.

2.6 CONCLUSION

This chapter presented an overview of the literature regarding knowledge and factors affecting student nurses' compliance with standard precautions for preventing Tuberculosis and HIV infections. The next chapter will be on the research methodology that was used to conduct this study.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

In chapter two, the literature review of the knowledge and factors affecting student nurse's compliance with standard precautions for preventing Tuberculosis and HIV infections was discussed. This chapter includes the research methodology that was used to conduct this study. The research methodology will be discussed under the subtopics: research design, setting, population, sampling, data collection instrument, data collection process and data analysis.

3.2 RESEARCH OBJECTIVES

As mentioned in Chapter 1, the objectives of the study were:

- To determine the knowledge of UNESWA student nurse's regarding standard precautions for prevention of Tuberculosis and HIV.
- To identify the factors affecting UNESWA student nurses' compliance with standard precautions for preventing Tuberculosis and HIV.

To determine the compliance of UNESWA student nurses with standard precautions for the prevention of Tuberculosis and HIV.

3.3 RESEARCH DESIGN AND METHODOLOGY

A non-experimental quantitative descriptive research design was conducted. According to Fain (2017:155) a quantitative study is a research method that generates knowledge through the use of numbers and measurements to interpret relationships among two or more variables. The advantage of a quantitative research is that it provides objectivity and makes research easier as results are based on what was studied rather than on the researcher's perspective, personality and beliefs (Nieswiadomy & Bailey, 2018:58). As it involves measurement and analysis of relationships among variable, the researcher assumes that there is a relationship among factors, demographical data, knowledge, perceptions and compliance with standard precautions in prevention of TB and HIV infection among student nurses. Based on these premises, the

researcher sought to determine how these factors influence compliance to standard precautions on student nurses.

Grove, Gray & Burns (2015:212) describe a descriptive study as one that provides insight into a situation as it naturally occurs with the intention of gaining information about characteristics in that particular field of study. Fain (2017:168) further alludes that it gathers information about a person or a group's condition, attitudes and characteristics. In the study, the researcher intends to determine and then offer a detailed and accurate description of how much student nurses know about standard precautions and the internal and external factors that influence them to comply with standard precautions.

3.3.1 The research setting

According to Grove, Gray & Burns (2015:276), a research setting is the place or location where the study will take place. The study took place in the University of Eswatini (UNESWA), Faculty of Health Sciences, found in a town called Mbabane in the Hhohho region of Eswatini. Eswatini is located in the southern part of Africa and consists of four regions, of which Hhohho is one of them.

Figure 3.1: The map of Eswatini showing the study site (Ministry of Sports, Culture, and Youth Affairs 2015)

The researcher chose this university because it is the largest and oldest tertiary institution in Eswatini, which means it has a larger population for the study. Student nurses in this university practice mainly in the country's referral hospital (Mbabane Government Hospital) as well as other health facilities, according to their educational needs. The university offers two programs of bachelors' degree in nursing science. One is a four-year course for freshman which currently has 208 students and the other is a two-year course for diploma holders and currently has 54 students. In addition to these programs there is also a one-year post diploma certificate in midwifery which currently has 1 student enrolled. The estimated enrolment of nursing student per year is 250. Estimation of undergraduate students per year is 50 students per class.

3.3.2 Population

According to Nieswiadomy & Bailey (2018:64) a population is a total set of people or objects with common characteristics on which the researcher is interested on doing the research on. In this study the target population were both male and female senior student nurses, studying at UNESWA. The researcher in this study selected year three, four and year five students because they have sufficient knowledge and experience with TB and HIV prevention. The total number of these senior students in the academic year 2019/2020 was 144. There were 58 third years, 64 in the fourth year and 22 Fifth year student nurses. The above data is from the student administration of the university. All students were above 18 years old, so they were able to consent for themselves to be part of the study.

3.3.3 Sampling

Nieswiadomy and Bailey (2018: 64) define a sample as a subgroup of the population which is chosen to represent the population and is used to do generalizations about the whole population. Sampling is viewed in terms of sampling method, sampling size and sampling criteria.

3.3.3.1 Sampling method

A total population sampling method was used in this study. In this study, a total population sampling was chosen because the size of the population of interest is small. Total population sampling is a type of sampling technique where you choose to examine the entire population (Etikan, Musa & Alkassim, 2016). In the case of total population sampling, the units of interest tend to have some characteristics that are not very common.

3.3.3.2 Sample size

The total number of student nurses in year three, four and five in the university is 144. This is our sample size but 105 students were willing to participate and completed the questionnaires completely.

3.3.3.3 Sampling criteria

The sampling criteria refers to the list of characteristics essential for eligibility or membership in the target population (Grove, Gray & Burns 2015:251). In this study, the researcher used both inclusion and exclusion criteria.

a) Inclusion criteria

- Both male and female student nurses in year three, four and year five.
- All students who consented participated in the study.

b) Exclusion criteria

- Student nurses who did not consent to be part of the study.
- Student nurses who were absent in university during the period of data collection.

Table 3.1: Sample framework of student nurses who participated in the study

No	Class of Students	Total number per class	Sample	Respondents
1.	Third year	58	58	29
2.	Fourth year	64	64	57
3.	Fifth year	22	22	19
	Total	**144**	**144**	**105**

3.3.4 Data collection

Grove, Gray & Burns (2015:47) defines data collection as the accurate collecting of information in an orderly manner which will be needed for the research purpose or to achieve the set research objectives, questions, or the hypothesis. The research instrument which was used in this study was self-administered questionnaires (Annexure B: Questionnaire). The researcher chose questionnaires because they are less costly, they offer a possibility of complete anonymity and the absence of an interviewer ensures that there will be no interviewer bias (Polit & Beck,

2017:275).

3.3.5 Data collection process

The researcher after acquiring permission from the authorities of the university hand delivered the questionnaires to students. The researcher also sought assistance from the lecturers in a form of a short introduction to the students. The questionnaires were then distributed to the students and they were allowed to take them and hand them back as soon as they could. Each questionnaire had a consent form attached to it for students to read and sign before completing the questionnaire. The students were also asked not to write their names in the questionnaires, instead a code was assigned to each questionnaire to ensure anonymity. Students were asked to return the completed questionnaires to their class representatives in the absence of the researcher to ascertain anonymity. The researcher collected the questionnaires a week later from the day of issuance.

- **Questionnaire**

The questionnaire was written in English because all participants can understand English and can read and write. The questionnaire also contains both open-ended questions and closed-ended questions. The advantage of closed-ended questions is that they are easily coded and can be used in large surveys (Fain, 2017:215). Open-ended questions on the other hand allow participants to express themselves in their own words thus offering a richer and fuller perspective on a topic if respondents are cooperative (Polit & Beck 2017:297).

The questionnaire has four sections namely:

- Section 1: Demographics
- Section 2: Knowledge
- Section 3: Factors affecting compliance with standard precautions for prevention of TB and HIV.
- Section4: Compliance with standard precautions for prevention of TB and HIV among student nurses.

The questionnaire has three different Linkert scales for section 2,3 and 4. According to Grove, Burns & Gray (2013:699) a Likert scale is an instrument used to assess the opinion or attitude of study participants; it contains a lot of declarative statements with a scale after each statement for participant to respond to. The knowledge section had a 3-point Linkert scale with responses

‘agree, ‘disagree’ and ‘not applicable’. Section 3 of factors had a 4-point Linkert scale with responses ‘strongly agree’, ‘agree’, ‘strongly disagree’ and ‘disagree’. The compliance section had a 3-point Linkert scale of ‘never’, ‘sometimes’ and ‘always’. Construction of the questionnaire was done by reviewing literature and using questions asked from similar studies. The researcher also ensured that adherence to the objectives of this study was done to make sure that the questionnaire is relevant. There was also assistance received from the supervisor and the statistician during the formulation of the questionnaire.

- **Distributing the questionnaire**

After receiving the approval letters from the Eswatini Health and Human Research Review Board and UNESWA, the researcher asked a copy of the timetable from the University’s Acting Dean. The time table had the locations of students at specific times and the names of the lecturers. The researcher approached the lecturers for assistance, in when and how students could be approached. Some lecturers were generous with their time and allowed the researcher to introduce herself and the study objectives during their time. Most of them referred the researcher to the class representative who assist with the distribution of questionnaires during the class breaks. Students were given one week to complete the questionnaires and submit them back to their class representatives to ensure anonymity.

3.3.6 Data analysis

According to Fain (2017:264) the purpose of data analysis is to answer research questions, test hypotheses, or both. In this study data was entered into Microsoft excel and the Statistical Package for Social Science (SPSS) software version 26 was used to analyze the data. Graphs, frequency tables, percentage distribution and pie diagrams were used to analyze and present the demographics, as well as the different questions in the questionnaire. Respondents’ self-report were used to identify student’s knowledge and factors influencing compliance to standard precautions. A statistician was also involved during the data analysis process. Assessment of the association of the three research questions and participant’s demographics was done using analysis of variables (ANOVA) and chi-squire tests.

3.3.6 Pilot study

A pilot study is a miniature trial version of the planned study done to test a research instrument and to identify potential problems before the actual study is done, as defined by Nieswiadomy & Bailey (2018:65). It is also done to estimate how long it takes to complete the questionnaire. In this study the researcher distributed questionnaires to be filled by some students who were in the same educational level as the student in the main study before the actual study. The number of questionnaires used for piloting was 10% of the sample size (144) which is 14 students. Students who were part of the pilot study were asked not to be involved in the main study. The researcher sought assistance from the lecturers to select these students through stratified random sampling. Then the pilot study was done in the university, but necessary arrangements were made with the lecturers to avoid interrupting ongoing lectures. The researcher then revised the instrument and did all necessary modifications as follows:

- It took 15-20 minutes to complete the questionnaire not 30 minutes as it was estimated before the pilot study was done.
- Question 26 was repeated in Question 30, so one was made to be about TB while the other to be about HIV as it was initially intended.
- Student nurses were not familiar with the terms 'clinical learning environment' and 'skills laboratory' so these terms were changed to 'clinical area' and 'demonstration laboratory' respectively.
- Only 2 students out of the 14 got Question 25 (the open-ended question) right because they read only the first part of the question. As such, the second part of the question was then written in a bold font for emphasis.
- Questions 40.2 and 40.4 asked if guest lecturers facilitated learning even more. After learning from the students that they never have guest lecturers this question was eliminated because it was not applicable.

3.3.7 Rigor/ Quality Control

3.3.7.1 Validity

According to Grove, Gray & Burns (2015: 224) validity is how trustworthy and accurate the findings obtained from the study are. To strengthen trustworthiness, the following types of validity were ensured:

- **Content validity** looks at whether the instrument covers all the major elements it is supposed to examine according to the variables (Grove, Gray & Burns, 2015:502). In this study, the researcher constructed questions from the literature related to the topic. The constructed questionnaire was given to the supervisors and biostatistician to evaluate and validate if the contents of the instrument measures the objectives to be studied.

- **Face validity** are the opinions of the experts on whether an instrument measures what it is intended to measure (Heale & Twycross, 2015:66). The questionnaire in this study is divided into sections, depending on the variables to be measured. It comprises of both closed and one open questions.

- **Construct validity** examines the relationship between the conceptual and operational definitions of variables being studied (Grove, Gray & Burns, 2015: 227). To ensure construct validity in this study the concepts or variable to be used were not only defined but their implication and application in this study was explained.

- **Criterion validity** can be done through doing a comparison with other instruments that measure the same variable (Heale & Twycross, 2015:66). In this study, literature review of similar studies was done during the construction of the questionnaire.

- **Internal validity** can be ensured to measure internal consistency within the instrument. In this study, it was ensured by questioning how well the items in the questionnaire measure characteristics of the variables and asking if there is a relationship between the variables and findings.

- **External validity** is the ability for study findings to be used or generalized beyond the study sample where it was used (Grove, Gray & Burns, 2015:228). In this study external validity was done by comparing results from this study to other similar studies which were done under a similar context.

3.3.7.2 Reliability

According to Pruzan (2016:122) reliability is a standard which shows that a measurement is

consistent. This means that consistent stable results should be found when the same object is being measured repeatedly. In this study, the contents of the instrument were guided by the best practices from Centers for Disease Control (CDC) (2016; 2018) and WHO guidelines (2009; 2011; 2013; 2018). A statistician was also consulted to review the questionnaire and a pilot study was done to ensure that the questionnaire is reliable. Cronbach alpha coefficient was used to measure the reliability of the factors influencing compliance with standard precautions for prevention of TB and HIV.

3.4 ETHICAL CONSIDERATIONS

In this study the researcher adhered to the three ethical principles as articulated in Belmont's report namely: beneficence, respect for human dignity and justice (Polit & Beck 2017:139).

3.4.1 Beneficence

According to Grove, Gray & Burns (2015:108) the principle of beneficence falls under the right of protection from discomfort and harm, which state that the researcher should do good and most of all do no harm. This principle means that the research is supposed to directly or indirectly benefit its respondents, the society or other individuals. The part of doing no harm means that a research should not cause any damage on the respondents whether physically, psychologically, economically or socially otherwise if it does, it needs to be terminated. To assure that this study would not cause harm to any individual, it went through the ethics committee for approval. Results from this study will not directly benefit the students who will participate in it but will benefit the students who will come after them, the educators, patients and the nursing profession.

3.4.2 Respect for human dignity

The principle of respect for human dignity is about the right to self-determination and the right to full disclosure.

- **Self-determination**

According to Nieswiadomy & Bailey (2018:50) all participation in nursing research should be voluntary, that is, no coercion or penalty for nonparticipation should be involved. Grove, Gray &

Burns (2015:113) define a voluntary consent as one where the prospective subject has decided to take part in the study according to his or her own volition, without being forced to do so. Participants were requested to volunteer to be part of this study. It was explained to them that they can be involved according to their willingness and they can choose to withdraw from the study at any point. Students who did not want to participate were asked not to sign the consent form.

- **Full disclosure**

According to Leedy & Ormrod (2015:121) participants must know the nature of the study and must offer written permission to be part of it. This means that the researcher must treat participants with respect, explaining to them the nature of the study, its benefit to them and any possible dangers that can be incurred during their participation. The researcher in this study formulated a consent form which was signed by the participants before completing the questionnaire. These forms contained information about the purpose and the scope of the study, the respondents' benefits for participating in the study, and their right to withdraw if they wish to do so. It was ensured that all potential participants of this study were within the consenting age and were of right mental capacity to consent for themselves.

3.4.3 Justice

The principle of justice includes the right to fair selection and treatment as well as the right to privacy.

- **Fair selection and treatment**

The right to fair selection and treatment advocates for people to be treated fairly and should receive equal benefits regardless of their age, race or socioeconomic level (Grove, Gray & Burns 2015:107). This means that the researcher should not be biased in selecting participants and should also be mindful of the fact that participants are people not just research subjects.
In this study participants were chosen because they are relevant to the problem being studied and they were treated with respect and fairness.

- **Privacy**

There are two terms in research which are used in ensuring participant's right to privacy, these are confidentiality and anonymity.

a) **Confidentiality** The researcher ensured that the information is kept in a safe place, without disclosing information without permission of the participants (Fain, 2017:37).

b) **Anonymity:** The researcher, ensured that the questionnaires were put in a sealed box with just enough space to push in a questionnaire and then kept in a locked area at work. Participants were asked not to write their names in the questionnaires, codes were used to make sure that even the researcher cannot link the participants to the information (Grove, Gray & Burns 2015:107).

3.5 CONCLUSION

This chapter included the research methodology and design which was applied when undertaking this study. It contains the description of the study's objectives, research design, research setting, population, sampling, data collection instrument, data collection process, data analysis, pilot, validity, reliability as well as ethical considerations observed in the study.

CHAPTER 4

DATA ANALYSIS, PRESENTATION AND INTERPRETATION OF RESEARCH RESULTS

4.1 INTRODUCTION

The previous chapter was on research design and methodology. This chapter will present and analyze the data that was collected on knowledge and factors influencing student nurse's compliance with standard precautions for preventing Tuberculosis and HIV infections.

Data analysis and presentation will be done under the following sub-topics: permission to conduct data collection; sample and sampling technique; the questionnaire; data analysis and research results.

4.2 PERMISSION TO CONDUCT DATA COLLECTION

According to Grove, Burns & Gray (2013:183) a research of this caliber should receive institutional review board approval from their university prior to seeking institutional review board approval at the institution where the study is to be conducted. This study first received ethical approval from the ethics committee of the University of Pretoria. The researcher then applied to the Eswatini Ministry of Health and a research protocol clearance certificate was obtained from the Eswatini Health and Human Research Review Board. The researcher then sought permission from the UNESWA Registrar who also communicated with the Dean of the Faculty of Health Sciences and issued approval to conduct the research. With this approval, the researcher was then able to approach the student nurses asking for their consent with the help of the lecturers and class representatives

4.3 SAMPLE AND SAMPLING TECHNIQUE

The target population for this study was third, fourth- and fifth-year student nurses because they have experience and knowledge on the topic being studied. A total population sampling method was used in this study and data collected on 105 students through self-administered questionnaires.

4.4 THE QUESTIONNAIRE

In this study data was collected using a questionnaire. The questionnaire had four sections namely: demographics, knowledge, factors influencing compliance with standard precautions for prevention of TB and HIV and compliance with standard precautions for prevention of TB and HIV among student nurses which will be discussed in depth. Section 2 on knowledge was further sub-divided into: training on TB and HIV; knowledge of TB and HIV and exposure to blood and body fluids. Section 3 was sub-divided to availability of resources, measures taken by students, hospital support and university support.

4.5 DATA ANALYSIS

In this study data analysis was based on 105 returned questionnaires. Hundred and forty-four questionnaires distributed but one hundred and seven came back in the main study of which 2 were incomplete. Hundred and five were completely filled and usable which makes the response rate 82.6%.

All (N=105) questionnaires were organized and checked for internal dependability, comprehensiveness, legibility and exactness. The data was captured on to an excel spreadsheet that was specifically prepared for this study by the statistician from the University of Pretoria. The statistician further assisted with the data analysis using SPSS version 26. Data analysis includes descriptive statistics and frequencies summarized in tables and graphs. The results are interpreted and presented in the same format as the questionnaire. The data pertaining to association of each of the research questions to the demographics were then presented and described.

4.5.1 Descriptive statistics

According to Grove, Gray & Burns (2015:692) descriptive statistics are all the statistics like frequency distributions, measures of central tendency and dispersion that allow the researcher to present their data in ways that give meaning and ensures understanding. In this study table 4.1 shows the summary of the mean, median and standard deviation of the responses together with the minimum and maximum scores of the questions. The results on these descriptive statistics have been presented in section 2, 3 and 4 together with the frequencies.

Table 4.1 Descriptive statistics for section 2, 3 and 4

	N				Std.		
	Valid	Missing	Mean	Median	Deviation	Minimum	Maximum
TB_Training	105	0	1.2810	1.0000	.30950	1.00	2.00
TB_Knowledge	105	0	1.0531	1.0000	.07738	1.00	1.29
HIV_Training	105	0	1.2048	1.0000	.29980	1.00	2.00
HIV_Knowledge	105	0	1.0048	1.0000	.03434	1.00	1.25
Exposure_1	105	0	1.4048	1.5000	.24114	1.00	2.00
Exposure_2	105	0	.0889	.0000	.18061	.00	1.00
Resources	105	0	2.7302	2.7143	.53103	1.00	4.00
Measures	105	0	1.5990	1.5000	.34448	1.00	2.67
Hospital_Support	105	0	2.0107	2.0000	.40601	1.00	3.38
University_Support	105	0	1.7333	2.0000	.53738	1.00	3.00
Compliance	105	0	2.2902	2.2857	.26034	1.71	3.00

4.5.2 Cronbach alpha results

Cronbach alpha coefficient was used to measure the reliability of the factors influencing compliance with standard precautions for prevention of TB and HIV. As seen in figure 4.1, most of the questions were found to be reliable, with a Cronbach alpha of more than 0.5, except for the measures taken by student nurses which had a Cronbach alpha of 0.426. Questions on the availability of resources had the highest Cronbach alpha of 0.759.

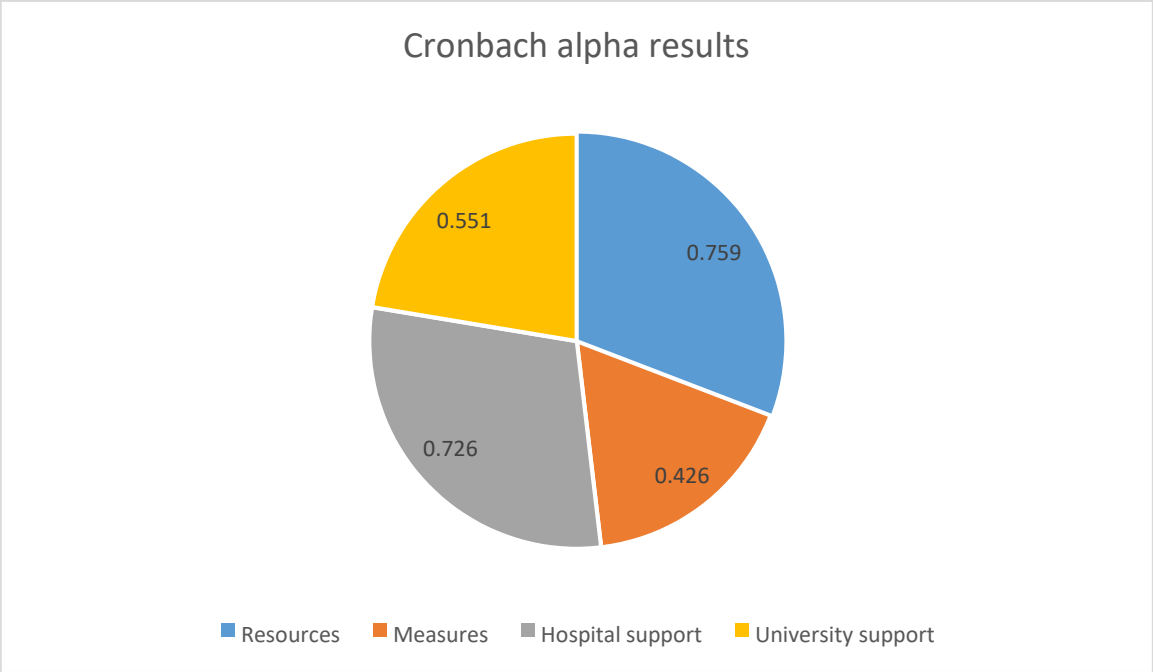

Figure 4.1 Cronbach alpha results

4.5.3 Inferential statistics

ANOVA was done to assess correlations the responses of the participants according to each objective and their demographics. In addition, cross-tabulations were also made to examine the presence of an association between the participants' demographics and their response using chi-square test.

4.6 RESEARCH RESULTS

4.6.1 SECTION 1: DEMOGRAPHICS

This section has information which helps us to know the participants involved in the study. It has six variables which are: gender, age, marital status, level of study, whether participants have repeated a class and their study specialties.

4.6.1.1 Demographics results

As tabulated below (Table 4.2) 62.9% (n=66) of the participants were female students while 37.1% (n=39) were male students. The majority (n=40) of the participants were between ages 20-24 years. The least number of students which accounted for 2.9% (n=3) per group and are between ages 40- 44 years and 44- 49 years. The median age is 28 years and the standard deviation is 6.761. Regarding marital status, most of the participants 70.5% (n=74) were single while 29.5% (n=31) were married.

Out of 105 students that responded 27.6% (n=29) of the students were doing 3rd year, 54.3% (n=57) were doing their 4th year while 18.1% (n=19) were doing their 5th year. There were only 3.8% (n=4) students who have repeated a class in their present nursing degree.

Regarding specialties, 27 students were doing general nursing, others were doing midwifery which are 32. Mental health and community had 24 and 33 of the students respectively. The least number of participants were doing other specialties (n=4). However, students were allowed to have more than one specialty.

Table 4.2 Demographics

VARIABLES	RESPONDENTS (N)	PERCENTAGE (%)
GENDER		
Male	39	37.1
Female	66	62.9
AGE GROUP		
20 – 24 years	40	38.1
25 – 29 years	17	16.2
30 – 34 years	21	20
35 – 39 years	20	19
40 – 44 years	3	2.9
45 and above	3	2.9
Not stated	1	1
MARITAL STATUS		
Married	31	29.5
Single	74	70.5
LEVEL OF STUDY		
3rd year	29	27.6
4th year	57	54.3
5th year	19	18.1

REPEATED YEAR		
Yes	4	3.8
No	100	95.2
Not stated	1	1.0
STUDY SPECIALTY		
General Nursing	27	25.7
Midwifery	32	30.5
Mental health	24	22.9
Community Nursing	33	31.4
Other	4	3.8
Not stated	1	1
TOTAL	**105**	**100**

4.6.2 SECTION 2: KNOWLEDGE

This section will be discussed under three sub-topics namely: training, knowledge on standard precaution for prevention of HIV &TB and exposure.

4.6.2.1 Training

This finding is illustrated in figure 4.2.

- **Tuberculosis**

As seen in the graph below (figure 4.2) most participants, 90.5% (n=95), agreed that they have received theoretical training on TB in class while 9.5% (n=10) of them disagreed. This is good because when student nurses are knowledgeable about TB they are less likely to infect themselves while practicing in the CLE. Almost half of participants which is 51.9% (n=54) agreed that they have received training on TB prevention procedures in the demonstration laboratory while 47.1% (n=49) disagreed. Only 1% (n=1) of the participant thought that the question was not applicable.

As seen in table 4.1, the minimum training score for TB was 1 and the maximum was 2. Most students agreed on TB training which makes the mean score 1.28 and the standard deviation 0.31.

- **HIV**

A majority of the participants, 94.3% (n=99) agreed that they have received theoretical training on HIV in class while 4.8% (n=5) disagreed and 1% (n=1) thought it was not applicable. This is important, as it empowers them with the right knowledge they need to take care of patient in the clinical area where they are going to work. Pertaining skills of HIV prevention however, 63.8% % (n=67) of the participants agreed that they have received training on HIV prevention procedures in the demonstration laboratory**,** 35.2% (n=37) disagreed and 1% (n=1) said it was not applicable. One may wonder if the students really didn't learn these procedures or they just did not relate them to HIV prevention.

The minimum training score for HIV was 1 and the maximum was 2 (table 4.1). Many students agreed on the HIV training questions which makes the mean score 1.2 and the standard deviation 0.3.

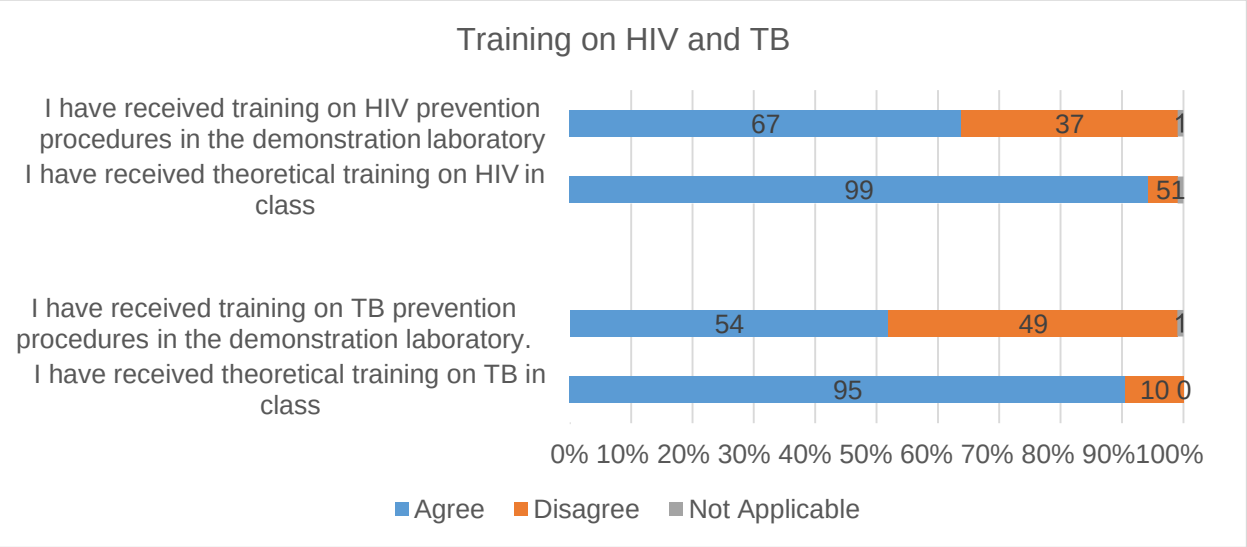

Figure 4.2 Training on HIV and TB

4.6.2.2 Knowledge on standard precaution for prevention of HIV &TB Tuberculosis

This variable is summarized in figure 4.3.

- **TB**

Most participants, 70.5% (n=74) agreed that TB can be contracted through body fluids including saliva droplets while 28.6% (n=30) of them disagreed. Almost all of the participants 99% (n=104)

agreed that health care workers can contract TB in the clinical setting. Among the students 99% (n=104) of the participants agreed that TB is preventable while 1% (n=1) disagreed. When asked if TB was curable, only 99% (n=104) of the participants answered the question of which 96.2% (n=101) of them agreed while 2.9% (n=3) disagree. Most participants agreed that knowledge on TB can help student nurses to protect themselves (100%, n=105) and the patients under their care (97.1%, n= 102) in the clinical area. Most of them, 99% (n=104) also agreed that training on standard precautions is important in the prevention of TB.

According to table 4.1 the mean score for TB knowledge is 1.05, the minimum being 1 and the maximum 1.29. the standard deviation is 0.08.

- **HIV**

When asked about HIV, almost all of the participants 98.1% (n=103) agreed that health care workers can contract HIV in the clinical setting while 1.9% (n=2) disagreed. All of them 100% (n=105) agreed that knowledge on HIV can help student nurses to protect themselves and the patients under their care in the clinical area. All of them, 100% (n=105) also agreed that training on standard precautions is important in the prevention of HIV. With this high score of knowledge on the importance of standard precautions, one may be confident that student nurses go to the clinical area equipped and ready to render nursing care in a way that they don't contract HIV or spread it among their patients.

As seen in table 4.1, the mean score for HIV knowledge is 1 and the standard deviation was 0.03. the minimum score was 1 and the maximum score is 1.25.

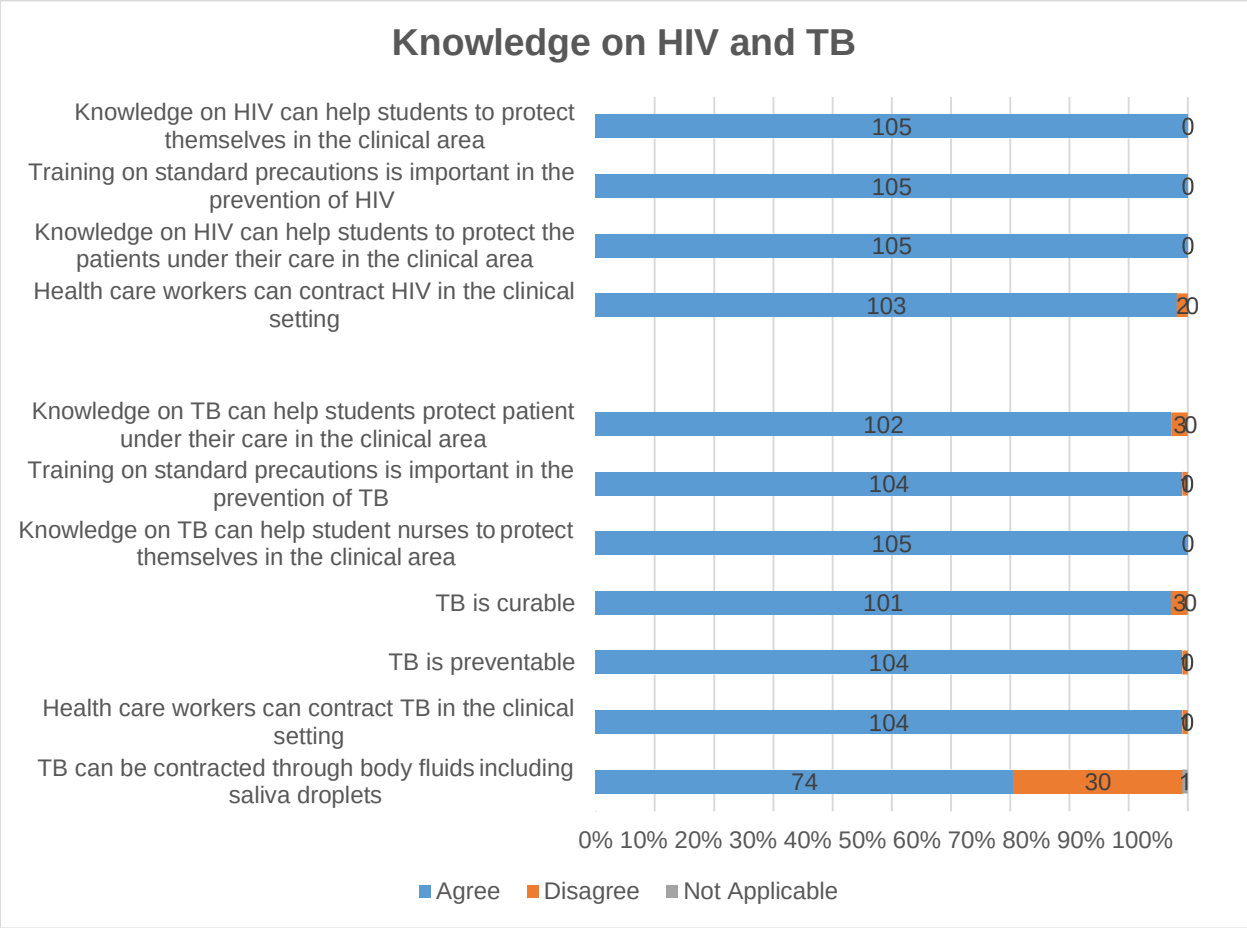

Figure 4.3 Knowledge on HIV and TB

4.6.2.3 Exposure to blood and body fluids

Unfortunately, 22.9% (n=24) of the participants agreed to have been accidentally exposed to blood and body fluids of a patient as they practiced in the past 12 months while 77.1% (n=81) disagreed. Among those exposed, 3 were exposed to blood or body fluids of a patient with TB, 18 with HIV and 7 with other illnesses. As revealed by the descriptive statistics, the minimum exposure to TB, HIV and other diseases was 0 and the maximum was 1 (table 4.1). The mean score of exposure was 0.09 and the standard deviation was 0.18.

When the student nurses were asked whether or not standard precautions apply to all the patients regardless of their diagnosis 96.2% (n=101) of them agreed while 3.8% (n=4) disagreed. When asked to explain their answer 10 participants did not answer whilst some participants gave more than one answer and these answers were grouped into 6 themes. 48% (n=49) said it was done to prevent the spread of TB, HIV and other nosocomial infection; 28% (n=29) explained that

patients may be asymptomatic or not yet diagnosed; 10.8% (n=11) alluded that everyone is at risk of infection; 7.8% (n=8) stated that standard precautions need to be observed to all patients or all patients should be treated as positive; 3.9% (n=4) mentioned that it was to prevent stigma and discrimination and lastly 1% (n=1) said it is the patients right not to disclose his or her condition. That being said and given that health workers and students nurses are so much exposed, it is safe to continue treating all patients as infected regardless of their present diagnosis. Refer to figure 4.4.

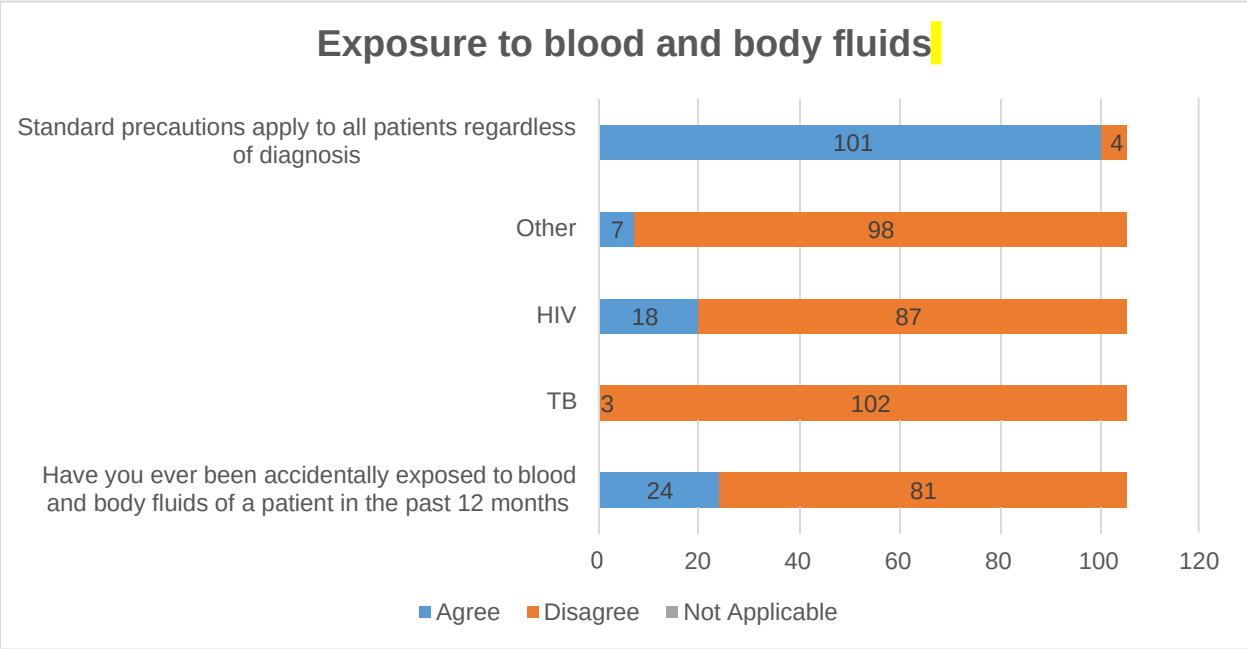

Figure 4.4 Exposure to blood and body fluids

4.6.3 SECTION 3: FACTORS INFLUENCING COMPLIANCE WITH STANDARD PRECAUTIONS FOR PREVENTION OF TB AND HIV

Factors influencing compliance with standard precautions for prevention of TB and HIV will be discussed under four sub-topics namely: availability of resources, measures taken by student nurses, hospital support role and university support role. A four-point Linkert scale was utilized using the following frequency responses: strongly agree, agree, disagree and strongly disagree. The frequency responses ‘strongly agree’ and ‘agree’ were combined and written as an agree option while ‘strongly disagree’ and ‘disagree’ were combined and expressed as disagree.

4.6.3.1 Availability of Resources

As illustrated in figure 4.5 only 17.1% (n=18) of the participants agreed that in the clinical setting there were enough resources with regard to the prevention of TB, the majority of the participants, 82.9% (n=87) disagreed with this statement. Regarding HIV, 4 participants did not answer this question so the total number of participants in this question is 101. Responses to this question were varied. Almost half of the participants 47.6% (n=50) agreed that there were enough resources with regard to the prevention of HIV in the clinical area while participants 48.6% (n=51) disagreed with this statement. Students were then asked on the availability of gloves, aprons, masks, goggles and running water and their answers still varied:

- A large group of the participants 61% (n=64) agreed that gloves were always available in the clinical setting while unfortunately, 38.1% (n=41) of the students disagreed.
- Only 18.3% (n=19) of the participants agreed that aprons were always available in the clinical setting and the majority of the students 81.7% (n=85) disagreed that aprons are available while 1% (n-1) did not answer.
- One participant did not answer the question on masks which makes the total number of participants for this question n=104. A small portion of participants 29.5% (n=31) agreed that masks are always available in the clinical setting while the majority of participants think otherwise as 69.5% (n=73) disagreed.
- The least number of participants 14.3% (n=15) agreed that goggles are always available while the majority of the students 85.7%(n=90) disagreed to this statement.
- Most students 64.8% (n=68) agreed that running water or an antiseptic solution is always available in the clinical setting, on the other hand, 35.2% (n=37) disagreed to this statement.

In general, gloves and hand washing equipment are the only resources that had higher scores in terms of availability according to these students. Lack of this basic PPE does not work in any department in the hospital as some infections are airborne and some are spread through contact, but it becomes worse in departments like maternity and theater where there are splashes of blood and body fluids.

As seen in table 4.1, the student's responses varied and the mean score on availability of resource was 2.73 and the standard deviation was 0.53. The minimum and maximum scores were 1 and 4 respectively.

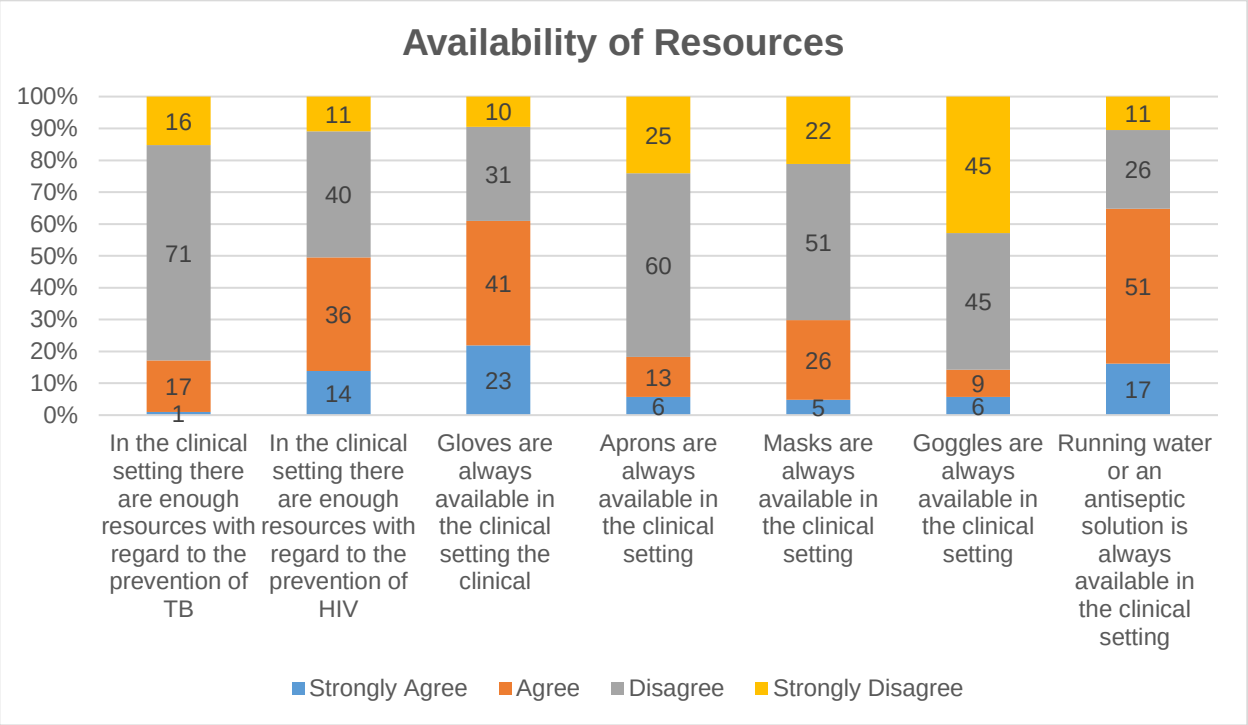

Figure 4.5 Availability of resources

4.6.3.2 Measures taken by students

This variable is summarized in figure 4.6. The question on TB immunization was answered by 103 students of which 80% (n=84) agreed that all student nurses should receive TB immunization as a precautionary measure to prevent infections in the clinical setting but on the contrary, 18.1% (n=19) disagreed to this statement. Many student nurses 96.2% (n=101) agreed that they should wear a surgical mask which covers the mouth and nose while, a very small fraction which is 3% (n=3) disagreed to this statement while 1% (n=1) did not answer. All of the participants 100% (n=105) agreed that students should wear the N95 mask in the TB ward. Most students were for the notion that a hibitane alcohol spray should be used after attending to each patient, as 96.2% (n=101) agreed. Only 3.8% (n=4) disagreed to this statement. The students were divided on cleaning and sterilizing equipment, while some of them, 60% (n=63) agreed that they always clean and sterilize patient's equipment between each patient, 40% (n=42) disagreed to this statement.

From these answers one can notice that student nurses are more motivated to practice precautionary measures to protect themselves and the patients. This explains why 94.3% (n=99) of them admitted that student nurses are afraid of being infected with HIV in the clinical area. The least number of students 5.7% (n=6) disagreed with this statement.

The minimum score for responses on measures taken by student nurses was 1 and the maximum was 2.67 (table 4.1). The mean score was 1.6 and the standard deviation was 0.34.

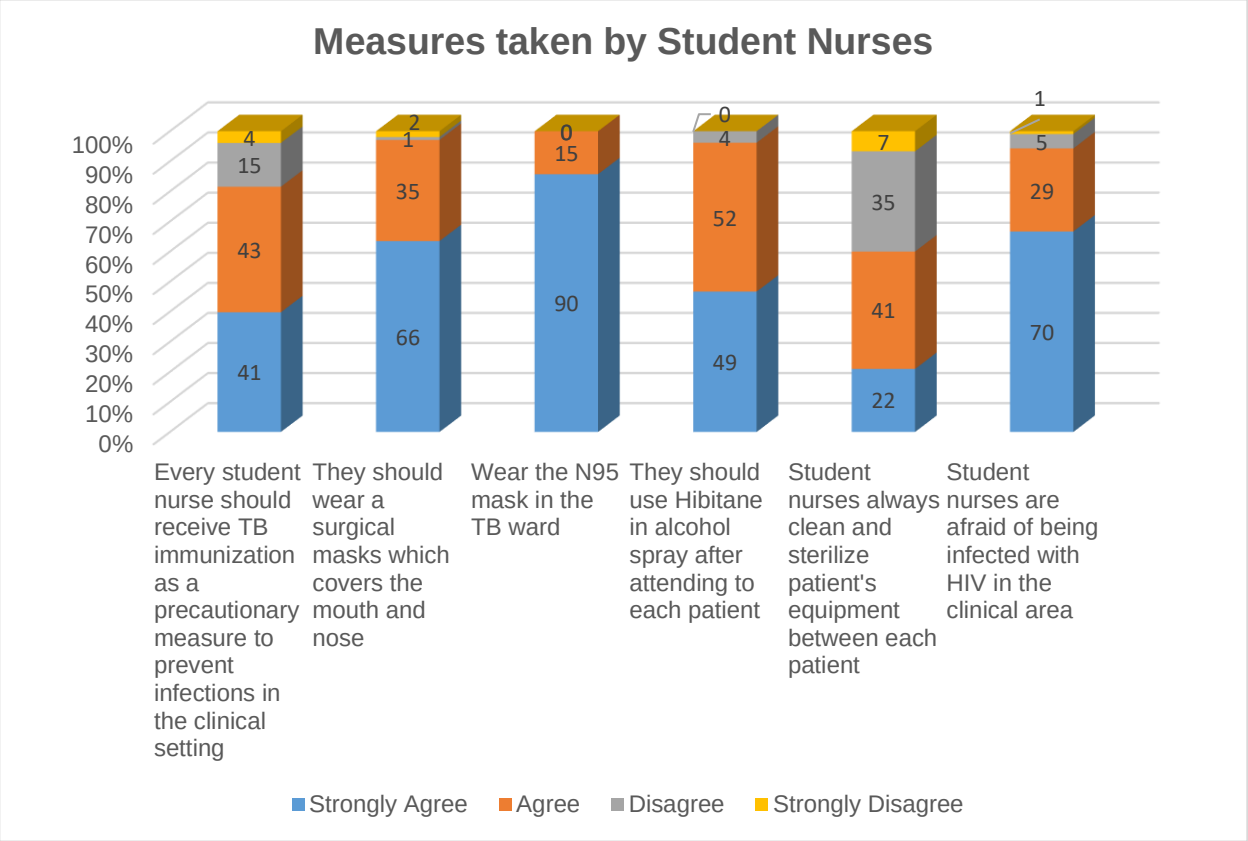

Figure 4.6 Measures taken by student nurses

4.6.3.3 Hospital support role

Most of the participants, 83.8% (n=88) agreed that most of the HIV prevention methods learnt in class are practiced in the clinical area and only 16.2% (n=17) disagreed. In as far as HIV prevention is concerned, students can smoothly integrate theory into practice as what they have learnt in class is also found in practice in the clinical area. But when it comes to TB the numbers are slightly reduced as 69.5% (n=73) agreed that most of the TB prevention methods learnt in class are practiced in the clinical area while some of the students which are 30.5% (n=32) disagreed.

When it comes to the nurses, most participants 77.1% (n=81) agreed that the experienced nurses in the clinical area are supportive in facilitating knowledge on standard precautions while 22.9% (n=24) of the participants disagreed. With regards to role-modeling, the students were also divided but more than half of them thought that the nurses in the clinical area were not good role models on the use of protective measures. 45.8% (n=48) of participants agreed that the nurses in the clinical area were good role models on the use of protective measures, while 55.2% (n=57) disagreed. Furthermore, 78.1% (n=82) agreed that the hospital provides trainings on infection prevention and a small group of the students 21.9% (n=23) disagreed.

One participant did not answer the question on PEP but most of the students 93.3% (n=98) agreed that post exposure services are available in the clinical setting. Unfortunately, 5.7% (n=6) disagreed to this statement. A lot of the student nurses 97.1% (n=102) agreed that post-exposure prophylaxis is available after exposure to patient's blood or body fluids and only 2.9% (n=3) disagreed to this statement. On follow-up however, the numbers in agreement have slightly reduced, now 81% (n=85) of the participants agreed that post-exposure follow-up is available after reporting exposure; there is a small portion of the students 15.2% (n=16) who disagreed to this statement and 3.8% (n=4) did not answer. Refer to figure 4.7.
The mean score for responses on hospital support was 2, ranging between the minimum of 1 and the maximum of 3.38 (table 4.2). The standard deviation was 0.41.

In summary we can see that as much as it’s not all 100%, the hospital teaches students on infection control, emphasizes on what was learnt in class, mentors students as they practice in the clinical area and in case of accidental exposure there are measures in place to assist them if they will report the accident and follow-up is done.

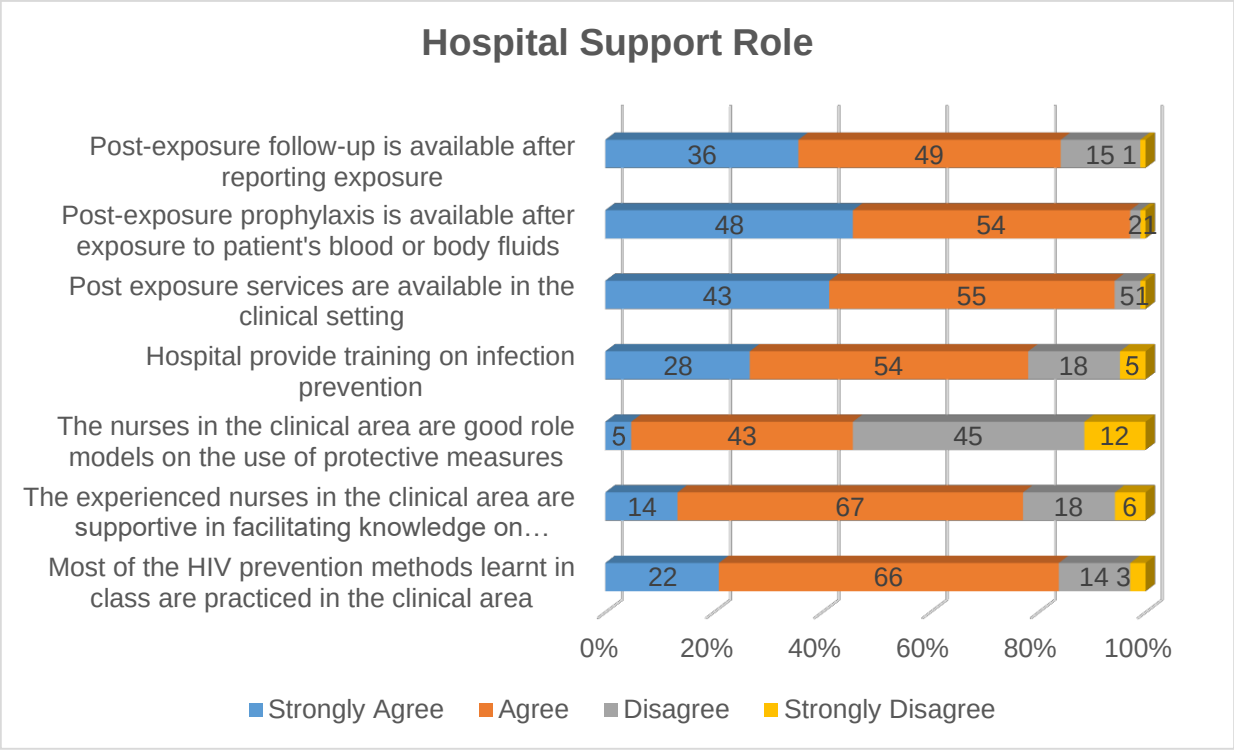

Figure 4.7 Hospital support role

4.6.3.4 University support role

As illustrated in figure 4.8, a good percentage of the students 90.5% (n=95) agreed that the university continuously teaches them on how to prevent contracting infections in the clinical setting. However, not all students agreed with this statement, as 9.5% (n=10) disagreed. The majority of student nurses, 91.4% (n=96), also agreed that information on standard precautions learnt in class was clear and adequate. A few of them however, 8.6% (n=9) disagreed. But generally, the university is doing a good job in supporting students in as far as standard precautions are concerned.

Given that most students agree on questions pertaining the university's support, the mean score was 1.73 and the standard deviation was 0.54. The minimum score for this question was 1 and the maximum was 3.

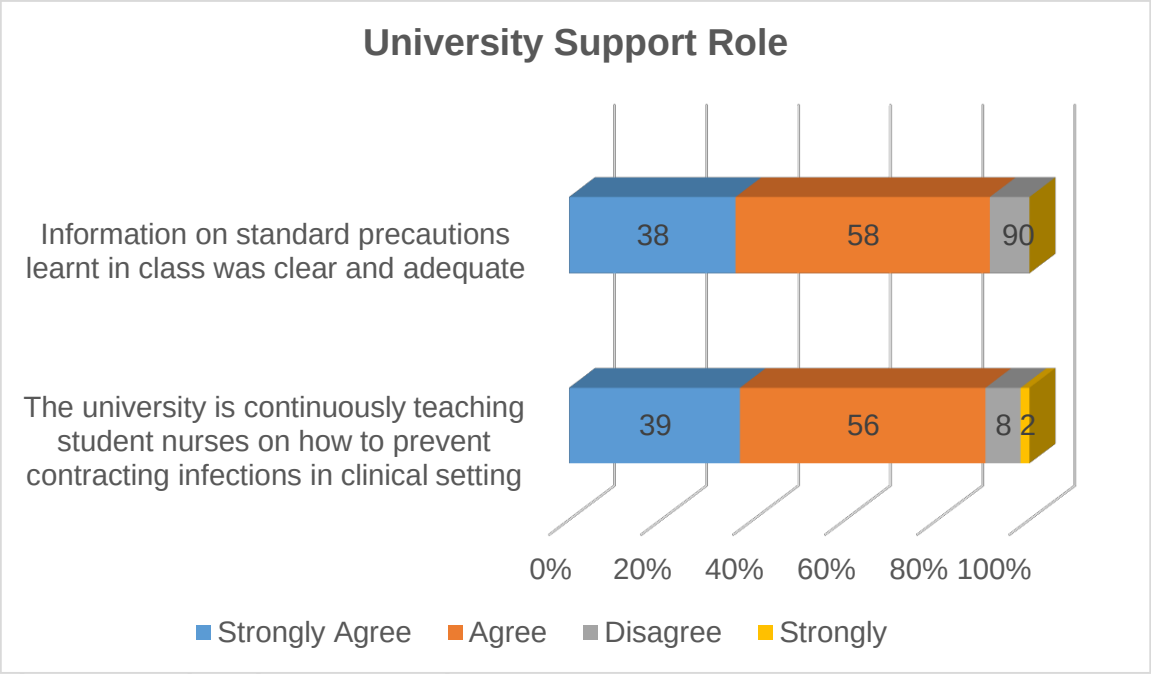

Figure 4.8 University support role

4.6.4 SECTION 4: COMPLIANCE WITH STANDARD PRECAUTIONS FOR PREVENTION OF TB AND HIV AMONG STUDENT NURSES

As summarized in figure 4.9, when students were asked about the use protective preventive equipment 1.9% (n=2) responded that they never use personal protective equipment depending on the patient's condition while 46.7% (n=49) said sometimes and 51.4% (n=54) said always. Regarding wearing gloves to draw blood samples only 95.2% (n=100) participants answered of which 18.1% (n=19) said they sometimes wear them while most students, 77.1% (n=81), said they wear them always. More than half of the students, 52.4% (n=55) said they never wear safety glasses when working with body fluids while 26.7% (n=28) sometimes wear them and only 21% (n=22) wear them always. The student nurses were divided when it comes to hand washing as only 2.9% (n=3) said they never wash hands according to the hand washing guidelines while 48.6% (n=51) said sometimes and 48.6% (n=51) said always. When it is an emergency more than half of the students, 54.3% (n=57) admit that they sometimes use protective equipment and the other 45,7% (n=48) use it always.

Students seem to be doing well when it comes to using designated containers to dispose sharps as only1% (n=1) never use designated sharp containers while 5.7% (n=6) said sometimes and most of them most of them, 92.4% (n=97) always use them which is good. 81% (n=85) of the

student reported to never recap the needles after use which is good but 14.3% (n=15) do it sometimes and only 4.8% (n=5) always recap used needles.

According to descriptive statistics, the mean score for compliance was 2.29 and the standard deviation was 0.26 (table 4.2). The minimum score was 1.71 and the maximum score was 3.

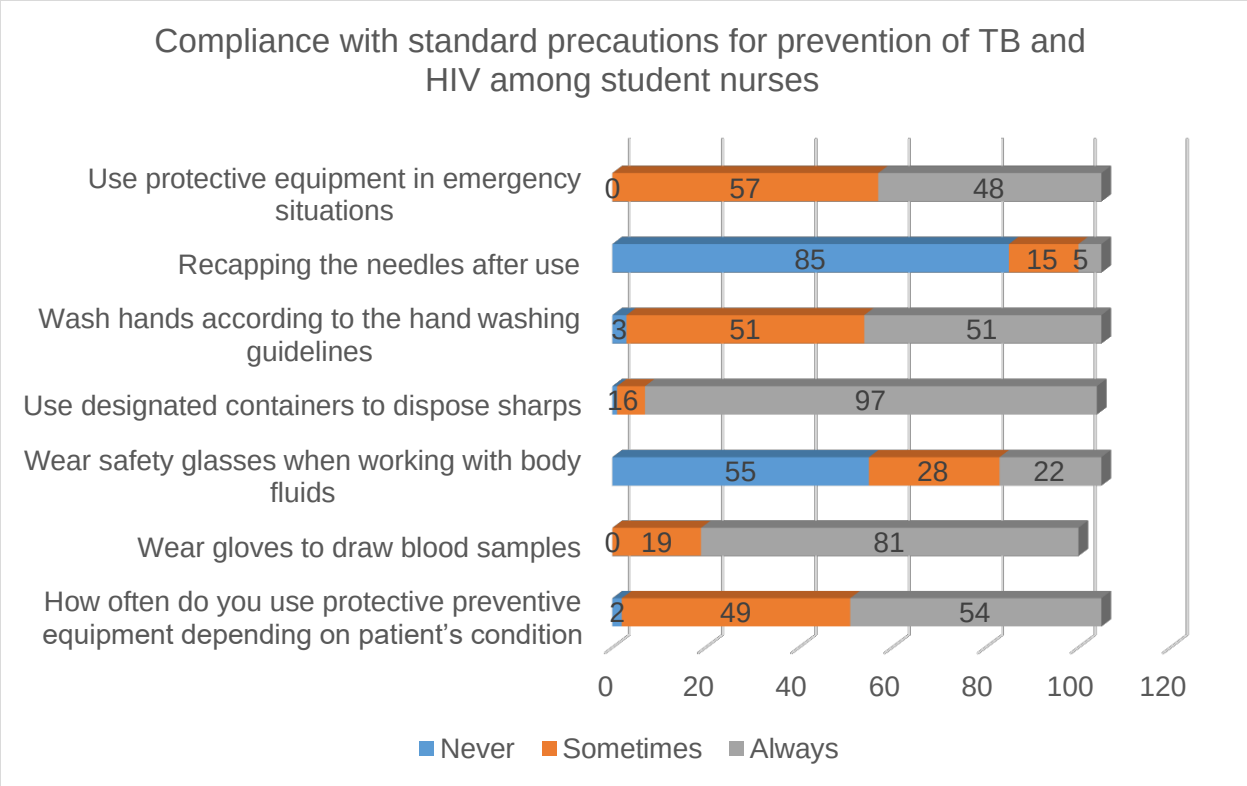

Figure 4.9 Compliance with standard precautions for prevention of TB and HIV among student nurses

4.6.5 RESULTS PERTAINING TO ASSOCIATION OF EACH OF THE RESEARCH QUESTION TO THE DEMOGRAPHICS.

A demographic association analysis was applied to answer to each research question the study. This study reports the results that shows there is enough evidence to show that there is association between participant's demographics and the students' responses. All scores were rounded off to at most, two decimal places, for simple presentation and to ensure easy readability. Association of each research question to the demographics was done with the ANOVAs. Then chi square tests were done to assess association on the results on student nurses' compliance with the demographics.

4.6.5.1 Research question 1

- **What is the knowledge of UNESWA student nurses regarding standard precautions for prevention of Tuberculosis and HIV?**

ANOVAs' Associations

As seen in table 4.3, mean knowledge score were presented in percentage. The total knowledge score for students was 91% the male students with more knowledge at 91.8% and the female students at 90.4%. Students between ages 25-29 year had the highest knowledge score of 93% while those between ages 40-44 years had the least knowledge score of 85%. The single students had higher knowledge (91.6%) than the married students (89.3%). On level of study, 92% of the 3rd year students had good knowledge, followed by the 4th year at 91% and the 89.1% on 5th year students.

4.6.5.2 Research question 2

- **What are the factors affecting UNESWA student nurses' compliance with standard precautions for preventing Tuberculosis and HIV?**

ANOVAs' Associations

The mean score of 2.7 shows that most students disagreed that resources such as gloves, masks, goggles and aprons were always available in the clinical area. Among these, responses from male students had a score of 2.71 and females 2.73. Students between ages 20-24 years had the highest score of 2.8 and the lowest were ages 45-49 with 2.4. Married students disagreed more by 2.74 that single students at score 2.72. Third year student were leading at 2.76, followed by fourth year students at 2.73 and fifth year students at 2.68.

As seen on table 4.3, most students agreed (1.6) in taking protective measures and there was no difference on score within each gender, age, marital status and study level.

Both male and female students mostly agreed to hospital support with the same score of 2.0. Students between ages 20-24 years had the highest mean score on hospital support of 2.1 and those between ages 45-49year had a mean score of 1.8. There was no significant difference

between the married and the single students. The mean hospital support scores for third year students were 2.1, 2 for fourth year students and 1.9 for fifth year students.

Table 4.3 shows that the mean score for university support was 1.7 because most students agreed that the university was supportive. There was no significant difference in responses within gender, age, marital status and study level.

4.6.5.3 Research question 3

- **What is the level of compliance to standard precautionary amongst UNESWA student nurses in prevention of Tuberculosis and HIV?**

a. ANOVAs' Associations

When it comes to compliance to standard precautions, students do not comply well, as the compliance score was 2.3 the minimum being 1.7 and the maximum was 3. Male students complied more (2.31) than the female students (2.28). Students between ages 25-29 years had the highest compliance rate of 2.34, while those of ages 40-44 had the lowest compliance rate of 2.18. The compliance rate was higher on single students (2.3) as compared to married student (2.2). Fourth year students complied more with a compliance score of 2.33, followed by fifth year students at 2.27 and third year students complied less at 2.22.

Table 4.3 Association of each of the research question to the demographics

		N	Knowledge of TB and HIV	Availability of resources	Measures taken by students	Hospital support	University support	Compliance
Gender	Male	39	91.8269	2.7192	1.5658	2.0060	1.6795	2.3071
	Female	66	90.4356	2.7307	1.6187	2.0135	1.7652	2.2803
	Total	105	90.9524	2.7302	1.5990	2.0107	1.7333	2.2902
Age	20-24 years	40	91.7188	2.8351	1.5125	2.1487	1.6500	2.2500
	25-29 years	17	93.0147	2.7157	1.5980	1.9286	1.6471	2.3445
	30-34 years	21	89.8810	2.6791	1.6746	1.9481	1.8333	2.3231
	35-39 years	20	90.0000	2.6429	1.6867	1.8804	1.8750	2.3000
	40-44 years	3	85.4167	2.6111	1.5556	1.9583	1.6667	2.1825
	45-49 years	3	95.8333	2.3810	1.6667	1.7917	1.6667	2.2381
	Total	104	91.1659	2.7276	1.5984	2.0048	1.7308	2.2875
Marital status	Married	31	89.3145	2.7496	1.6667	1.9579	1.7581	2.2458
	Single	74	91.6385	2.7220	1.6667	2.0328	1.7230	2.3089
	Total	105	90.9524	2.7302	1.5990	2.0107	1.7333	2.2902
Level of study	3rd year	29	92.0259	2.7644	1.5287	2.0720	1.6034	2.2167
	4th year	57	91.0088	2.7281	1.6386	2.0066	1.7982	2.3342
	5th year	19	89.1447	2.6842	1.5877	1.9295	1.7368	2.2707
	Total	105	90.9524	2.7302	1.5990	2.0107	1.7333	2.2902

b. Association between demographics and compliance to standard precautions according to Chi Squared Result

These findings were illustrated in table 4.4 and table 4.5.

Cross tabulation was done on responses of compliance among student nurses and their demographics. As seen in table 4.4, there was a significant relationship between compliance to hand washing and age. The exact significance value was 0.14 and the chi square test was 24.13. There was also a correlation between gender and discarding sharps (exact significant value of 0.11; chi square test = 7.55). There was a significant relationship between recapping of used needles and marital status the exact significant value was 0.027 (chi square test = 7.22). There was also a correlation between the use of PPE and the level of study (exact significant value was 0.40; chi square test =10.04).

Table 4.4 Association between demographics and compliance to standard precautions

		Age	Gender	Marital status	Study group
V43: How often do you use protective preventive equipment depending on the patient condition	Exact significance value	.914	.458	.506	**.040**
	Remarks	No significance	No significance	No significance	**Significance**
V44: How often do you wear gloves to draw blood samples	Exact significance value	.324	.613	.158	.402
	Remarks	No significance	No significance	No significance	No significance
V45: How often do you wear safety glasses when working with body fluids	Exact significance value	.445	.439	.557	.101
	Remarks	No significance	No significance	No significance	No significance
V46: How often do you use designated containers to dispose sharps	Exact significance value	.372	**.011**	.552	.633
	Remarks	No significance	**Significance**	No significance	No significance
V47: How often do you wash hands according to the hand washing guidelines	Exact significance value	**.014**	.928	.090	.078
	Remarks	**Significance**	No significance	No significance	No significance
V48: How often do you recap the needles after use	Exact significance value	.074	.514	**.027**	.676
	Remarks	No significance	No significance	**Significance**	No significance
V49: How often do you use protective equipment in emergency situations	Exact significance value	.228	.688	.088	.539
	Remarks	No significance	No significance	No significance	No significance

Table 4.5 Cross table of demographics and chi square test results

Demographics	Compliance to standard precautions	Chi square	Degree of freedom	p-Values
Age	How often do you wash hands according to the hand washing guidelines	24.131[a]	10	0.004
Gender	How often do you use designated containers to dispose sharps	7.545[a]	2	0.009
Marital status	How often do you recap the needles after Use	7.221[a]	1	0.003
Study level	How often do you use protective preventive equipment depending on the patient condition	10.042[a]	4	0.079

4.7 CONCLUSION

This chapter was on data analysis of the result collected in the study. The findings from this research were analyzed, interpreted and presented using tables and graphs. The following chapter will be on discussion of research results.

CHAPTER 5
DISCUSSION OF RESEARCH RESULTS AND LITERATURE CONTROL

5.1 INTRODUCTION

The previous chapter analyzed data, presented and interpreted the research findings. In this chapter the results will be discussed and compared to results from other studies. The purpose of the study was to assess knowledge and factors affecting compliance with standard precautions for TB and HIV prevention in the clinical area among student nurses in Eswatini. A quantitative approach was used to conduct a survey on third, fourth- and fifth-year student nurses of Eswatini University using questionnaires.

This study was done to attempt to answer the following research questions:

- What is the knowledge of UNESWA student nurses regarding standard precautions for prevention of Tuberculosis and HIV?
- What are the factors affecting UNESWA student nurses' compliance with standard precautions for preventing Tuberculosis and HIV?
- What is the level of compliance to standard precautionary amongst UNESWA student nurses in prevention of Tuberculosis and HIV?

5.2 DISCUSSION OF RESULTS

5.2 .1 KNOWLEDGE ON STANDARD PRECAUTION FOR PREVENTION OF HIV &TB

5.2.1 .1 Training

As a base for knowledge assessment, students were asked if they have received training on TB and HIV in class and in the skill's laboratory. The majority of participants in this study agreed that they had received training on TB and HIV. Among the students 90.5% agreed that they had received theoretical training on TB in class, 94.3% agreed that they had received theoretical training on HIV in class. Furthermore, 51.9% of the students agreed that they had received training

on TB prevention procedures in the demonstration laboratory while 63.8% said they received it on HIV. When added together, the mean score for TB and HIV was 1.28 and 1.2 respectively which shows that most students agreed that they have been taught.
These results are similar to Haile, Engeda & Abdo (2017:4) in which healthcare workers who had taken infection prevention training were 2.9 times more likely to be always compliant with standard precautions as compared to non-trained health care workers.

5.2.1.2 Knowledge on TB and HIV

The mean knowledge score of all participants for TB was 1.05 and for HIV was 1. This shows that students have adequate knowledge on TB and HIV prevention. The total knowledge score showed that 91% of the respondents had good knowledge and only 9% of them had poor knowledge on TB, HIV and standard precautions.

- **TB**

According to Daniels & Nicoll (2012: 858) TB is a chronic lung infection caused by a mycobacterium that results in the development of tubercles in the lungs. WHO (2018:6) added that TB is spread when people who have pulmonary TB expel bacteria into the air, for example by coughing. Most participants (70.5%) rightfully agreed with the authors that TB can be contracted through body fluids including saliva droplets. It is worth noting that as much as most students (90.5%) agreed that they have been taught about TB in class, not all of them were able to grasp the knowledge of how TB spreads from one person to another. Moreover, WHO (2018) suggests that using the good coughing etiquette can be effective in the prevention of TB.

Almost all of the participants (99%) agreed that health care workers can contract TB in the clinical setting. This shows that most students are aware of the risk of contracting TB in the clinical area so they are more likely to protect themselves. Again 99% of the participants agreed that TB is preventable. WHO (2018:6) alludes that TB can be prevented in many ways including the BCG vaccine which is given to prevent TB in children.

When asked if TB was curable, 96.2% of them agreed that TB is curable. According to WHO (2018:6) there is treatment for TB and the first effective anti-TB drugs were developed in 1940. In

addition, the nursing students might have seen evidence in the clinical facilities that the University of Eswatini allocate them for clinical practice because they provide TB services. Most of the participants agreed that knowledge on TB can help student nurses to protect themselves (100%) and the patients under their care (97.1%) in the clinical area. Most of them, (99%) also agreed that training on standard precautions is important in the prevention of TB. Makhado & Davhana-Maselesele (2016:3) emphasized that it is very important for nurses to have adequate knowledge on how they can protect themselves against hospital borne infections.

- **HIV**

Almost all of the participants (98.1%) agreed that health care workers can contract HIV in the clinical setting. Rahiman, Chikte & Hughes (2018:20) alludes that nurses are at risk of acquiring nosocomial illnesses including HIV and it is of paramount importance that they possess sound knowledge of infection prevention procedures. Rasweswe & Peu (2020:4a) argue that it is essential to provide relevant information on HIV to nurses. All of the participants (100%) agreed that knowledge on HIV can help student nurses to protect themselves and the patients under their care in the clinical area. According to Rasweswe & Peu (2020:1b) the acquired HIV knowledge is used to justify actions or stop unsafe practices to protect and prevent occupational infections. As such student nurses should be informed on how to prevent the transmission of HIV. Hundred percent (100%) of the nursing students also agreed that training on standard precautions is important in the prevention of HIV. Reda, Fisseha, Mengistie & Vandeweerd (2010:1) also allude that standard precautions are effective in the prevention of hospital acquired infections like HIV. However, contrary to this study, Earl (2010:333) did a study which revealed that 37% of the students in Thailand did not know how to use universal precautions as a method for preventing HIV transmission. This is worrying considering that nursing students are delegated to various hospital procedures that can expose them to acquiring hospital infections.

5.2.1.3 Exposure

In this study some student nurses (22.9%) agreed that they have been accidentally exposed to blood and body fluids of a patient as they practiced in the CLE. This shows how much student nurses are at risk of contracting TB and HIV in the CLE. Exposure to blood and body fluids may occur accidentally or when health workers and students overlook good infection control practices such as not recapping sharps and wearing gloves, masks, shoe covers, aprons, goggles/ shields

and gowns where necessary. The mean score of exposure to blood and body fluids of patients with TB, HIV and other conditions was 0.09.

The study conducted in South Africa on occupational exposure to blood and body fluids and use of human immunodeficiency virus post-exposure prophylaxis amongst nurses in a Gauteng province hospital, revealed that 43% of nurses had experienced occupational exposure to BBFs whilst performing their day-to-day work. (Rasweswe & Peu 2020:3a). The findings from the above study further showed that they were performing various procedures such as inserting intravenous infusion, administering injections, collision with one another whilst holding sharps or needles, cutting, disassembling or detaching instruments, disposing needles, recapping needles, assisting in theatre, drawing blood samples from patients or clients, waste disposal, delivering babies in clinical or emergency settings and suturing of wounds. Makhado & Davhana- Maselesele (2016:1) allude that it is common for the healthcare providers to be at a greater risk of exposure to HIV by needle sticks or cuts and getting blood or other body fluids in their eyes or mouths or opened skin. The exposure rate is worrying because the student nurses work and learn under the direct supervision of qualified nurses.

Nevertheless, most students (96.2%) know that standard precautions apply to all the patients regardless of their diagnosis. These findings differ from those of Abdulraheem, Amodu, Saka, Bolarinwa & Uthman (2012:3) where only one third (32.2%) of the respondents agreed that all patient's blood and body fluids were potentially infectious irrespective of their diagnostic status.

5.2.2 FACTORS INFLUENCING COMPLIANCE WITH STANDARD PRECAUTIONS FOR PREVENTION OF TB AND HIV

5.2.2.1 Availability of resources

One of the important factors in compliance to standard precautions is the availability of resources like PPE, without which there are no means for health workers to comply. In the current study, only 17.1% of the students agreed that there are enough resources with TB prevention and 47.6% with HIV prevention. Porto & Marziale (2016:1) also mentioned that inadequate provision of equipment and protective equipment is one of the reasons and consequences of low adherence to standard precautions by the nursing team. Abdulraheem, Amodu, Saka, Bolarinwa & Uthman (2012:3) did a study where more than two-thirds (80.6%) participants reported that only gloves and face masks were provided for surgical and delivery procedures. In this study the availability

of resources is worse, since only gloves (61%) and running water (64.8%) were said by the students to be available. Otherwise the other PPE like aprons, masks and goggles only 18.3%, 29.5% and 14.3% of the students said they are available respectively. When put together, the students mostly disagreed to the availability of equipment the mean score on availability of resource was 2.73.

With such lack of PPE, it is difficult to comply to standard precautions. In agreement to this statement, 48.6% of the student nurses asked in a study done in Nigeria alluded that they cannot practice standard precautions because of inadequate supply of barrier equipment (Jonah, Bewerang & Emmanuel ,2014:59).

According to findings from this research, lack of resources is one of the factors that negatively influenced compliance to standard precautions for TB and HIV prevention. According to Haile, Engeda, & Abdo (2017:5) health care workers who readily access PPE are 2.87 times more likely to be always compliant than those who do not have PPE.

5.2.2.2 Measures taken by students

As much as there is a lot that can be done by the government, the hospitals and the university to ensure compliance to student nurses regarding standard precaution, it all starts at a personal level. The students' opinions and willingness count, whether or not they are going to comply. Many student nurses (96.2%) agreed that they should wear a surgical mask which covers the mouth and nose and all of the students (100%) agreed that they should wear the N95 mask in TB wards. Similarly, Jonah, Bewerang & Emmanuel (2014:62) did a study where 89.5% of the students believed on wearing masks and other protective devices as part of precautionary measures. Most students (96.2%) agreed that a hibitane alcohol spray should be used after attending to each patient. These results were slightly different from those of Labrague, Rosales & Tizon (2012:88) where only 63.8% of the students believe they should perform hand hygiene between patient contacts. The students were divided on cleaning and sterilizing equipment, some (60%) agreed that they always clean and sterilize patient's equipment between each patient. Similarly, Mitchell, Say, Wells, Wilson, Cloete & Matheson (2014:4) did a study on "Australian graduating nurses' knowledge, intentions and beliefs on infection prevention and control" where 52% of the students believe they should always clean medical equipment after use. Given that most students agreed to these measures, the mean score on measure taken by student nurses was 1.6.

TB immunization is a precautionary measure which students can take to prevent themselves from contracting TB as they practice in the clinical area. In this study, 80% of the student nurses agreed that they should receive TB immunization. However, the effectiveness of the TB vaccine (BCG) has been said to be poor in adults and therefore it is not used in Eswatini (WHO, 2018:6; Montagna, Napoli, Tafuri et al 2014:3). The students know that they can use these measures to protect themselves in the CLE but still 94.3% of them admitted that they are afraid of being infected with HIV in the clinical area. These results are different from those of Earl (2010:333) where only 41% percent of the participants reported they were “scared” by the thought of contracting HIV/AIDS at work.

5.2.2.3 Hospital support role

For student nurses to grasp the concept of standard precaution, it should be first taught to them. We learn also from this study that the hospital teaches students on infection prevention as 78.1% of the participants agreed on such trainings. These findings were like those of Tong, Morulane, Mabina & Makhado (2018:10) where most of the students reported that they had demonstrations, orientation sessions and clinical teaching regarding infection control in the clinical area. After teaching the students it is important then that these standard precautions be clearly put into practice in the CLE. In this study when students were asked if most of the HIV and TB prevention methods learnt in class are practiced in the clinical area, 83.8% and 69.5% agreed respectively. On the contrary, Ward (2010:1533) did a study on experiences of nursing and midwifery students in clinical placements where students reported that they observed some practices done by qualified nurses which were against what they had learnt in class.

Another important aspect which can facilitate knowledge and compliance on standard precautions would be having supportive nurses in the clinical area. In this study 77.1% of the students said the experienced nurses were supportive however only 45.8% agreed that they were good role models. Negative role modelling was also found in a study by Kim & Oh (2015:111) where student nurses discussed various occasions related to noncompliance, including poor hand hygiene, the non-use of PPE, and poor needle recapping by nurses. The students further stated that they have difficulty in complying to standard precautions when they are working with nurses who do not comply. The mean score for responses on hospital support was 2, which shows that as much as they mostly agreed on the hospital support, the student nurses were divided in their responses.

The hospital has the responsibility of providing PEP services in case one of the health workers including student nurses has been exposed to blood and body fluids during their practice. In this study, 93.3% of the participants agreed that post exposure services are available in the clinical setting and 81% agreed that post-exposure follow-up was done. This is good because the safety of the students is secured in this matter. It is important that student nurses should be aware that PEP services are available in case of exposure. In a study by Tong, Morulane, Mabina & Makhado (2018:8) not all the student nurses were aware of the availability of PEP in the units they were working in, though the majority reported to be aware of it, thus 60.9% of first year, 75% of second year, 76.9% of third year, and 84.1% of fourth year students knew about the availability of PEP in the PHC facilities.

5.2.2.4 University support role

The university is the primary institute responsible for teaching the student nurses about standard precautions. In this study 90.5% of the students agreed that the university is continuously teaching them on how to prevent contracting infections in clinical setting and 91.4% also agreed that information on standard precautions learnt in class was clear and adequate. When put together most students agree on questions pertaining the university's support, the mean score was 1.73. Efstathiou, Papastavrou, Raftopoulos & Merkouris (2011:7) did a qualitative research on factors influencing compliance to standard precautions where participants reported that continuous reminders about the need for implementing standard precautions, improves compliance.

5.2.2.5 Summary of factors

The factors influencing compliance with standard precautions for prevention of TB and HIV among student nurses are listed below and divided into positive (facilitators) and negative (barriers) factors. As said earlier in chapter 4 that the Cronbach's alpha for most of the factors was above 0.5, the internal reliability was good. It is worth noting that the two factors which are classified as barriers in this section had the highest reliability score of 0.729 and 0.759.

Positive

- Adequate knowledge
- Students willingness to take measure
- Hospital support through trainings and practicing what was learnt in class
- Supportive nurses

- Availability of PEP
- The university's continuous support

Negative

- Lack of resources (PPE)
- Poor role-modelling

5.2.3 COMPLIANCE WITH STANDARD PRECAUTIONS FOR PREVENTION OF TB AND HIV AMONG STUDENT NURSES

Compliance to standard precautions is important to prevent the spread of TB and HIV in the clinical area. In this current study almost all, the Cronbach alpha for questions on compliance was above 0.5, which show that the reliability of the responses was good (Figure 4.1). Among the participants, 51.4% reported that they always use PPE depending on the patient's condition. The mean score for compliance was 2.29 which shows that student do not comply well. Similarly, Jonah, Bewerang, & Emmanuel (2014:62) did a study on knowledge and practice of universal precautions among student nurses in school of nursing where 52.6% of the student nurses reported to use gloves and face mask when caring for patients. However, Abdulraheem, Amodu, Saka, Bolarinwa & Uthman (2012:3) when asking student nurses on their compliance, only a very few (2.5%) said they wore protective gear/apron.

- **Gloves**

Regarding wearing gloves to draw blood samples, a lot of the students (77.1%) said they wear them always. This was similar to a study done Mitchell, Say, Wells, Wilson, Cloete & Matheson (2014:4) where 96% of the participants said they always use gloves when they anticipate exposure to blood or bodily fluids. On the contrary however, Efstathiou, Papastavrou, Raftopoulos & Merkouris (2011:5) did a study where most nurses commented that using gloves to draw blood from a patient reduces their dexterity, saying that they cannot feel the vein because "the gloves interfere".

- **Safety glasses**

In the current study, only 21% of the students said they always wear safety glasses. This may be due to unavailability of goggles and face shields in the CLE or the lack of culture of wearing them.

This is different from the result of Colet, Cruz, Alotaibi, Colet & Islamc (2017:424) where the compliance rate in wearing goggles, face shield, and apron whenever there was a possibility of a splash or splatter was 72.9%.

- **Disposing sharps and recapping**

When students were asked if they used designated containers to dispose sharps in this study, 92.4% said they always did and 81% of the students said they never recap needles after use. The findings of Labrague, Rosales & Tizon (2012: 89-90) also correspond to with this current study given that 82.8% students reported that they disposed needles and blades in a sharp disposal box or receptacle after using, and almost three fourths (74.14%) said they do not recap syringe after using.

- **Hand washing**

Washing hands has its challenges, while most people try to wash their hands often, only a few do it the right way. In this study almost half of the students (48.6%) said they always wash their hands according to the hand washing guidelines. According to Avşar, Kaşikci & Yağci (2015:620) 50.0% of the students in their research washed their hands 1-3 times and only 0.9% washed their hands 10 times or more. In terms of the students' duration of hand washing, the hand washing duration of 60 second or above was only done by 4.7%.

- **PPE in emergencies**

Compliance to using PPE in emergency situations is difficult. In this study 45.7% of the student nurses said they always used protective equipment in emergency situations. When Efstathiou, Papastavrou, Raftopoulos & Merkouris (2011:5) interviewed nurses on this issue many participants described an emergency situation as a major obstacle in following precautions and participants explained how in the matter of life and death they had to neglect their own safety and rushed to help save the patient's life.

5.2.4 DISCUSSION RESULTS PERTAINING TO ASSOCIATION OF EACH OF THE RESEARCH QUESTION TO THE DEMOGRAPHICS

To see if the demographic characteristics of the students influence their responses, statistics analysis was done to compare the responses of the students and their demographics through the ANOVAs and by doing chi square tests.

Research question 1

- **What is the knowledge of UNESWA student nurses regarding standard precautions for prevention of Tuberculosis and HIV?**

Associations

Results from this study show that male students were more knowledgeable than female students. This is different form the study by Mitchell, Say, Wells, Wilson, Cloete & Matheson (2014:3) where the percentage of correct answers from female students was 60.4% and for male students it was 59.7%. The single students had higher knowledge than the married students. On level of study, 92% of the 3rd year students had good knowledge, followed by the 4th year at 91% and the 89.1% on 5th year students. This might be due to the fact that standard precautions are learnt in the lower levels and by the time the students reach the 5th year, they had forgotten some of the content. Students between ages 25-29 year had the highest knowledge score while those between ages 40-44 years had the least knowledge score. Similar to the study of Mitchell et al (2014:3) students between ages 26-35 years were the most knowledgeable, the least knowledgeable being students of age 35 years and above.

Research question 2

- **What are the factors affecting UNESWA student nurses' compliance with standard precautions for preventing Tuberculosis and HIV?**

Associations

As mentioned in chapter 4, factors which showed different responses among gender, age, marital status and study level were availability of resources and hospital support. More female students than male students disagreed with the availability of resources in the CLE. Students between ages 20-24 years had the highest score of 2.8 and the lowest were ages 45-49 with 2.4. Married students disagreed more by 2.74 that single students at score 2.72. Third year student were leading at 2.76, followed by fourth year students at 2.73 and fifth year students at 2.68. From this research we gather that younger student and the ones from a lower study level felt that resources we not enough more than the other students. These results differ from those of Tong, Morulane, Mabina & Makhado (2018:10) where 64.4% of first year students, 60% of second year students, 65.4% of third year students and 65.9% of fourth year students agreed that protective clothing was available in the clinical area.

When it comes to hospital support, both male and female students mostly agreed to hospital support with the same score of 2.0. Students between ages 20-24 year had the highest mean score on hospital support and those between ages 45-49year. There was no significant difference between the married and the single students. The mean hospital support scores for third year students were 2.1, 2 for fourth year students and 1.9 for fifth year students. Contrary to these findings, Tong, Morulane, Mabina & Makhado (2018:10) did a study where 71.7% of first year students, 66.7% of second year students, 46.2% of third year students, and 68.2% of fourth year students reported that there was adequate clinical support.

Research question 3

- **What is the level of compliance to standard precautionary amongst UNESWA student nurses in prevention of Tuberculosis and HIV?**

Associations

Compliance differed with the students' gender, age, marital status and level of study. In this study, male students complied more than female students and the results show that there is association (Chi-7.55; p-0.009) between gender and the use of designated containers to dispose sharps. This is contrary to the result of a study by Haile, Engeda & Abdo (2017: 4) female healthcare workers were 2.18 times more likely to be always compliant with standard precautions as compared to male HCWs. Students between ages 25-29 years had the highest compliance rate while those ages 40-44 had the lowest compliance rate. There was an association (Chi- 24.13; p-0.004) specifically on age and hand washing. This differed from the results of Cruz (2019) in which the increased in age, marital status and year of study influenced standard precautions compliance rate. The compliance rate was higher on single students as compared to married student. It was worth noting that there was a connection (Chi-7.22; p-0.003) between marital status and recapping of used needles. Fourth year students complied more to standard precautions, followed by fifth year students and third year students complied less. The difference was specifically noted in the use of PPE where an association (Chi-10.04; p-0.079) was seen in the study level and use of PPE. Colet, Cruz, Alotaibi, Colet & Islam (2017:425) on their study on "Compliance with standard precautions among baccalaureate nursing students" learnt that students at a high level of study complied more to standard precautions than students on the lower level. So, their conclusion was that as the students' exposure to the clinical environment increases, so also their compliance with standard precautions.

5.4 CONCLUSION

In this chapter, research findings on knowledge and factors affecting student nurses' compliance with standard precautions for preventing Tuberculosis and HIV infections were discussed. These results were also compared to other similar and different results which were found by other researchers.

CHAPTER 6
SUMMARY, LIMITATIONS, RECOMMENDATIONS AND CONCLUSIONS

6.1 INTRODUCTION

This is the last chapter of the study which concludes the research. It contains the summary of the process of the study, the summary of the results, limitations, recommendations, and the conclusion.

6.2 SUMMARY AND INTERPRETATION OF THE RESEARCH FINDINGS

The findings of this study have been presented in the previous chapter. The objectives of the study were to:

- To determine the knowledge of UNESWA student nurses regarding standard precautions for prevention of Tuberculosis and HIV.
- To identify the factors affecting UNESWA student nurses' compliance with standard precautions for preventing Tuberculosis and HIV.
- To determine the compliance of UNESWA student nurses with standard precautions for the prevention of Tuberculosis and HIV.

The interpretations of findings and conclusions are presented in accordance with the research objectives as indicated in the different sections of a questionnaire.

6.2.1 Demographics

A total of 105 nursing students from UNESWA participated in this study, out of which 29 (27.6 %) were in level 3, 57 (54.3%) were in level 4, and 19 (18.1%) were in level 5. Their median ages were 27 and 29 years for males and females, respectively.

6.2.2 Knowledge

Knowledge on standard precautions among student nurses is important so that students can protect themselves as they practice in the CLE. From this study we learn that the university ensures that students are trained on TB, HIV and standard precaution in class. Some students however reported that they have not received training on TB and HIV prevention in the skills laboratory. When students were assessed on how much they know on standard precautions for the prevention of TB and HIV their scores were high, showing that student nurses have adequate knowledge. However, this did not prevent the students from being exposed to blood and body fluids as we learn from the current study that 22.9% of the students found themselves exposed. It is clear from this study that despite been knowledgeable about precautionary measures at clinical facilities, the students do not always practice what they have learnt on standard precautions.

6.2.3 Factors influencing compliance with standard precautions for prevention of TB and HIV

From the study, it is noted that when it comes to compliance to standard precautions, the scores of the students are low. Factors which negatively affect compliance are lack of resources and poor role modelling. Student nurses find it hard to comply to standard precautions when there are not enough resources to do so and when they see the qualified nurses not complying. On a positive note, the researcher was able to gather that factors which facilitate compliance among student nurses were: adequate knowledge, students' willingness to take measure, hospital support through trainings and infection control policies, supportive nurses, availability of PEP and the university's continuous support.

6.2.4 Compliance with standard precautions for prevention of TB and HIV among student nurses

Student nurses do not comply to standard precautions as well as they should. They do not wear aprons, goggles, and masks to protect themselves from blood and body fluids in the CLE. Most of them wear gloves and neglect the other areas of the body which are susceptible to infections like TB and HIV. However, the gloves they claim protect their hands are used without washing their hands before wearing and after removing them. It is worth noting though that they do comply

in terms of handling and disposing sharp objects after use. When it comes to emergency situations compliance is worse as they may be panicking and rushing to save patients' lives.

6.3 LIMITATIONS

According to Grove, Gray and Burns (2015:598) limitations are challenges which may hinder or reduce the ability of research findings from being generalized. In this study, due to time and resource constraints the study was conducted in only one learning institution (UNESWA) in Eswatini. This may be a problem because there is a possibility that in other universities research findings could have been different. Secondly, the researcher used self-reporting to assess compliance to standard precaution. This may be a problem because some participants can give incorrect information. Observation should have been a better way to assess compliance.

6.4 RECOMMENDATIONS

This study sought to determine the knowledge and factors affecting student nurse's compliance regarding standard precautions for preventing Tuberculosis and HIV in Eswatini university. In accordance with the objectives, the study assessed and determined the level of knowledge of student nurses and the extent to which they adhere to the provisions of the current concept of standard precautions in practice. The study findings further identified the factors influencing the practice of standard precautions by student nurses in the University of Eswatini. Based on the study findings, recommendations have been made on how to improve the knowledge and practice of standard precautions, including infection prevention and control among student nurses. The recommendations will be discussed under three sub-topics namely: to the university, to the hospitals/ CLE and future research.

6.4.1 To the university

- The university should ensure that student nurses are not only educated on the theory of TB and HIV prevention but also taught the skills in the demonstration laboratory.
- Given that the content on TB, HIV and standard precautions is always changing, it is recommended that when these topics are being taught, the university should invite guest lecturers who work with TB and HIV every day to teach students on the latest updated

information.

- Nurses in the clinical area are always complaining of shortage of staff. It goes without saying that they do not have enough time to teach and mentor students. It is therefore important that the university should have enough clinical facilitators to monitor students in the clinical area.

6.4.2 To the hospitals or CLE

- The hospital has the responsibility to provide quality nursing care to the patients and modelling the right way of doing procedures to student nurses. So, ordering and monitoring of supplies should be done efficiently in the hospitals to eliminate shortage of resources.
- When the students are in the clinical area, it would be good for the preceptors to be exempted from other duties and be allowed to supervise the student nurses.

6.4.3 Future research

- Further research should be conducted in other universities in Eswatini on knowledge and factors affecting compliance with standard precautions for TB and HIV prevention in the clinical area among student nurses.

6.5 CONCLUSION

This study has shown that student nurses have been taught well about standard precautions and they have adequate knowledge on them. A lot has been done to ensure compliance among student nurses which includes trainings in the hospital, PEP services, supportive nursing personnel and the continuous support role of the university. However, as students face the reality of emergency situations, lack of equipment and working with nurses who do not comply to standard precaution in the CLE, they find themselves not complying like they should. With this poor adherence to standard precautions, student nurses are at risk of infecting themselves and their patients during their practice in the clinical area. Through this research the researcher appeals to the universities and the hospitals to cling on the factors facilitating compliance to standard precautions and eliminate the barriers of compliance to standard precautions among student nurses.

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ANNEXURE A: Information leaflet and consent form

PARTICIPANT'S INFORMATION & INFORMED CONSENT DOCUMENT

STUDY TITLE: ASSESSMENT OF KNOWLEDGE AND FACTORS AFFECTING STUDENT NURSE'S COMPLIANCE REGARDING STANDARD PRECAUTIONS FOR PREVENTING TUBERCULOSIS AND HIV IN ESWATINI UNIVERSITY

Principal Investigators: Ncobile Victoria Sidzandza Gina
Institution: University of Pretoria

DAYTIME AND AFTER-HOURS TELEPHONE NUMBER(S):
Daytime numbers: +268 78247784
Afterhours: +268 78247784
DATE AND TIME OF FIRST INFORMED CONSENT DISCUSSION:

			:
Day	**Month**	**Year**	**Time**

Dear Participant

Dear Mr. / Ms. ..... date of consent procedure …...../…...../…...

1) INTRODUCTION

You are invited to volunteer for a research study. This information leaflet is to help you to decide if you would like to participate. Before you agree to take part in this study you should fully understand what is involved. If you have any questions, which are not fully explained in this leaflet, do not hesitate to ask the investigator. You should not agree to take part unless you are completely happy about all the procedures involved.

2) THE NATURE AND PURPOSE OF THIS STUDY

You are invited to take part in a research study. The aim of this study is to assess knowledge and factors affecting student nurse's compliance regarding standard precautions for preventing Tuberculosis and Human Immunodeficiency Virus.

3) EXPLANATION OF PROCEDURES TO BE FOLLOWED

This study involves answering some questions from the questionnaire. You will be given the questionnaire and the researcher will arrange when it will be returned back after you have filled it.

4) RISK AND DISCOMFORT INVOLVED.

There are no risks involved. The completion of questionnaire will take 30 to 45 minutes of your time.

5) POSSIBLE BENEFITS OF THIS STUDY.

The results of this study may help us understand how much student nurses know regarding standard precaution, and the factors that influence their compliance to them.

6) I understand that if I do not want to participate in this study, I will not be discriminated against.

7) I may at any timewithdraw from this study.

8) HAS THE STUDY RECEIVED ETHICAL APPROVAL?

This proposal was submitted to the Faculty of Health Sciences Research Ethics Committee, University of Pretoria, telephone numbers 012 356 3084 / 012 356 3085 and written approval has been granted by that committee. The study has been structured in accordance with the Declaration of Helsinki (last update: October 2013), which deals with the recommendations guiding doctors in biomedical research involving human/subjects. A copy of the Declaration may be obtained from the investigator should you wish to review it.

9) INFORMATION If I have any questions concerning this study, I should contact:

Principal researcher +26 878247784

Supervisor: Dr M Rasweswe: +27 12 356 3174

Co-supervisor: Professor M Moagi: +2712 356 3152

10) CONFIDENTIALITY

All information obtained in this study will be regarded as confidential. Results will be published or presented in such a fashion that your contribution remain unidentifiable.

11) CONSENT TO PARTICIPATE IN THIS STUDY.

I have read or had read to me in a language that I understand the above information before signing this consent form. The content and meaning of this information have been explained to me. I have been given opportunity to ask questions and am satisfied that they have been answered satisfactorily. I understand that if I do not participate it will not alter my management in any way. I hereby volunteer to take part in this study.

I have received a signed copy of this informed consent agreement.

Participant Name: ..... Date: .....

Participant Signature: ..... Date: .....

Researcher's Name: ..... Date: .....

Researcher's Signature: ..... Date: .....

Witness Name and Signature: ..... Date: .....

ANNEXURE B: Questionnaire

Questionnaire	**For official use only**
Dear Participant This questionnaire will determine the knowledge and factors influencing compliance of student nurses on standard precautions in prevention of TB and HIV infections in the clinical setting. All information will be treated as confidential and the researcher undertakes not to reveal any individual information that appears in this questionnaire. You will require approximately 15-20 minutes to complete this questionnaire. Read the questions and mark your response off with a cross (X) in the box provided for the close-ended questions. Complete the open-ended question with the description. **<u>Section 1</u>: Demographics** 1. Gender a. Male ☐ b. Female ☐ c. Other ☐ _____	V1 ☐
2. Age_____years	V2 ☐
3. Marital status a. Married ☐ b. Single ☐ c. Other ☐ _____	V3 ☐
4. Level of study a. 3rd year ☐ b. 4th year ☐ c. 5th year ☐	V4 ☐
5. Have you ever repeated any year in your current degree? a. Yes ☐ b. No ☐	V5 ☐

6. Study Specialty

a. General Nursing ☐ b. Midwifery ☐

c. Mental Health ☐ d. Community Nursing ☐

e. Other ☐ _____

For official use only

V6 ☐

<u>Section 2</u>: Knowledge

Marking key for the questions/statements below:

a. Agree

b. Disagree

c. Not Applicable

Variables	**Agree**	**Disagree**	**Not Applicable**	
7. I have received theoretical training on TB in class.				V7 ☐
8. I have received training on TB prevention procedures in the demonstration laboratory. .				V8 ☐
9.TB can be contracted through body fluids including saliva droplets.				V9 ☐
10. I have received theoretical training on HIV in class.				V10 ☐
11. I have received training on HIV prevention procedures in the demonstration laboratory.				V11 ☐
12.Health care workers can contract TB in the clinical setting.				V12 ☐ V13 ☐
13.TB is preventable				V14 ☐
14. TB is curable.				
15. Health care workers can contract HIV in the clinical setting.				V15 ☐
16. Knowledge on TB can help student nurses to protect themselves in the clinical area.				V16 ☐

17.Knowledge on HIV can help students to protect the patients under their care in the clinical area.				V17 ☐
18. Training on standard precautions is important in the prevention of HIV.				V18 ☐
19. Knowledge on HIV can help students to protect themselves in the clinical area.				V19 ☐
20. Training on standard precautions is important in the prevention of TB.				V20 ☐
21. Knowledge on TB can help students protect patient under their care in the clinical area.				V21 ☐
22. Have you ever been accidentally exposed to blood and body fluids of a patient in the past 12 months.				V22 ☐
23. If yes, was the patient diagnosed with any of the following:				V23.1 ☐
23.1 TB				V23.2 ☐
23.2 HIV				V23.3 ☐
23.3 Other				
24. Standard precautions apply to all the patients **regardless of their diagnosis**.				V24 ☐

25. If you AGREE with item **24**, please explain by giving reasons.

_____

_____

_____

Section 3: Factors influencing compliance with standard precautions for prevention of TB and HIV

For official use only

Marking key for the questions/statements below:

a. Strongly agree b. Agree c.Strongly disagree d. Disagree

Variables	Strongly agree	Agree	Disagree	Strongly Disagree	
26. In the clinical setting there are enough resources with regard to the prevention of TB.					V26 ☐
27. Every student nurse should receive TB immunization as a precautionary measure to prevent infections in the clinical setting.					V27 ☐
28. Most of the HIV prevention methods learnt in class are practiced in the clinical area.					V28 ☐
29. The experienced nurses in the clinical area are supportive in facilitating knowledge on standard precautions					V29 ☐
30. In the clinical setting there are enough resources with regard to the prevention of HIV.					V30 ☐
31. The nurses in the clinical area are good role models on the use of protective measures.					V31 ☐
32. Most of the TB prevention methods learnt in class are practiced in the clinical area.					V32 ☐

33. Gloves are always available in the clinical setting.					V33 ☐
34. Aprons are always available in the clinical setting.					V34 ☐
35. Masks are always available in the clinical setting					V35 ☐
36. Goggles are always available in the clinical setting.					V36 ☐
37. Running water or an antiseptic solution is always available in the clinical setting.					V37 ☐
38. All student nurses should take measures to prevent transmission of infections in the clinical setting:					
38.1. They should wear a surgical mask which covers the mouth and nose.					V38.1 ☐
38.2 Wear the N95 mask in the TB ward.					V38.2 ☐
38.3 They should use Hibitane in alcohol spray after attending to each patient.					V38.3 ☐
39. Hospital support role					
39.1 Hospital provide training on infection prevention.					V39.1 ☐
39.2 Post exposure services are available in the clinical setting.					V39.2 ☐
39.3 Post-exposure prophylaxis is available after exposure to patient's blood or body fluids.					V39.3 ☐
39.4 Post-exposure follow-up is available after reporting exposure.					V39.4 ☐
40. University support role					
40.1 The university is continuously teaching student nurses on how to prevent contracting infections in clinical setting.					V40.1 ☐
40.2 Information on standard precautions learnt in class was clear and adequate.					V40.2 ☐
41. Student nurses always clean and sterilize patient's equipment between each patient.					V41 ☐
42. Student nurses are afraid of being infected with HIV in the clinical area.					V42 ☐

Section 4: Compliance with standard precautions for prevention of TB and HIV among student nurses

How often to you comply with the following standard precautions:

Marking key for the questions / statements below

a. Never b. Sometimes c. Always

Variables	Never	Sometimes	Always	
43.How often do you use protective preventive equipment depending on the patient condition				V43 ☐
44. Wear gloves to draw blood samples				V44 ☐
45. Wear safety glasses when working with body fluids				V45 ☐
46. Use designated containers to dispose sharps				V46 ☐
47. Wash hands according to the hand washing guidelines				V47 ☐
48. Recapping the needles after use				V48 ☐
49. Use protective equipment in emergency situations				V49 ☐

ANNEXURE C1: Ethical approval from the University of Pretoria

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Health Sciences

The Research Ethics Committee, Faculty Health Sciences, University of Pretoria complies with ICH-GCP guidelines and has US Federal wide Assurance.

- FWA 00002567, Approved dd 22 May 2002 and Expires 03/20/2022.
- IRB 0000 2235 IORG0001762 Approved dd 22/04/2014 and Expires 03/14/2020.

28 February 2020

Approval Certificate
New Application

Ethics Reference No.: 884/2019
Title: Assessment of Knowledge and Factors Affecting Student Nurses' Compliance Regarding Standard Precautions for
Preventing Tuberculosis and HIV in Eswatini University

Dear Miss NSV Gina

The **New Application** as supported by documents received between 2020-02-03 and 2020-02-26 for your research, was approved by the Faculty of Health Sciences Research Ethics Committee on its quorate meeting of 2020-02-26.

Please note the following about your ethics approval:

- Ethics Approval is valid for 1 year and needs to be renewed annually by 2021-02-28.
- Please remember to use your protocol number (884/2019) on any documents or correspondence with the Research Ethics Committee regarding your research.
- Please note that the Research Ethics Committee may ask further questions, seek additional information, require further modification, monitor the conduct of your research, or suspend or withdraw ethics approval.

Ethics approval is subject to the following:

- The ethics approval is conditional on the research being conducted as stipulated by the details of all documents submitted to the Committee. In the event that a further need arises to change who the investigators are, the methods or any other aspect, such changes must be submitted as an Amendment for approval by the Committee.

We wish you the best with your research.

Yours sincerely

Dr R Sommers
MBChB MMed (Int) MPharmMed PhD
Deputy Chairperson of the Faculty of Health Sciences Research Ethics Committee, University of Pretoria

The Faculty of Health Sciences Research Ethics Committee complies with the SA National Act 61 of 2003 as it pertains to health research and the United States Code of
Federal Regulations Title 45 and 46. This committee abides by the ethical norms and principles for research, established by the Declaration of Helsinki, the South African
Medical Research Council Guidelines as well as the Guidelines for Ethical Research: Principles Structures and Processes, Second Edition 2015 (Department of Health)

Research Ethics Committee
Room 4-60, Level 4, Tswelopele Building
University of Pretoria, Private Bag x323
Gezina 0031, South Africa
Tel +27 (0)12 356 3084
Email: deepeka.behari@up.ac.za
www.up.ac.za

Fakulteit Gesondheidswetenskappe
Lefapha la Disaense tša Maphelo

ANNEXURE C2: Research clearance certificate from the Eswatini Health and Human Research Review Board

RESEARCH PROTOCOL CLEARANCE CERTIFICATE

BOARD REGISTRATION NUMBER	**FWA 00026661/IRB 00011253**										
PROTOCOL REFERENCE NUMBER	SHR157/2019										
Type of review	Expedited	X		Full Board							
Name of Organization	Student (Masters)										
Title of study	Assessment of Knowledge and Factors Affecting Student Nurses' Compliance with Standard Precautions for Preventing Tuberculosis and HIV in Swaziland University										
Protocol version	1.0										
Nature of protocol	New	X		Amendment			Renewal			Extension	
List of study sites	University of Swaziland, Faculty of health Sciences										
Name of Principal Investigator	Ms. Gina, Ncobile Sidzandza Victoria										
Names of Co- Investigators	N/A										
Names of steering committee members in the case of clinical trials	N/A										
Names of Data and Safety Committee members in the case of clinical trials	N/A										
Level of risk (Tick appropriate box)	Minimal			More than minimal			High				
	X										
Clearance status (Tick appropriate box)	Approved	X					Disapproved				
Study approval validity period	Start date	02/07/2020					End date	02/07/2021			
Secondary approval validity end dates	Renewal end date						Extension				
Signature of Chairperson											
Signing date	02/07/2020										
Secretariat Contact Details	Name of contact officers			Babazile Zhongwe							
	Email address			babazile.zhongwe@gmail.com							
	Telephone no.			(00268) 24040865/24045405 4010							

ESWATINI HEALTH & HUMAN RESEARCH REVIEW BOARD
02 JUL 2020
EHHRRB

Page 1 of 2

APPROVAL CONDITIONS

Ref.	Conditions	Indication of conditions (tick appropriate box)				
1	Implementation of approved version of protocol	✓				
2	Provide a specific insurance cover certificate in respect of this particular study within 14 days of receiving this Ethics Clearance certificate					
3	Update information on adverse events both on the addendum and the informed consent form to include measures for addressing life threatening adverse events that occur at home.					
4	Reporting of adverse events within 5 days of occurrence	✓				
5	Submission of progress reporting for multi-year studies	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
		✓	✓	✓	✓	✓
6	Submission of end of project report (Hard copy)	✓				
7	Submission of end of project report (Soft copy)	✓				
8	Submission of data sets					

List of reviewed documents

Ref.	Documents	Reviewed documents (tick appropriate box)
1	Completed application form	✓
2	Cover letters	✓
3	Evidence of administrative permission to conduct the research by involved institutions/sites (where applicable)	
4	Detailed current resume or curriculum vitae of Principal Investigator/s including Principal investigators declaration	✓
5	Summary resume or biography for other investigator(s)	
6	Evidence of approval/rejection by other Ethics Committees, including comments and requested alterations to the protocol, where appropriate.	✓
7	Research protocol (see outline in Annex 1)	✓
8	Questionnaires and interview guides (with back-translated versions where applicable)	✓
9	Case report forms (CRFs), abstraction forms and other data collection tools	
10	Participant/subjects Information Statement(s) (where applicable)	✓
11	Informed consent form(s) including photographic and electronic media consent statements.	✓
12	Advertisements relevant to the study (where applicable)	
13	Source of funding and detailed budget breakdown including material and incentives to participants if applicable	✓
14	Notification form for adverse effects/events.	
15	Proof of payment	✓
16	Proof of insurance cover for research subjects in clinical trials or where applicable	
17	Any other special requirements should be stated, if applicable	

ANNEXURE C3: Approval letter from UNESWA Registrar to the Dean

UNIVERSITY OF ESWATINI
FACULTY OF HEALTH SCIENCES
2020 -07- 24
DEAN

UNIVERSITY OF ESWATINI

REGISTRAR'S OFFICE

INTERNAL MEMORANDUM

FROM: Registrar TO: Dean, Faculty of Health Sciences

DATE: 23rd July, 2020

RE: APPLICATION TO CONDUCT RESEARCH: MS. NCOBILE VICTORIA SIDZANDZA GINA

The above-named and bearer of this note has approached us with an application to conduct research among nursing students in the Faculty of Health Sciences.

Having secured clearance from the Ministry of Health (Eswatini) and the University of Pretoria Research Ethics Committee to conduct research among human subjects and having satisfied us that it is safe to conduct such research on our premises, Ms. Gina is granted permission to conduct her research.

Thank you for your cooperation in this regard.

Dr. S.S. Simelane

cc. Vice Chancellor

ANNEXURE C4: Approval letter from UNESWA Dean

UNIVERSITY OF ESWATINI
FACULTY OF HEALTH SCIENCES

P.O. BOX 369, Mbabane H100, Swaziland
Tel (-268) 4040171/2/4046242; Fax (-268) 4046241

E-mail: psdlamini@uniswa.sz

DEAN
Prof. P. S. Dlamini, SRN, (SCM (S.I.H.S.), B. Ed Nursing (Botswana), M. Cur. Nursing (Natal).

07 September, 2020

Dear Ms. Gina

RE: PERMISSION TO CONDUCT RESEARCH: MS. NCOBILE VICTORIA SIDZANDZA GINA

Having secured clearance from the Ministry of Health (Eswatini) and the University of Pretoria Research Ethics Committee to conduct research among human subjects and having satisfied us that it is safe to conduct research on our premises: you are therefore granted permission conduct research.

UNIVERSITY OF ESWATINI
FACULTY OF HEALTH SCIENCES
2020 -09- 07
DEAN

Thank you

Prof. P.S. Dlamini

ANNEXURE D1: Letter to the Department of Health Eswatini requesting permission to conduct research study.

P.O. Box 7662
Mbabane
Eswatini
Cell no: +268 78247784

The Manager
Department of Health address
P. O. Box H100
Mbabane

Dear Sir/Madam

Application to conduct research

I am currently studying Master's in Nursing Science at the University of Pretoria, and I am expected to conduct research as part of the requirements. May I kindly request your permission to do so at the University of Eswatini, faculty of health sciences.

The topic for my research is "Assessment of Knowledge and Factors Affecting Student Nurses' Compliance Regarding Standard Precautions for Preventing Tuberculosis and HIV in Eswatini University. A quantitative study will be conducted. There will be no interruption of classes or clinical practice time. Completion of questionnaire will be done out of University or clinical practice time.

Thank you in anticipation

Yours faithfully
Ncobile
Victoria Sidzandza Gina

ANNEXURE D2: Letter to the University requesting permission to conduct research study.

P.O. Box 7662
Mbabane
Eswatini
Cell no: +268 78247784

Dean of the faculty of health sciences
University of Eswatini
P. O. Box 369
Mbabane

Dear Madam

Application to conduct research

I am currently studying Master's in Nursing Education at the University of Pretoria, and I am expected to conduct research as part of the requirements. May I kindly request your permission to do so at the University of Eswatini, faculty of health sciences.

The topic for my research is "Assessment of Knowledge and Factors Affecting Student Nurses' Compliance Regarding Standard Precautions for Preventing Tuberculosis and HIV in Eswatini University. A quantitative study will be conducted. There will be no interruption of classes or clinical practice time. Completion of questionnaire will be done out of University or clinical practice time.

Thank you in anticipation

Yours faithfully
Ncobile Victoria Sidzandza

ANNEXURE E: Bio-statistician support letter

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA
Denkleiers • Leading Minds • Dikgopolo tša Dihlalefi

DEPARTMENT OF STATISTICS

LETTER OF STATISTICAL SUPPORT

Date: 25 October 2019

This letter is to confirm that **Ms NSV Gina**, studying at the University of Pretoria, discussed the project with the title **"Assessment of knowledge and factors affecting student nurses' compliance regarding standard precautions for preventing tuberculosis and HIV in Eswatini University"** with me.

I hereby confirm that I am aware of the project and I also undertake to assist with the statistical analysis of the data generated from the project.

All third, fourth and fifth year students enrolled at a university in Swaziland will be approached to participate in the study. In 2019 there were 114 third, fourth and fifth year students enrolled at the university. The content validity of the questionnaire has been evaluated by the supervisor and myself. Before the questionnaire will be implemented in the field, a pilot study will also be done.

The statistical analysis of the data will consist of frequencies and descriptive statistics such as means, standard deviations and medians. Where possible, scores will be computed across the items in each section of the questionnaire. These scores will be compared across the demographic variables by performing ANOVAs (if the data come from a normal distribution) or non-parametric tests (if the data is not normally distributed). Internal reliability will be gauged by computing Cronbach alphas across the items in each section of the questionnaire.

Ms JC Jordaan
Internal Statistical Consultation Service
Department of Statistics
E-mail address: joyce.jordaan@up.ac.za

Annexure F: Letter for confirmation of editing

University of Eswatini

P/B 4 Kwaluseni, Swaziland, Southern Africa, Telephone : (+268) 2517 0000

Department of Academic Communication Skills

02 December 2020

TO WHOM IT MAY CONCERN

This letter serves to confirm that I have done the language editing and proof-reading of Ms. Ncobile Sidzandza Victoria Gina's thesis entitled: **"Assessment of Knowledge and Factors Affecting Student Nurses' Compliance Regarding Standard Precautions for Preventing Tuberculosis and HIV In Eswatini University."**

Much of the editing done dealt with technical language aspects, which otherwise obstructed the information being conveyed and hindered smooth reading of the document. On the whole the document was an interesting read and easy to follow.

I hope that the work will be found to be of an acceptable standard.

Yours faithfully

Khanyisile Nomthandazo Sikhondze (Ms.)