KNOWLEDGE, ATTITUDE AND PRACTICES OF HEALTH CARE PROVIDERS REGARDING MEASURES TO PREVENT INFECTION TO HIV IN A REGIONAL HOSPITAL IN THE VHEMBE DISTRICT

BY

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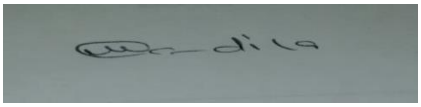
DECLARATION

I, Nemadandila Ndumeliso Annikie, hereby declare that this proposal titled **"Knowledge, attitude and practices of health care providers regarding measures to prevent infection to HIV and utilization of post exposure prophylaxis in a selected regional hospital in Vhembe district"** for the degree Master of Public (MPH) at the University of Venda has not been submitted previously by me at this university or any other institution, that it is my own work in design and in execution, and that all reference material contained therein has been duly acknowledged.

Signature :  **Date : 13 March 2022**

PREFACE

This dissertation is presented in article format and is comprised of three sections. These three sections are Section A which presents the overview of the study, introduction and background of the study, research purpose and objectives, methodology and ethical considerations. Section B presents two manuscripts, and Section C presents the study conclusion, limitations, and recommendations based on the research findings. The outline of the dissertation is as follows:

Section A: Dissertation Overview

Section A of this dissertation presents the overview of the study, background and introduction, problem statement, the study's main aim and objectives, study design and methodology and ethical considerations.

Section B: Manuscript

This section contains two manuscripts:

The First manuscript is titled: *"Examining the knowledge, attitude, and practices of health care providers regarding measures to prevent occupational exposure to HIV district. A systematic review."*

The second manuscript is titled: *"Examining the knowledge, attitude, and practices of health care providers regarding measures to prevent occupational exposure to HIV in a regional hospital in Vhembe district."*

Section C: Conclusion, Recommendations and Dissertation Limitations

Section C presents the study conclusions for this dissertation, recommendations and limitations.

DEDICATION

This work is dedicated to my loving family. To my loving mother Nemadandila Khengani Evelyn who raised me to be a young aspiring woman that I am today and supported me through my research studies. Thank you Mma for your unconditional love and unshakable support. My brothers Nemadandila Litshani and Nemadandila Lutendo for your support and daily motivation. The support they showed is unthinkable. I will forever be grateful.

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LIST OF ACRONYMS AND ABBREVIATIONS

AIDS : Acquired Immune Deficiency Syndrome

BBFs **:** Blood and Body Fluids

HCWs. : Health Care Workers

HCP : Health Care Provider

HCPs : Healthcare providers

HEAIDS : Higher Education and Training HIV/AIDS programme

HIV : Human Immunodeficiency Virus

ICU : Intensive Care Unit

MMW : Male Medical Ward

NOPEP : Non-Occupational Post-Exposure Prophylaxis

OPD : Out Patient Department

PEP : Post-Exposure Prophylaxis

PLWH : People Living With HIV

Prep : Pre-Exposure Prophylaxis

PSW : Peads Surgical Ward

UNAIDS : United States Agency for International Development

WHO : World Health Organization

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ABSTRACT

The exposure of healthcare workers (HCWs) to HIV in the workplace is a significant issue, as they face a high risk of infection from patient body fluids and blood. The objective of this study was to assess the knowledge, attitude, and practices of HCWs in a particular regional hospital in the Vhembe district regarding strategies to prevent HIV exposure at work. This research employed a quantitative cross-sectional descriptive design.

The intended sample size for this study was 245 healthcare participants, but only 103 healthcare professionals completed the questionnaire and participated in the research. The researchers used a probability stratified sampling technique to select the respondents, and the data were gathered through self-administered questionnaires that contained closed-ended questions. The collected data were analyzed using Statistical Package for Social Science (SPSS) software, version 25, and presented in tables, charts, and graphs. Prior to the actual data collection, the questionnaire was pre-tested to ensure that it could obtain reliable and high-quality data. To ensure validity and reliability, it was essential to properly select the research sample and utilize a consistent measuring instrument when collecting the data. The study was approved by the Ethics Committee of the University of Venda and the Vhembe District Department of Health, Primary Healthcare Executive Officer in Thohoyandou. The study's findings indicated that although most respondents were aware of PEP for HIV, and had a positive attitude towards it, their actual practices were still inadequate. The study makes recommendations for future research and addressing these limitations.

Keywords: *Attitude, Healthcare providers, HIV, Knowledge, Occupational exposure, Practices.*

SECTION 1:

OVERVIEW OF THE STUDY

1.1 INTRODUCTION AND BACKGROUND

Healthcare workers are at risk of occupational exposure to blood and body fluids, posing a significant risk of HIV transmission (Auta, Adewuyi & Tor-Anyiin, 2017). According to the World Health Organization (WHO), approximately 3 million healthcare workers are exposed to bloodborne infections yearly, with 90% occurring in developing countries (Yazie et al., 2019). Koto and Maharaj (2016) emphasize the importance of prioritizing the personal safety and well-being of professionals caring for HIV-infected patients.

HCWs may become infected with HIV due to unsafe sexual behaviour. Still, they are also exposed to occupational hazards such as being pricked by infected injecting equipment or accidentally exposed to contaminated blood or body fluids (Koto & Maharaj, 2016). Wu et al. (2016) found that needle sticks injured 20 730 HCWs in China in 2000, and 30 HCWs may have been infected with HIV. South African HCWs, like those around the world, are more likely to be exposed to Blood and Body Fluids (BBFs) contaminated with blood-borne diseases like HIV at work (Dhital, Sharma and Dhital 2017).

The stigmatization of PLWH in healthcare settings negatively affects patient satisfaction, psychological distress, self-esteem, and motivation to stay healthy (Eaton et al., 2020). This impacts the outcome of a meeting between the HCWs and the PLWH. The risk of HIV infection among healthcare workers in remote rural areas of South Africa rises as the HIV epidemic spreads to these areas (Wilburn & Eijkemans, 2014). Li et al. (2019) found that 28% of primary hospital HCWs had contact with HIV-positive patients.

To address this issue, the World Health Organization (WHO) and the South African National Department of Health (SANDoH) have presented universal precautions (UPs) to protect against and prevent exposure to BBFs (United Nations AIDS Special Analysis, 2016). Personal Protective Equipment (PPE) such as gloves, eye goggles, gowns, covers, veils, and professional immunisation programs are essential in reducing health hazards (Yazie et al., 2019). However, Makhado and Davhana-Maselesele (2016) discovered that not all nurses caring for PLWH knew the availability of

PEP in the unit where they worked. PEP is the use of antiretroviral medications for 28 days to prevent HIV acquisition after high-risk exposure (Ayieko, Petersen, Kabami, Mwangwa, Opel, Nyabuti, Charlebois, Peng, Koss, Balzer, and Chamie, 2021).

Although prevalence varies by province or region, South African healthcare facilities are dealing with several issues stemming from the HIV and AIDS infection pandemic (United Nations AIDS Special Analysis, 2016). This study aims to determine the extent of healthcare workers' knowledge, attitudes, and practices (KAP) in the Vhembe district regarding HIV prevention measures.

1.2 CONCEPTUAL/ THEORETICAL FRAMEWORK:

1.2.1 Theory of reasoned action and the theory of planned behaviour

This study utilised the Theory of Reasoned Action to analyze behaviour by looking at attitudes, intentions, and norms. The main purpose of this theory is to comprehend voluntary behaviour by examining the underlying motivation to act. The theory states that a person's intention to perform a behaviour is the primary predictor of whether they will do it or not. The social norms surrounding the act also determine whether the behaviour is performed. The Theory highlights the importance of behavioural intention, which stems from the belief that achieving the behaviour will lead to specific outcomes. Attitudes and subjective norms determine these intentions, and stronger intentions increase the likelihood of the behaviour being performed. This theory helped the researcher understand the attitudes, intentions, and practices of healthcare workers regarding measures to prevent occupational exposure to HIV in a regional hospital in the Vhembe District and predict their behaviour towards patients with HIV based on their attitudes, intentions, and social norms.

1.3 Problem statement

The author, a nurse by profession, noticed that healthcare workers (HCWs) who care for people living with HIV (PLWH) are at a high risk of occupational exposure to HIV through needle sticks or cuts. Studies by Kabotho and Chivese (2020) and Aigbodion et al. (2019) revealed that many HCWs had

experienced occupational exposure to blood and body fluids, including HIV. Sono and Chelule's (2019) study also found that some nurses in Limpopo Province were exposed to HIV. Despite ongoing research on this issue, the number of HCWs being exposed to HIV and other infectious diseases is increasing. This study aims to improve the knowledge, attitudes, and practices of HCWs regarding the prevention of occupational exposure to HIV.

1.4 Rationale of the study

Research studies have been conducted globally and in Africa, specifically in South Africa, to investigate healthcare providers' knowledge, attitudes, and practices towards preventing occupational exposure to HIV. Makhado and Davhana-Maselesele (2016) conducted a study titled "Knowledge and uptake of occupational post-exposure prophylaxis amongst nurses caring for people living with HIV," which examined a slightly different aspect of this topic. However, to the researcher's knowledge, no study has been conducted on HCWs' knowledge, attitudes, and practices regarding measures to prevent occupational exposure to HIV in Vhembe District, Limpopo province. Therefore, the researcher identified the need to conduct this study to assess healthcare providers' knowledge, attitudes, and practices towards preventing occupational exposure to HIV.

1.5 Significance of the study

The significance of this study lies in its ability to shed light on the knowledge, attitude, and practices of healthcare workers (HCWs) regarding measures to prevent occupational exposure to HIV in a selected regional hospital in the Vhembe district. The findings from this study are significant as they provide insights into the underlying occupational hazards that HCWs face while caring for patients with HIV. The results of this study may also be beneficial to government and Department of Health policymakers, as they can utilize the findings to improve policies, guidelines, and strategies aimed at eradicating occupational exposure to HIV and other infectious diseases among HCWs.

1.6 Purpose of the Study

The primary aim of this study was to describe the knowledge, attitudes, and practices of healthcare providers in a specific regional hospital in the Vhembe district concerning measures aimed at preventing occupational exposure to HIV. The study also sought to determine the utilization of post-exposure prophylaxis among these healthcare providers.

1.7 Objectives of the study.

The objectives of the study are to:

- Assess healthcare providers' knowledge regarding the measures to prevent occupational exposure to HIV.1
- Determine the attitudes of healthcare providers regarding measures to prevent occupational exposure to HIV
- Describe the practices of healthcare regarding measures to prevent occupational exposure to HIV.
- Establish if demographic characteristics contribute to the prediction of total knowledge, attitude, and practice scores among HCWs

1.8 Definition of terms

Attitude: Folasayo, Oluwasegun, Samsudin, Saudi, Osman and Hamat (2017) defined attitude as proceeding with the association of beliefs, emotions and conduct inclinations towards socially significant objects, groups, occasions or even symbols. In this study, attitude is how healthcare providers think about measures to prevent Occupational exposure to HIV.

Healthcare providers: Healthcare providers are the clinical staff, counsellors, and ward-based outreach teams (Koto & Maharaj 2016). This study's scope of healthcare providers encompasses nurses, doctors, and lay counsellors caring for PLWH. Lay counsellors were considered part of the health care provider group due to task shifting, which involves them in performing HIV-related procedures like testing and counselling, CD4 count

assessments, and providing HIV and drug literacy counselling, which puts them at risk of occupational exposure to HIV.

HIV: World Health Organisation (WHO) (2018) defined the Human Immunodeficiency Virus (HIV) as a type of virus that attacks the cells of the immune system, destroying or impairing their function (WHO, 2018). In this study, HIV refers to the viral organism responsible for the signs and symptoms of AIDS.

Knowledge: Knowledge denotes the familiarity gained through experience or learning (Limaye, Sullivan, Dalessandro & Hendrix-Jenkins, 2017). In this study, knowledge will refer to the specific knowledge base and skills needed to prevent occupational exposure to HIV.

Occupational exposure: Occupational exposure refers to being infected by HIV through needle sticks, skin cuts, and eyes while working with HIV-positive people (WHO, 2016). This definition directly explains how the concept of occupational exposure will be used in this study. It refers to a healthcare provider being infected with HIV while caring for people living with HIV in the healthcare facility.

Prevent occupational exposure: In this study, prevent occupational exposure incluse the use of PEP for prevention of infection.

Practice: According to Messing and Stellman (2006), defined practice in the healthcare context refers to health occupational prevention mechanisms/exercises planned for decreasing danger. Further in this study, practice will refer to repeated activities by healthcare providers caring for persons living with HIV and AIDS in a hospital setting.

1.9 Research methodology

The research methodology is the specific procedure for selecting, identifying, analysing, and processing the subject under study (Veal, 2017). This section outlines the methods to be used in this study. It focuses on discussing the study approach and design, study setting, study population and selection of participants, measurement instrument and reliability and validity of the tool, plan for information gathering, data breakdown, moral considerations, and plan for the distribution of results.

1.9.1 Research approach

A quantitative approach was adopted in this study. According to Hilla Brink, Christa van der Walt and Gisela van Rensburg (2018), a quantitative research approach systematically investigates phenomena by gathering quantifiable data and performing statistical and computational techniques. The quantitative approach is appropriate to provide a descriptive data analysis to measure healthcare providers' knowledge, attitude, and practices on preventing occupational exposure to HIV. The quantitative method allowed the researcher to quantify the responses from the participants. The questionnaire instrument containing closed-ended questions will be used to gather data from the participants in this study. The questionnaire containing the same set of questions was answered by each participant individually. The same questions were then researched to compare responses to reflect the relationships between variables.

1.9.2 Study Design

The study design was cross-sectional and descriptive in nature. The study employed the cross-sectional design because data were gathered from the respondents to describe the status of practices of healthcare providers' chosen regional hospitals in Vhembe regarding occupational exposures. Descriptive studies research the relationship between variables without examining the cause (Creswell, 2014). In this study, the researcher seeks the doctors' and nurses' information regarding preventing occupational exposures to HIV in a selected regional Hospital in the Vhembe district without studying the cause.

1.9.3 Study area

This research was conducted at a selected regional Hospital in Vhembe district, Limpopo province in South Africa. Limpopo province comprises five districts: Vhembe, Capricorn, Letaba, Sekhukhune and Waterberg. In the Vhembe district, there are also four municipalities: Makhado, Musina, Thulamela and Collins Chabane local municipality (Statistics South Africa (Stats, SA), 2011). The geographical area is rural and economic activities include agriculture, tourism, mining, and informal traders. Venda and Tsonga ethnic groups predominate the population in the Vhembe district. According to Stats SA

(2011), the total population in the Vhembe district is 1,295 million. Vhembe district has six Districts, one specialised, one regional Hospital, 115 fixed Primary Health care facilities, eight community health centres and 36 mobile clinics. The selected regional Hospital was selected to be part of this study since it is the only regional Hospital in the Vhembe district.

1.9.4 Study Population and Sampling

1.9.4.1 Study Population

A population is a whole group important to the researcher and meets the investigation's criteria (Polit and Beck, 2017). The study population are the HCWs from a selected regional hospital in the Vhembe district. Nurses, doctors, and lay counsellors who work closely with HIV and AIDS patients will form part of the sample population

1.9.5 Sampling

Sampling refers to the process of selecting the sample from a population to obtain information about the research topic presenting the research population (Du Plooy-Cilliers, Davis and Bezuidenhout, 2014). In this study, the number of registered nurses was 333. The doctors in the population study were 45, with nine lay counsellors who work closely with HIV patients. Those mentioned above were the target population of the study.

1.9.6 Sampling of Hospitals

Vhembe has three regional hospitals: Siloam Hospital, Tshidzini hospital and Louis Trichardt Memorial Hospital. Out of the total of three regional Hospitals in the Vhembe District, the selected regional Hospital in Vhembe District was selected using the purposive sampling technique. The selected Hospital in Vhembe District has three categories of healthcare providers who work close to PLWH: Doctors, Nurses and Lay counsellors. Thus, these healthcare professional categories formed part of the participants in this study for this study.

1.9.7 Sampling and Sample size

Using the Raosoft sample size calculator at a 95% confidence interval and 5% margin of error the sample size was 336.

1.9.8 Sampling of respondents

The process of dividing members of a population into homogeneous subgroups is known as stratification (De Vos, Strydom, Founche and Etlport, 2016). The stratified sampling method was applied to the three working categories of professional nurses, doctors, and lay counsellors. Following that, respondents in each stratum were chosen using simple random sampling. Simple random sampling ensures that every individual or group has an equal chance of being included in the sample. The researcher put plain sheets of paper containing either a 'yes' or 'no' answer into a container and instructed participants from each group to randomly pick one without seeing it. The people who selected a 'yes' paper were included in the research, whereas those who selected a 'no' paper were not. Table 1 displays the overall number of healthcare professionals and the size of the sample.

Table 1 Population and Sampling frame

Categories of healthcare providers	**Total number of healthcare providers**	**Number of Participants**
Professional Nurses	333	166
Doctors	45	23
Lay counsellors	9	5
Total	**672**	**336**

Thus, 336 respondents were chosen out of 672 healthcare workers at a selected regional Hospital in the Vhembe district, Limpopo Province.

1.9.9 Inclusion criteria

HCWs who worked in the unit/department/ward for at least three months under the selected regional hospital were included in the study, and those who only worked for less than three months were not.

1.9.10 Exclusion criteria

Healthcare providers who do not work in the unit/department/ward of HIV were not included in the study. The study didn't include all healthcare providers on leave during data collection.

1.9.11 Measurement instrument

A closed-ended questionnaire was used as a data collection instrument to gather data about the knowledge, attitudes and practices knowledge, attitude, and practices of healthcare providers regarding measures to prevent occupational exposure to HIV. However, Grove, Gray and Burns (2015) believe that questionnaires have their limitations: very low response rates, lack of resources for large-scale research, and respondents' inability to express themselves. The questionnaire was divided into the following four sections: Section A: Demographic information; Section B: Knowledge of healthcare providers regarding the measures to prevent occupational exposure to HIV; Section C: Attitudes of healthcare providers regarding measures to prevent occupational exposure to HIV; Section D: Practices of healthcare regarding measures to prevent occupational exposure to HIV. Since many existing questionnaires did not include the specific aspects that the researcher aimed to address, a new questionnaire was developed by the researcher with the assistance of their supervisor. This new questionnaire was created entirely from the beginning. The researcher developed the questionnaire by incorporating certain portions of previously used data collection instruments from studies conducted in Ethiopia (Eticha and Gemeda, 2019), China (Wu et al., 2016), and another study by Uzochukwu, Sibedu, Ughasoro, and Onwujekwe (2014), due to the unavailability of an appropriate questionnaire.

1.9.12 Pre-testing the instruments

Pre-testing of the instruments used refers to the administration of the data collection instruments with a small set of respondents, 10%, 20 respondents: 17 professional nurses, two doctors, and one lay counsellor, from the population of the full-scale survey (Mikuska, 2017). Prior to distributing the questionnaire to the participants, the validity and reliability of the questionnaire were assessed and evaluated by Mikuska in 2017. Pre-testing allowed the researcher to gauge their responses and reaction

to the questions (Mikuska, 2017). The questionnaire was pre-tested before the actual data collection to check on its ability to gather quality and reliable data (Bryman, 2016). Before the actual data collection, appropriate corrections and adjustments were made to ensure the respondents' questions were clear and understood.

1.9.13 Validity and Reliability

Validity refers to the degree to which research measures what is supposed to measure. In contrast, reliability refers to whether the same instrument can be used at different times or administered to various participants from the same population and will give the same findings (Maree, 2016).

1.9.13.1 Validity

Validity denotes whether an instrument has measured what it was supposed to measure given its applied situation (Heale & Twycross, 2015). The researcher sought the supervisor's assistance to ascertain the validity of the data.

1.9.13.1. Validity

The degree to which an instrument measures what it is supposed to measure is known as validity (Heale and Twycross, 2015). To ensure the instrument's content validity, the drafted questionnaire was sent to the study's supervisors to thoroughly examine each question's relevance and readability. The correct information was used to modify the questionnaire to address the study's goals and objectives and ensure that the questions were related to the research topic to avoid bias in the study or obtaining data that was unrelated to the topic.

1.9.13.2 Reliability

Reliability, under the quantitative research approach, is linked to the consistency of the research findings. Furthermore, to assess whether the measuring instruments used are reliable and ensure that the same results would be achieved if the research were repeated by a different researcher at a different time using the same method or instrument (Du Plooy-Cilliers et al., 2014).

The researcher used the test-retest method with a 10% sample to ensure the questionnaire's reliability. This involved administering the questionnaire twice to the same individuals at different times in the hospital. One hospital not included in the study was randomly selected. The responses from the first administration were compared to those from the second administration one week later to assess response consistency. The degree of internal consistency was measured using Cronbach's alpha, which ranges from 0 to 1.0. The results of the first response for each individual were compared to the second response, and the correlation coefficient was 0.854, with a Cronbach's alpha of 0.634. Since the correlation coefficient was close to 1, the results were deemed acceptable.

1.9.14 Plan for data collection

Maree (2016) asserts that data collection is critical in addressing the research question. For this particular study, primary data was collected from the field. The researcher sought permission from the Provincial Department of Health Limpopo province to conduct the study and subsequently obtained permission from the hospital manager to collect data. Arrangements were made with the unit managers to facilitate data collection, which the researcher carried out during day and night shifts. Respondents who had difficulty understanding the questions were clarified. The data collection process involved the use of closed-ended questionnaires and did not provide any incentives to the participants. The completion of the questionnaire took approximately 30 to 45 minutes. To avoid interruptions to hospital services, the researcher sought permission from participants to distribute the questionnaires during their lunch breaks, which did not interfere with their work-related duties. Upon completion, the questionnaires were collected immediately by the researcher. For participants who were unavailable during their lunch breaks, the questionnaire was given to them to fill out at their earliest convenience in a private setting. For those who completed the questionnaire at home, the researcher collected the completed questionnaires during the participants' next work day during their lunch break.

1.9.15 Plan for data management and analysis

Responses from the questionnaire were inspected to establish whether accurate and complete data were acquired after data collection. Punch (2005) observed that any research should conduct data cleaning

before data analysis to enable the researcher to spot and eliminate all errors. Specific data analysis methods were employed to achieve the study's particular objectives. The data were analysed using the Statistical Packaging for Social Sciences (SPSS) software version 25, and the findings were mostly presented through frequency tables, pie charts, and illustrative graphs.

Analysed data was carefully checked to determine whether the procedures that were used during analysis were appropriate and correct and whether the findings presented were meaningful. Relationships and correlation of the results among respondents were attained through the cross-tabulation function through the SPSS using chi-square, phi and crammers tests.

1.9.16 Ethical considerations

This study adhered to ethical research guidelines, which are moral standards that govern the research process (Du-Plooy et al., 2014). The research maintained integrity by honestly presenting the study's findings. Participants were informed of the study's purpose before agreeing to participate, and their participation was voluntary. Before collecting data from potential participants, the University of Venda Higher Degrees Committee obtained permission to conduct the study.

1.9.16.1 Permission to conduct the study and Ethical clearance

The research proposal was submitted for approval to the Department of Public Health. It was then reviewed and approved by the Faculty Higher Degree Committee (FHDC) and the Executive Faculty Higher Degree Committee (EFHDC). The approved proposal underwent ethical clearance by the Human and Clinical Trial Research Ethics Committee (HCTREC). Once ethical approval was granted, a certificate and formal letter were obtained to request permission to conduct the study from the Limpopo Department of Health and Vhembe District Department of Health, which can be found in Appendix 4.

1.9.17.2 Informed consent

Before everything, the researcher ensured the respondents knew the study's goal and purpose. Respondents were given an information sheet (Appendix 4) to understand the purpose of the study. The

participants who agreed to participate in the study were required to sign a written consent form indicating that they fully agreed to participate. Respondents were also informed that it is within their rights to withdraw from the study at any time.

1.9.17.3 Voluntary participation

Respondents were informed about their rights before data collection to decide whether they wanted to participate in the study. The researcher informed the respondents that they had the right to participate or withdraw from participating in this study.

1.9.17.4 Confidentiality

According to Babbie and Mouton (2009), a research project guarantees confidentiality when the researcher can identify a given person's responses but promises not to do so publicly. In this study, the respondent's information was kept safe because the researcher knows the respondents have the right to privacy. Respondents were requested not to write their personal details on the questionnaire to ensure confidentiality. The researcher did not ask an identifying question to the participants. All completed questionnaires were kept separate from signed consent forms and saved under the lock and key cabinet.

1.9.17.5 Dissemination and interpretation of results

The final mini-dissertation will be submitted to the Department of Health and the University of Venda library for future researchers. The findings from the study were submitted for consideration for publication in peer-reviewed and accredited journals.

1.10 REFERENCE

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SECTION TWO

JOURNAL AUTHOR GUIDELINES AND MANUSCRIPTS

2.1 Journal Author Guidelines

The manuscript was prepared based on the "**Health SA Gesondheid**" guidelines as found in the following link:

https://hsag.co.za/index.php/hsag/pages/view/submission-guidelines#part_1

2.2 MANUSCRIPT 1

Title of the manuscript: Nemadandila N.A, Makhado L, Mashau N.S. Examining healthcare providers' knowledge, attitude, and practices regarding measures to prevent occupational exposure to HIV district: A systematic review. **Health SA Gesondheid** (**Under Review**)

Examining healthcare providers' knowledge, attitude, and practices regarding measures to prevent occupational exposure to HIV district: A systematic review.

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ABSTRACT

Background: Effective communication of Occupational Health and Safety (OHS) measures is essential for preventing occupational exposure to HIV among healthcare workers (HCWs) in private and public healthcare institutes

Purpose: This systematic review aims to assess the knowledge, attitudes, and practices of HCWs regarding PEP for HIV in South Africa, Africa, and the world at large.

Methods: The review analysed 38 English studies published between 2015 and 2023 that examined HCWs' knowledge, attitudes, and practices towards preventing occupational exposure to HIV. Various search engines, including EBSCOhost, Google Scholar, PubMed, and Science Direct, were used to identify scientific studies, which were evaluated using the critical appraisal skills programme checklist and analysed with content analysis.

Results: The systematic review found varying levels of knowledge, attitudes, and practices of PEP for HIV among HCWs. The study identified key themes, including healthcare providers' knowledge, attitudes, and practices regarding measures to prevent occupational exposure to HIV. The review also highlighted challenges to attitudes and practices of PEP for HIV, such as lack of training, long working hours, and lack of resources.

Conclusion: The systematic review stresses the importance of a safe working environment and OHS communication to prevent occupational exposure to HIV among HCWs. PEP training programs are critical to enhancing their knowledge, attitudes, and practices.

Contribution: This study adds to the literature by exploring HCWs' knowledge, attitudes, and practices on PEP for HIV. It highlights the significance of training programs to enhance HCWs' abilities and address challenges preventing occupational exposure to HIV.

Keywords: Attitude**,** Healthcare providers, HIV, Knowledge, Occupational exposure, Practices.

Introduction

Healthcare workers (HCWs) and policymakers face the constant challenge of occupational exposure to HIV and AIDS due to the endemic nature of these diseases. However, the adoption of preventive measures by HCWs is hindered by various factors. A study by Eticha and Gemeda (2019) revealed that a significant proportion of HCWs (43.4%) had unfavourable attitudes towards measures to prevent occupational exposure. Previous studies have emphasized the importance of adequate knowledge, positive attitudes, and effective practices in preventing occupational exposure to HIV (Babanawo, 2016; Bareki & Tenego, 2018; Eticha & Gemeda, 2019; Gebreslase & Buruh, 2014; Makhado & Davhana-Maselesele, 2016). The Theory of Reasoned Action (TRA) suggests that intention determines behaviour, which is influenced by attitudes and subjective norms (LaCaille, 2020). Positive attitudes towards gaining knowledge can improve practices and prevent occupational exposure to HIV for HCWs.

HCWs are at a high risk of occupational exposure to HIV, and there is a need for appropriate guidelines and efficient supply chains of PEP to ensure their maximum protection (Gul, Ak & Guneri, 2017; Mponela, Oleribe, Abade & Kwesigabo, 2015). In South Africa, the shortage of resources and high volumes of work also put HCWs at risk, as shown in Makhado and Davhana-Maselesele's (2016) study on nurses in rural Limpopo Province. This study highlights that the lack of knowledge, negative attitudes, and improper practices of HCWs regarding measures to prevent occupational exposure to HIV pose significant challenges.

Purpose of the study

This systematic review aims to analyze the evidence on HCWs' KAP concerning HIV exposure prevention in the workplace and develop a protocol, methods, and strategies to assist them.

Method used for literature review

Search strategy

To achieve the objectives of the study on the knowledge, attitudes, and practices of healthcare workers towards measures to prevent occupational exposure to HIV, the researchers conducted a systematic search of eligible studies using various search engines, including EBSCOhost, PubMed, Science Direct, and Google Scholar. The search was based on relevant keywords from the title and abstract concepts of the literature and aimed to identify relevant studies that provided information on measures, attitudes, and practices regarding the prevention of occupational exposure to HIV among healthcare professionals in Southern Africa, Africa, and other regions across the globe.

The study did not impose any restrictions on the type of studies that were included, as the search strategy employed did not discriminate among studies. The keywords played a critical role in the systematic

search for relevant literature. In some instances, the keywords were transformed into sentences to fit with the flow of existing literature and to broaden the scope of the search. The researcher used the following search engines and keywords: EBSCOhost (University of Venda Library) - "knowledge, attitude, and practices healthcare providers measures to prevent occupational exposure"; PubMed - "knowledge, attitude, and practices healthcare providers measures to prevent occupational exposure"; Google Scholar - "knowledge, attitude, and practices healthcare providers measures to prevent occupational exposure"; and ScienceDirect - "knowledge, attitude, and practices healthcare providers measures to prevent occupational exposure".

The literature eligibility criteria

The literature included in this study pertains explicitly to healthcare providers' knowledge, attitudes, and practices towards measures to prevent occupational exposure to HIV and encompasses both developed and developing nations in Africa and worldwide. Only studies written and published in English were included in this research.

Inclusion criteria:

- Studies focus on healthcare providers' knowledge, attitudes, and practices related to HIV prevention measures and the general practices of healthcare professionals in developed and developing countries in Africa and the rest of the world.
- Publications from 2011 to 2023.
- Articles published in English.

Exclusion criteria:

- Articles that were published before 2011 focused on healthcare providers' knowledge, attitudes, and practices related to HIV prevention measures.
- Articles published in languages other than English.

Study selection

The researchers used the PRISMA Flow diagram generator to guide the systematic review, following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (McKenzie et al., 2020). The diagram was used to determine which studies would be included and excluded in the review. Figure 2.1, adapted from the PRISMA flow diagram generator, is presented below to show the flow of the study selection process.

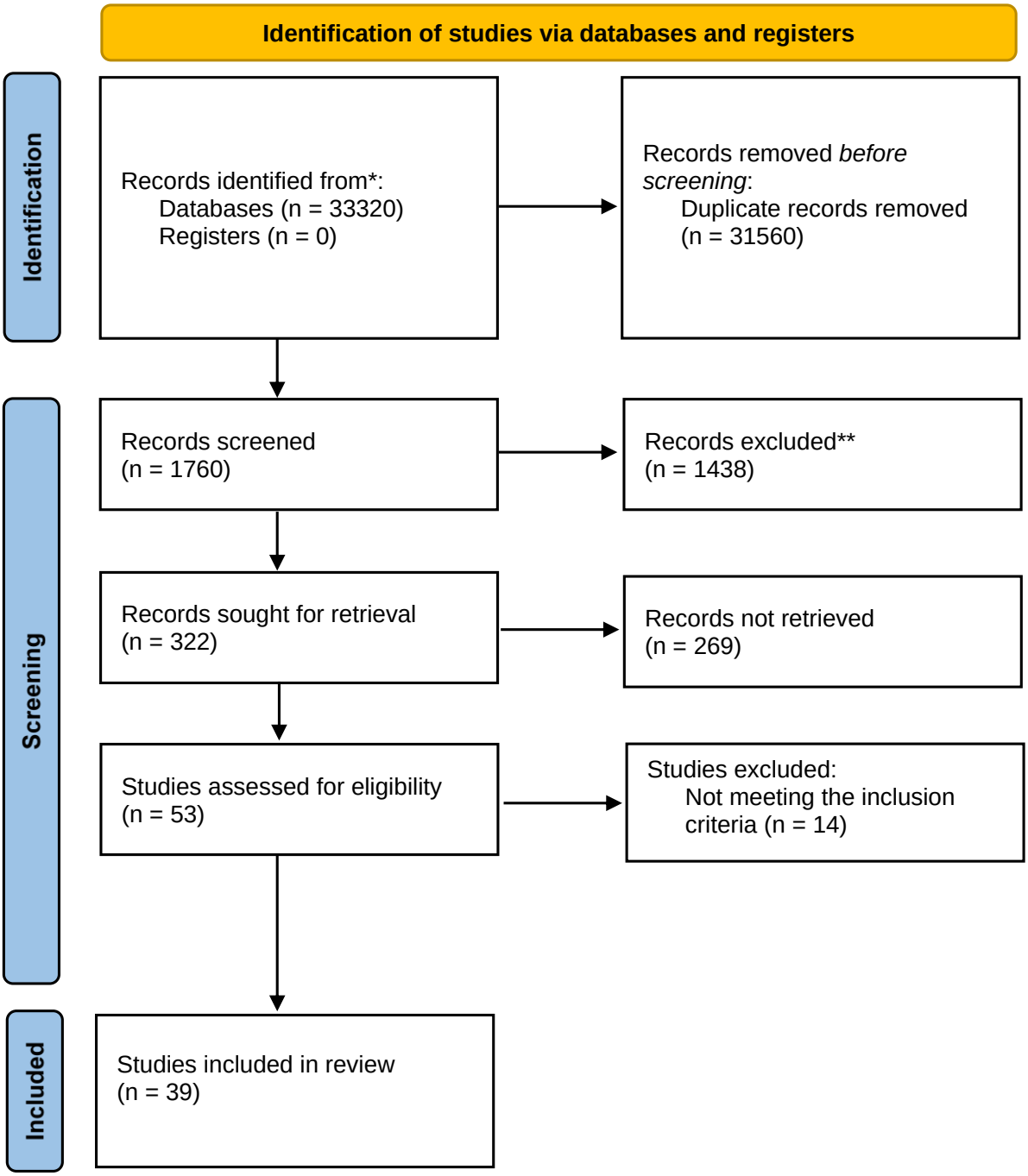

Figure 1: PRISMA 2020 flow diagram for new systematic reviews which included searches of databases From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71

Study selection Criteria

The researchers thoroughly evaluated each study by examining their abstracts to determine their relevance in the study's scope, aim, methods, and findings. The study titles played a crucial role in the selection process. The search initially yielded 33 320 entries from the selected search engines and 31560 were removed as they were dublicate records. A total numer of 1760 were screend fro the review and

1438 were excluded. However, the researcher narrowed the search only to include studies directly relevant to the study's focus. The researchers then carefully retrieved 322 and read before incorporating them into the literature review, hoever 269 records were not retrived. After reviewing the abstracts, the researcher subjected 53 eligible studies to a comprehensive review, with attention paid to the keywords to ensure their relevance howevr 14 records were not retrived. A total of 39 articles were ultimately included, either independently or as supplementary arguments in the literature review. At the same time, the other studies were excluded after a full read of their abstracts and titles.

Appraisal of the selected studies in this research

The researcher utilized the Critical Appraisal Skills Programme (CASP) (Purssell, 2020) to evaluate the selected studies for inclusion. The cohort study checklist was used to assess the articles for relevance, solidity, and credibility. The studies that matched the checklist criteria were then integrated into the study, as indicated in Table 2. The researcher scored the checklist by dividing the number of checked "yes" items by the total number of applicable items. The cohort study checklist used in this study comprised ten questions, which served as a guide in determining the eligibility of the studies. The researcher evaluated the selected studies by answering the ten questions on the checklist, and the results were presented as percentages to indicate the studies' eligibility. Please see Table 2 for the results.

Table 2: Appraisal of Selected Studies using CASP

Author(s)	**Study design**	**Study assessment**
1. Akpuh et al. (2020)	Cross-sectional study	67%
2. Aluko (2016)	Cross-sectional	70%
3. Auta et al. (2017)	Systematic review	81%
4. Babanawo (2016)	Cross-sectional study	76%
5. Baldeh (2019).	Cross-sectional survey	65%
6. Bareki & Tenego (2018).	Cross-sectional study	82%
7. Dhanya et al. (2017).	Cross-sectional survey	76%
8. Dilie et al.. (2017)	Cross-sectional study	76%
9. Eticha & Gemeda, (2019)	Cross-sectional study	67%
10. Gaji et al. (2013)	Cross-sectional	68%

11. Gebreslase & Buruh (2014)	Cross-sectional study	71%
12. Halboub et al. (2015)	Cross-sectional Study	61%
13. Hakre et al. (2016)	Cross-sectional study	80%
14. Ismail et al. (2018).	Cross-sectional study	66%
15. Jin et al. (2014).	Cross-sectional study	68%
16. Kabotho & Chivese (2020).	Cross-sectional study	74%
17. Konlan et al. (2017)	Cross-sectional study	85%
18. Mabina et al. (2018)	Cross-sectional descriptive study	76%
19. Mabwe et al. (2017)	Exploratory research design	66%
20. Makori et al. (2012)	A qualitative – exploratory study.	67%
21. Makhado & Davhana-Maselesele (2016)	Cross-sectional descriptive study	80%
22. Makhado & Seekane (2020)	Systematic review	79%.
23. Makhado et al. (2022)	Systematic Review	79%
24. Mashoto et al. (2015)	Cross-sectional survey study	68%
25. Mossburg et al. (2019).	A comprehensive literature search	71%
26. Mekgoe et al. (2019)	A Phenomenological qualitative design	82%
27. Nwankwo et al. (2020)	Cross-sectional descriptive study	68%
28. Oche et al. (2018)	Cross-sectional descriptive study	72%
29. Peu & Rasweswe, (2020).	A quantitative descriptive study	72%
30. Rostamzadeh et al. (2018)	Cross-sectional study	82%
31. Sabermoghaddam et al. (2015).	Cross-sectional study	80%
32. Siuki et al. (2019).	Cross-sectional study	67%
33. Sono & Chelule (2019).	Cross-sectional study	74%
34. Tshering et al. (2020).	Cross-sectional study	76%
35. Wu et al. (2016).	Cross-sectional study	69%
36. Yazie et al. (2019).	Cross-sectional study	84%
37. Yi et al. (2018).	Cross-sectional study	72%
38. Zarei et al. (2015).	Cross-sectional study	75%
39. Zaveri et al. (2012)	Cross-sectional study	76%

Characteristics of the studies

The features of the studies included in this research were deemed significant and noteworthy for discussion. As previously stated in the eligibility discussion, the studies that were considered for inclusion mostly fell within the ten years from 2011 to October 2023 to ensure up-to-date literature. Only studies published in English were selected, as the researcher was proficient in English and could easily access them. To be included in the study, the selected studies had to examine healthcare providers' knowledge, attitudes, or practices concerning measures to prevent occupational exposure worldwide. The included studies' features are the authors, year of publication, study objective, country of study, research methodology, outcomes, and limitations. Table 3 displays the characteristics of the studies included in this systematic literature review.

Table 3: Characteristics of selected studies

Author(s)	Title of the study	Objectives	Setting	Study design	Population & sample	Main findings	Study limitation	Study focus
Mossburg et al. (2019)	Occupational Hazards among Healthcare Workers in Africa: A Systematic Review.	This systematic review examined occupational exposure rates to blood and bloodborne pathogen among healthcare workers in sub-Saharan Africa	Sub-saharan Africa	A systematic review	Literature review	Two studies reported 21–32% of respondents linked poor knowledge or training with the prevention of needlestick injuries.. Attitudes were generally positive toward occupational safety procedures, while access was poor.	The review was only limited to studies done in a Central and sub-Saharan African context.	Knowledge and attitudes towards occupational hazards
Rostamzadeh et al. (2018)	Dentists' knowledge, attitudes and practices regarding Hepatitis B and C and HIV/AIDS in Sanandaj, Iran	To evaluate dentists' knowledge, Attitude, and Practices (KAP) regarding infection control and basic principles.	Iran	Cross-sectional study design	Dentists	The results also indicated that dentists' higher level of knowledge about HBV, HCV and HIV/AIDS was significantly influenced by work experience. Positive attitude towards HBV, HCV and HIV/AIDS was considerably influenced by age group and workplace	This study did not primarily assess knowledge and attitude regarding cross-infection risks. It also involves a limited number of samples.	Knowledge and attitudes

Gajic et al. (2013)	"knowledge and attitudes of health care workers from the primary health centre in inðija, Serbia on professional exposures to blood-borne infections	This cross-sectional study aimed to determine the level of knowledge and attitudes on occupational exposure in primary health care	Serbia	Cross-sectional study design	Health care workers	This demonstrated that health workers tend to estimate the risk of HIV infections unrealistically. There was a low level of education about the prevention and control of blood-borne infections among (49%) of the participants	The bias of occupational exposure and the fact that some answers reflected the personal views of the HCWs, which often change with time.	Knowledge, attitudes and practice
Hakre et al. (2016)	Knowledge, attitudes, and beliefs about HIV pre-exposure prophylaxis among US Air Force Health Care Providers.	A cross-sectional survey regarding knowledge, attitudes, and beliefs toward HIV PrEP	USA	Cross-sectional study design	Military Health care providers	the number of HIV-infected patients treated in the past 12 months, past prescription of antiretrovirals for HIV prevention, frequency of prescribing PrEP in the past 12 months, and ever being questioned by a patient about PrEP were associated with PrEP knowledge. Providers who had ever prescribed antiretrovirals to prevent HIV had greater odds of high PrEP knowledge	The setting was biased as it concentrated on the armed force	Knowlege

Aluko *et al. (2016)*	Knowledge, attitudes and perceptions of occupational hazards and safety practices in Nigerian healthcare workers.	This study assessed the workplace hazards and safety practices by selected HCWs in a typical health care facility (HCF) in Nigeria.	Nigeria	Descriptive cross-sectional design	Health Care workers	Most respondents were knowledgeable about hazards in HCFs, Also, most respondents believed they were at risk of occupational hazards, while about two-thirds perceived the risk as high.	Bias arises from the use of a semi-structured questionnaire; The study was conducted in a tertiary healthcare facility, a model of best practice in the health care sector and so; the findings might not be generalisable across levels of HCFs in Nigeria	Knowledge and attitudes
Halboub et al. (2015)	Knowledge, Attitudes, and Practice of Infection Control among Dental Students at Sana'a University, Yemen.	This study evaluated senior dental students' senior dental students' knowledge, attitudes, and practices regarding infe	Yemen	Crossectional design	Dental students	A significantly higher percentage of 5th-year students showed positive attitudes toward the treatment of patients with infectious diseases, as compared to only 31.0% of 4th-year students	The limitation of this study is that the responses were based on students' self-assessments rather than being provided under the supervision of the investigators in a clinical environment. Thus, the reported level of practice	Knowlegde, atttitudes and practices

							might be lower than the real level	
Zaveri, J. and Karia, J. (2012).	Knowledge, attitudes and practice of laboratory technicians regarding universal work precaution.	The present study aims to determine the knowledge, attitude, and practice of universal work precautions amongst medical laboratory technicians in private hospitals.	India	Cross-sectional design	Health care workers	It is concluded that laboratory technicians' knowledge, attitude, perception, and compliance with universal work precautions are poor.	It cant be generalized to other settings due to the small sample; however, it can be used for comparison	Knowledge, attitudes and practices
Makhado et al. (2020)	Knowledge regarding post-exposure prophylaxis amongst nurses in an African context.	A systematic review on the level of knowledge among nurses regarding PEP in an African context	South Africa	A cross-sectional and descriptive study	The population is nurses in an African context	Nurses were aware of PEP, but they did not have sufficient knowledge.	The review was only limited to studies done in an African context.	Knowledge regarding post-exposure to prophylaxis
Makhado et al. (2016)	Knowledge and uptake of occupational post-	Determine knowledge, insight and uptake of occupational post-	South Africa	A cross-sectional descriptive study	The study was conducted in a regional	Results revealed that not all nurses who are		Knolwedge

	exposure prophylaxis amongst nurses caring for people living with HIV.	exposure prophylaxis among nurses caring for PLWH			hospital, and the population was nurses.	exposed to HIV are aware of PEP.		
Makhado et al. (2022)	Healthcare practitioners and students' PEP knowledge, attitude and adherence in Southern Africa	to assess the level of knowledge, attitude and adherence to PEP in HCPs in Southern Africa	Southern Africa	Systematic review	Literature review	most participants have adequate knowledge regarding PEP	This study only included HCPs and students in the Southern African region training. Many of the studies included were quantitative, and perhaps more data would have emerged should there have been qualitative studies within the inclusion criteria. The findings of this study may not be generalised as the included studies may not accurately represent health HCPs	Knowledge and Attitudes

							(in practice and training) in Southern Africa.	
Auta et al. (2017)	Healthcare workers' occupational exposures to body fluids in 21 countries in Africa: systematic review and meta-analysis.	To estimate the lifetime and 12-month prevalence of occupational exposure to body fluids among African healthcare workers.	Africa	Systematic review	Literature review	Almost one-half of African healthcare workers were occupationally exposed to body fluids annually.	The cross-sectional design of the studies reviewed does not allow causal relationships to be established.	Attitudes and knowledge
Babanawo (2016)	Assessment of Knowledge and Use of HIV Post-Exposure Prophylaxis and Healthcare Workers' Risk to Occupational Exposure in New Juabeng Municipality	• Assess and describe • Examine the knowledge and use of PEP among HCWs	Ghana	Quantitative cross-sectional study	HCWs in New Juabeng Municipality	• Despite the high prevalence of occupational injuries, PEP's knowledge and patronage is low among HCWs. • Need for formal training.	Limited sample population	Knowledge
Baldeh, M. (2019).	Knowledge, attitude, and practice on occupational HIV infection.	Assess the knowledge, attitude and practice regarding occupational	Gambia	Quantitative cross-sectional survey	HCWs at Faji Kunda Health Centre, Gambia	Nurses' knowledge of HIV transmission was satisfactory, and there were serious	Limited sample population	knowledge, attitude and practice

		exposure to HIV among HCWs				gaps in implementing universal precautions. There is a need for capacity building of nurses, especially the untrained ones, to change their attitudes and reinforce universal precaution practices in work settings		
Bareki & Tenego (2018).	Assessment of knowledge, attitudes and practices of HIV post-exposure prophylaxis among the doctors and nurses in Princess Marina Hospital, Gaborone: a cross-sectional study.	Assess the knowledge, attitudes and practices of PEP for HIV among HCWs.	Botswana	Quantitative Cross-sectional study	Nurses in Princess Marina Hospital, Gaborone	Adequate knowledge regarding PEP. Showed inadequate practices concerning HIV PEP.	Sample size cant be used for generalisation	Knowledge, attiudes and practices

Dhanya et al. (2017).	Knowledge, attitude, and practice towards HIV patients among dentists.	Assess the knowledge, attitude and practices of HCWs towards HIV patients.	Kerala	Cross-sectional survey	Two hundred six dentists practising in the Trichur district of Kerala.	Fear and reluctant to treat HIV-known patients	The results of the study are based on subjective assessment.	Knoweledge, attiudes and practices
Eticha & Gemeda, (2019)	Knowledge, Attitude, and Practice of Postexposure Prophylaxis against HIV Infection among Healthcare Workers in Hiwot Fana Specialized University Hospital, Eastern Ethiopia	Assess the knowledge, attitudes and practices of HCWs regarding PEP.	Ethiopia	Cross-sectional study	311 health care workers of Hiwot Fana Specialized University Hospital	Participants had a negative attitude and poor practice with regard to postexposure prophylaxis	Unwilling of HCWs in the hospital to participate in the study and the absence of HCWs at the time of data collection	Attiudes
Ismail et al. 2018.	Occupational exposure to HIV in a developing country: assessing knowledge and attitude of a	Assess if continuing medical education symposium can be used as an effective educational tool to	Pakistan	Cross-sectional study	This quasi-experimental study with 364 HCWs in	Training on knowledge, attitudes and practice regarding PEP for HIV is important for	There was no control group (without intervention) which may limit the ability to	Knowledge and attiudes

	healthcare professional before and after an awareness symposium.	improve attitude, awareness and knowledge regarding occupational exposure to HIV infection			Karachi, Pakistan.	improved practices among HCWs.	conclude the observed intervention effect	
Jin et al. (2014).	An assessment of healthcare students' attitudes toward patients with or at high risk for HIV	Assess the students' attitudes towards patients with HIV.	Malaysia	Cross-sectional study	The survey invitation was emailed to 3191 students at eight professional schools	High negative attitudes towards patients with HIV	Low response rates from the participants.	Attitudes
Konlan et al. (2017)	The level of nurses' knowledge on occupational post-exposure to hepatitis B infection in the Tamale metropolis, Ghana	Assess nurses' knowledge of occupational exposure to HIV	Ghana	Cross-sectional study	108 nurses	Nurses are aware of their risk of occupational exposure to hepatitis B but lack the requisite knowledge on post-exposure management and measures that reduce the exposure.	The sample size was small for generalisation	Knowledge

Mabwe et al. (2017)	Understanding the magnitude of occupational exposure to human immunodeficiency virus (HIV) and uptake of HIV post-exposure prophylaxis among healthcare workers in a rural district in Tanzania	Assess the knowledge, practice and knowledge regarding occupational exposure to HIV among HCWs	Tanzania	Exploratory research design	221 HCWs from selected healthcare facilities in Kongwa, Tanzania.	The uptake of PEP services among HCWs remains low despite the high rate of occupational exposure. Wider dissemination of HIV PEP guidelines and training of HCWs is required in Tanzania to ensure that HCWs know of and have prompt access to PEP services		Knowlegde and practices
Mashoto et al. (2015)	Knowledge of occupational exposure to HIV: a cross-sectional study of healthcare workers in Tumbi and Dodoma hospitals,	Assess healthcare workers' knowledge of occupational exposure to HIV.	Tanzania	Cross-sectional survey study	A self-administered questionnaire was used to capture information on knowledge of occupational exposure to	A substantial proportion of studied healthcare workers had little knowledge on occupational exposure to HIV and were not aware of a contact person in the event of	The study relied on the self-administered questionnaire. The validity of information in self-reports may be limited by social desirability and recall bias. There is a possibility that in this	Knowledge

					HIV infection from 401 HCWs	occupational exposure to HIV.	study, socially desired behaviours have been over-estimated and undesired behaviours under-estimated.	
Mossburg et al. (2019).	Occupational hazards among healthcare workers in Africa	This systematic review examined occupational exposure rates to blood and bloodborne pathogen among healthcare workers in sub-Saharan Africa.	Africa	A comprehensive literature search		The high burden of blood and bloodborne pathogen exposures demonstrated here indicates a high risk of contracting bloodborne illnesses. Although the data are sparse, implementation of preventative policies based on current knowledge remains critical to minimize risk and reduce exposure	Sampling strategies limit us from developing a deeper understanding of prevalence within distinct professions	Knowledge
Nwankwo et al. (2020)	Challenges and Adherence to	To review challenges and adherence to SP for	Nigeria	The World Wide Web sites such as	Literature review	Needle stick injuries and exposure to		Practices

	Standard Precautions for Prevention of Percutaneous Injuries and Exposure to Blood Borne Pathogens in Clinical	the prevention of percutaneous injuries and exposure to patients' blood in clinical practice		PubMed Central and Google scholar were searched using keywords such as percutaneous, needle stick injuries, standard precautions, and adherence. Relevant articles were reviewed and included based on defined criteria.		patients' blood remain a risk for disease transmission among HCWs. Despite appreciable knowledge of standard precautions, the practice has remained low globally.		
Oche et al. (2018)	Determinants of appropriate knowledge on human immunodeficiency virus postexposure prophylaxis	To assess the knowledge, attitude, and practice of postexposure prophylaxis (PEP) among HCWs in a tertiary health institution	Nigeria	Cross-sectional descriptive study	156 HCWs at Usmanu Danfodiyo University Teaching	87.2% (136) of the respondents had heard of PEP, and 71.8% (112) thought that HIV/AIDs could be prevented through PEP.		Attitudes

	professional health-care workers in Sokoto, Nigeria.	in Sokoto, Northwestern Nigeria.			Hospital, Sokoto	A total of 71.2% (111) had good knowledge about PEP, whereas 86.8% (118) had a positive attitude toward PEP.		
Sabermoghaddam et al. (2015).	Incidence of occupational exposure to blood and body fluids and measures taken by health care workers before and after exposure in regional hospitals of a developing country	Assess the occupational exposure to blood and body fluids among HCWs	Iran	Cross-sectional study	371 healthcare workers working in government hospitals in the Northern Khorasan province of Iran	High level of needlestick injuries	The study has been done in the domain of occupational exposure in regional hospitals of Northern Khorasan province in Iran only	Practices
Siuki et al. (2019).	Health education intervention on HIV/AIDS prevention behaviours among	To investigate the impact of a health education intervention on improving HIV/AIDS preventive behaviours	Iran	Cross-sectional study	120 HCWs	Health education intervention based on planned behaviour theory regarding HIV is significant.		

	health volunteers in healthcare centres.	among Health volunteers in Torbat-e Heydarieh, Iran.						
Sono & Chelule (2019).	Analysis of occupational infections and injuries among Healthcare workers in Limpopo province, South Africa/by Tiyani Milta Sono	Describe the occupational infections and injuries among HCWs	South Africa, Limpopo province	Cross-sectional study	HCWs in Limpopo	Lack of knowledge, attitude and practices among HCWs.		Knowledge
Tshering et al. (2020).	Assessment of knowledge, attitude and practice of post-exposure prophylaxis for HIV among nurses at Jigme Dorji Wangchuck National Referral Hospital	Assess knowledge, attitude and practice of PEP for HIV among nurses in Bhutan	United States of America	Cross-sectional study	221 registered nurses working at Jigme Dorji Wangchuck National Referral Hospital, Bhutan	Despite the positive attitude exhibited by the majority of our respondents, the level of knowledge and practice of PEP for HIV among nurses was very low.	Cross-sectional design and non-randomized sampling method were the main limitations of this study.	Knowledge , attitudes and practices

Wu et al. (2016).	Knowledge, attitude, and practices regarding occupational HIV exposure and protection among health care workers in China: Census survey in a rural area.	Assess the knowledge, attitude, and practices regarding occupational HIV exposure and protection among HCWs in low HIV prevalence areas of rural China.	China	Cross-sectional study questionnaire survey	All medical units in Pucheng County, Shaanxi, China.	A high rate of occupational exposure (85%) and lack of universal precautions practice behaviour were recorded.	The study was carried out in medical institutions of a low HIV prevalence area such as Pucheng County	Knowledge, attitudes and practices
Yazie et al. (2019).	Knowledge, attitude, and practice of healthcare professionals regarding infection prevention at Gondar University referral hospital, northwest Ethiopia	The aim was to assess the levels of knowledge, attitude, and practices of the healthcare professionals towards safety at Gondar University referral hospital.	Ethiopia	Cross-sectional study	282 HCWs at Gondar University referral hospital.	Generally, the levels of knowledge, attitude, and practice scores among the study participants were low	Data obtained from the study participants through self-report were not cross-checked with their actual practices on the ground	Knowledge, attitude, and practice
Yi, Y., Yuan, S., Li, Y., Mo, D. and Zeng, L. (2018).	Assessment of adherence behaviours for self-reporting	Assess adherence behaviours for self-reporting occupational	China	Cross-sectional study	six tertiary hospitals in Changsha City	The prevalence of exposure to blood/body fluids among RNs was		Attitudes

		exposure to blood and body fluids among RNs and identify factors affecting self-reporting in Hunan Province, China, to develop upgraded strategies.			completed a structured questionnaire.	high, and the underreporting rate was likely substantially underestimated		
Zarei, N., Joulaei, H., Darabi, E. and Fararouei, M. (2015).	The stigmatized attitude of healthcare providers: a barrier for delivering health services to HIV positive patients.	Assess the attitude of HCWs towards patients with HIV	Iran	Cross-sectional study	575 HCWs of public and private hospitals in Shiraz.	The dominant attitude of the health care providers toward HIV/AIDS patients was related to fear	The problem of completing the questionnaire due to the sensitive nature of the job of the studied groups and lack of their time, as well as the difficulty of cooperation of the health providers with higher education levels	Attitudes

The studies included in this research were meticulously chosen, with each selection process carefully outlined to ensure the study's objectives were met. The study's purpose and setting were clearly stated, and the findings were discussed, along with limitations. The systematic literature review conducted in this research yielded three primary themes, which were extracted and thoroughly discussed.

Thematic analysis of the selected studies

Out of the 28 studies that met the study selection criteria, some were excluded from the analysis. This was because they were not published in English, and the researcher couldn't understand the language they were written in, or their full text was inaccessible due to being available only for purchase. The focus of the literature reviewed in this study was on healthcare professionals' knowledge, attitudes, and practices regarding occupational exposure to HIV. The researcher thoroughly analyzed each article's text to understand the study objectives, results, and limitations. Emerging themes were identified through a thematic evaluation of the data, with a focus on creating a cohesive discussion flow and developing themes and subthemes. Three themes emerged from this analysis.:

The themes are:

- ***Knowledge of HCWs regarding measures to prevent occupational exposure*** (Babanawo, 2016; Baldeh, 2019; Bareki and Tenego, 2018; Dhanya et al., 2017; Dilie et al., 2017; Eticha and Gemeda, 2019; Gebreslase and Buruh, 2014; Ismail et al., 2018; Konlam et al., 2017; Mabwe et al., 2017; Makhado and Davhana-Maselesele, 2016; Makhado et al., 2022; Mabina et al., 2018; Makhado and Seekane, 2020; Mashoto et al., 2015; Nwankwo et al., 2020; Oche et al., 2018; Tshering et al., 2020; Wu et al., 2016; Yazie et al., 2019; Tenego, 2018; Dhanya et al., 2017; Eticha and Gemeda., 2019; Ismail et al., 2018; Jin et al., 2014; Oche et al., 2018; Tshering et al., 2020; Wu et al., 2016; Yazie et al., 2019; Zarei N et al., 2015).
- ***Attitudes of HCWs regarding measures to prevent occupational exposure*** (Mossburg et al., 2019; Rostamzadeh et al, 2018; Gajic et al., 2018; Hakre et al., 2018; Makhado et al., 2022; Aluko, 2016; Halboub et al., 2015; Dhanya et al., 2017; Dilie et al., 2017; Eticha & Gemeda, 2019; Gebreslase and Buruh, 2014; Mabwe et al 2017)

3. ***Practices of HCWs regarding measures to prevent occupational exposure*** (Akpuh et al., 2020; Babanawo, 2016; Baldeh, 2019; Bareki & Tenego, 2018; Dhanya et al., 2017; Dilie et al., 2017; Eticha & Gemeda, 2019; Gebreslase and Buruh, 2014; Mabwe et al., 2017; Mekgoe et al., 2019; Makori et al., 2012; Oche et al., 2018; Tshering et al., 2020; Wu et al., 2016; Yazie et al., 2019).

Results

Knowledge regarding the measures to prevent occupational exposure to HIV among healthcare providers

The present study's findings indicate that most healthcare workers know post-exposure prophylaxis (PEP) for occupational exposure to HIV. Still, many are unaware of its availability in their hospitals/clinics. Zaveri et al. (2012) suggest that this knowledge deficit may result in substandard care, ineffective service provision, inefficient resource use, and an impact on health outcomes, as well as increasing the risk of HIV transmission. Inadequate or incomplete information passed on to patients during health education can create wrong perceptions or strengthen negative perceptions based on cultural beliefs and misconceptions. The present systematic literature review also found that little knowledge was reported on the protocol for using PEP, despite healthcare providers receiving training. The study reported that needle stick injuries and splashes over the face and eyes are the most common forms of occupational exposure to HIV among healthcare professionals (O'Byrne, MacPherson & Orser, 2018).

Mashoto, Mubyazi, and Mushi (2015) supported this sentiment and noted that exposure to HIV and other blood-borne pathogens is significant in occupational exposure to sharp injuries and needle sticks. The study revealed that some healthcare workers were not aware of whom they should report or contact in the case of occupational exposure to HIV, and some indicated a lack of comprehensive knowledge on the causes of occupational HIV transmission. Aluko (2016) found that there is a need for intensive training for healthcare workers regarding post-exposure prophylaxis and infection prevention and control, including using personal protective equipment provided to all healthcare workers, not only prioritizing nurses. Protective

gear is critical to preventing healthcare occupational exposure to blood and body fluids, which threatens the transmission of HIV from patients to healthcare workers (Auta, Adewuyi &Tor-Anyin, 2017).

The systematic literature review revealed that developing countries, including those in Africa, are at the most risk when healthcare professionals are experiencing exposure to HIV and AIDS, among other chronic diseases (Gajic et al., 2013). The review also found that nurses are an emerging category of people contributing to HIV-positive patients due to increased occupational exposure to HIV (Tshering, Wangchuk & Letho, 2020). Halboub et al. (2015) found that the majority of nurses had poor knowledge regarding post-exposure prophylaxis (PEP) for HIV, and some were not aware of the accessibility of PEP services in their facilities.

Siuki et al. (2019) noted that in developing countries, there is a risk of occupational HIV transmission because of the lack of stringent safety strategies and guidelines at the workplace, limited resources for post-exposure assessment and treatment, high rates of undiagnosed HIV disease, and constrained access to personal protective equipment. Despite the availability of resources to protect healthcare workers from potential occupational exposure, there is a problem regarding how knowledge is shared among healthcare workers. Wu et al. (2016) found that even in advanced and developed countries, the challenge of healthcare workers' exposure to bloodborne diseases is still pervasive. In China, for example, needle sticks injured 20,730 healthcare workers, and 30 of them may have been infected with HIV in 2000 alone.

Attitudes of healthcare providers regarding measures to prevent occupational exposure to HIV

The systematic literature review has revealed that healthcare workers often fear exposure to bloodborne diseases when dealing with PLWHA, which can negatively affect healthcare providers and patients (Zarei, Joulaei, Darabi, and Fararouei, 2015; Okoli et al., 2020). This fear can lead to negative attitudes towards measures to prevent occupational exposure to HIV, resulting in decreased patient satisfaction, low self-esteem, and feeling unmotivated towards healthy practices (Eaton et al., 2020). The study identified a need to enhance knowledge and change attitudes among healthcare workers towards PLWHA, which can be

achieved through training and equipping healthcare practitioners with knowledge about bloodborne diseases and socio-cultural beliefs (Mabwe, Kessy, and Semali, 2017).

The study calls for increased dissemination of HIV PEP use measures, guidelines, and positive attitude training for healthcare workers (Gajic et al., 2016). However, there have been instances of discrimination towards PLWHA by some healthcare workers, with some being unwilling to treat patients with HIV (Dhanya et al., 2017). This highlights the need for ethical responsibility among healthcare workers towards treating patients with HIV.

Practices of healthcare regarding measures to prevent occupational exposure to HIV

The present study has found that healthcare workers have lower practice levels when preventing occupational exposure to HIV. Similar studies conducted in Tanzania have also reported poor management of occupational exposure among healthcare workers. Thus, there is a need for collective efforts to improve awareness of occupational exposure to HIV and its management. The study also reveals a mismatch between ensuring the safety of healthcare workers and expecting effective health service delivery during the COVID-19 pandemic. Previous studies have shown that the virus infected many healthcare workers, while others died, but many healthcare workers still work in poor conditions without adequate protection and life insurance. The failure to implement effective personal protection, shortage of protective equipment, and lack of training, supervision, and monitoring of infection prevention and control mechanisms are pervasive among healthcare professionals, especially in developing countries. Therefore, efforts should be made to motivate and improve the underreporting rate and encourage employees to report occupational exposure to HIV. The study also found a lack of in-service training for healthcare workers in preventing HIV transmission in the workplace. Thus, there is a need for healthcare workers to be trained in programs that aim to enhance practices on occupational exposure to bloodborne diseases.

Overall, the study emphasizes the need to understand the experiences of healthcare workers regarding occupational exposure to HIV in specific contexts to improve future practices.

Findings and discussion

The lack of resources and training regarding exposure to bloodborne diseases, such as HIV, is a persistent challenge among healthcare professionals in South Africa, according to Kabotho and Chivese (2020) and Makhado and Davhana-Maselesele (2016). Healthcare facilities should prioritise safety practices, including personal protective equipment (PPE) and professional immunisation programs, to protect healthcare workers, patients, and visitors from health hazards (Yazie, Sharew and Abebe, 2019). The prevalence of occupational exposure to HIV is high among healthcare professionals in South Africa, with needle stick injuries being a significant contributor, according to Akpuh et al. (2020). Although healthcare protective measures and safety materials are necessary, there is a need to emphasise other healthcare departmental sections such as PMTCT, which is exposed to high risks of blood and body fluids (Akpuh et al., 2020). The provision of protective resources is unequal, and the distribution of these resources is skewed, with nurses in rural areas struggling to access protective materials during the COVID-19 outbreak, according to Mail & Guardian (2020). Despite the high reports of nurses confirming exposure to HIV, many fail to report incidents or seek HIV post-exposure prophylaxis within their workplace, positing a critical challenge to lessening HIV occupational exposure and the contraction of HIV among nurses (Peu & Rasweswe, 2020). To address these challenges, healthcare workers need better infection control training, structured intervention, in-service training, universal precautions, and accessible resources for protection and treatment, such as HIV post-exposure prophylaxis (Rasweswe & Peu, 2020).

Conclusions

The literature highlights the importance of healthcare providers' knowledge, positive attitudes, and good practices in preventing occupational exposure to HIV. However, a mismatch between knowledge and practices leads to poor implementation of measures. Negative attitudes and work overload are some of the

challenges linked to occupational exposure. Despite research efforts, more practical approaches are needed to improve knowledge, attitudes, and practices towards preventing occupational exposure to HIV. Accessible PEP, infrastructure, resources, communication, and training are critical for healthcare professionals. However, positively influencing attitudes towards proper practices remains a challenge that requires more strategies. While the literature provides insights into occupational exposure among healthcare providers, further improvements and practical efforts are needed.

Limitations and recommendations for future research and policy reforms

This study's literature review was constrained to published studies from October 2011 to October 2021 and only included articles published in English. This limitation may have resulted in the exclusion of relevant articles that were published in other languages. The context of the included studies was broad, covering South Africa, Africa, and other parts of the world, as long as they were relevant to the study's focus and keywords.

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Data availability statement

The data that is used in this systematic review is publicly available on the search engines referred to in this study.

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2.1 Journal Author Guidelines

The manuscript was prepared based on the *Life Science Journal* guidelines as found in the following link:

https://www.elsevier.com/wps/find/journaldescription.cws_home/525477?generatepdf=true

2.2 MANUSCRIPT 2

Title of the manuscript: Nemadandila NA, Makhado L, Mashau NS. Knowledge, attitude, and practices of health care providers concerning measures to prevent occupational exposure to HIV district: A cross-sectional study. **Life Science Journal (Under review)**

Knowledge, attitude, and practices of health care providers regarding measures to prevent HIV in a regional hospital in Vhembe District.

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ABSTRACT

Background: Private and public healthcare institutes need to ensure a safe working environment for healthcare workers (HCWs). The Occupational Health and Safety (OHS) measures are communicated effectively to all employees to prevent occupational exposure to HIV. Thus, knowledge, attitude, and practices regarding PEP for HIV become imperative. The purpose was to determine healthcare providers' knowledge, attitude, and practices regarding measures to prevent occupational exposure to HIV in a regional hospital in the Vhembe District

Methods: The study employed the quantitative research approach. The study was a cross-sectional descriptive study. The self-administered questionnaire was used to collect the data from HCWs (n =103 participants. The Statistical Packaging for Social Science (SPSS) software was used to analyse the data. The data was analysed using descriptive and inferential statistics.

Findings: This study revealed that most of the participants (87%) agreed that they had been exposed to blood and body fluids from the patients. The study's findings indicated that the number of times the HCWs are exposed to HIV was linked to their years of work experience. The more years of work experience, the more times reported having been exposed to blood and body fluids from patients. Most of the participants indicated a remarkable knowledge regarding PEP for HIV, with 99% indicating that they are aware of PEP and 94% reporting that they are aware of PEP guidelines at the hospital. Despite the remarkable reports of being aware of PEP for HIV, the actual practices of measures to protect against occupational exposure to HIV were poor.

Conclusion: The major findings of this study revealed that knowledge, attitude, and practices to prevent occupational exposure to HIV among HCWs is partially understood. Despite the general indication of many participants that they are aware of measures to prevent occupational exposure to HIV, the actual practices of these measures, especially on PEP for HIV, are still limited. Training programmes regarding PEP for HIV are strongly recommended.

Keywords: Attitude**,** Healthcare providers, HIV, Knowledge, Occupational exposure, Practices.

INTRODUCTION

Occupational exposure to HIV is a significant concern for healthcare workers worldwide. It occurs when healthcare providers are infected with HIV through needle sticks, skin cuts, or exposure to bodily fluids while working with HIV-positive patients (WHO, 2016). In sub-Saharan Africa, healthcare workers are at particular risk as HIV and AIDS are severe problems that cost the lives of many individuals (Eticha & Gemeda, 2019).

To prevent occupational exposure to HIV, the World Health Organization (WHO) and the South African National Department of Health (SANDoH) have provided universal precautions (UPs) as guidelines for all healthcare workers (WHO, 2016). These guidelines mandate that all healthcare workers use available protection and treatment, including HIV Post-Exposure prophylaxis (PEP) services if they accidentally come into contact with blood and body fluids (Rasweswe & Peu, 2020).

Despite these protective measures, healthcare workers face potential exposure to blood-borne diseases like HIV when dealing with patients with chronic diseases like HIV (Gul, Ak, & Guneri, 2017). This highlights the importance of individual practices, attitudes, and knowledge regarding measures to prevent HIV exposure among healthcare workers, especially in countries like South Africa, where healthcare facilities face many challenges from the HIV and AIDS pandemic (United Nations AIDS Special Analysis, 2016).

In South Africa, the lack of knowledge and practices to protect healthcare workers from blood-borne diseases is a significant concern in low-resource settings (Nwankwo et al., 2020). Kabotho and Chivese (2020) suggest that this deficiency may result from inadequate training and exposure to appropriate post-exposure prophylaxis (PEP) information. Similarly, Aminde et al. (2015) found that 73.7% of respondents in Cameroon had poor knowledge about HIV PEP, while Serwaa (2018) reported that 21.3% of nurses in Ghana did not know about the availability of PEP services in their facility.

Moreover, the stigmatization of People Living with HIV (PLWH) in healthcare settings is a pervasive problem that affects the relationship between healthcare providers (HCPs) and PLWH (Okoli et al., 2020). This stigmatization has been linked to reduced patient satisfaction, psychological distress, low self-esteem, and feeling undeserving of care among PLWH (Eaton et al., 2020).

Overall, there is a lack of understanding regarding the knowledge and practices of measures to prevent occupational exposure among healthcare professionals in Southern Africa, Africa, and globally. This study aims to address this gap by determining healthcare providers' knowledge, attitude, and practices regarding measures to prevent occupational exposure to HIV in a regional hospital in the Vhembe District. By doing so, we hope to contribute to the body of knowledge that informs policies and interventions that can effectively protect healthcare workers and improve the quality of care for PLWH.

RESEARCH METHODS AND DESIGN

This research project used a quantitative research methodology suitable for generating a statistical and numerical data analysis. This approach enabled the researchers to understand healthcare workers' knowledge, attitudes, and practices in preventing occupational exposure to HIV.

Study design

The research methodology used in this study was a quantitative cross-sectional descriptive design. This design was chosen to collect data on the knowledge, attitudes, and practices of healthcare workers (HCWs) regarding measures to prevent occupational exposure to HIV at the Regional Hospital in the Vhembe district. The study participants were approached in their working environment to gather the necessary information.

Study area

The study was conducted at the Regional Hospital in the Vhembe district of Limpopo province in South Africa. Limpopo province comprises five districts, namely Vhembe, Capricorn, Letaba, Sekhukhune, and Waterberg, with Vhembe being one of them. In addition, Vhembe district is further divided into four municipalities, including Makhado, Musina, Thulamela, and Collins Chabane local municipality, with a rural geographical area and economic activities mainly centred on agriculture, tourism, mining, and informal trading. The population in the Vhembe district is mainly composed of the Venda and Tsonga ethnic groups, with a total population of 1,295 million, according to Statistics South Africa (Stats SA, 2011). The Vhembe district has one regional hospital, six district hospitals, one specialized psychiatric hospital, eight community healthcare centres, 120 fixed primary healthcare facilities, and 22 mobile clinics. The regional hospital was chosen for the study as it is the only one in the Vhembe district.

Study population and sampling strategy

The study sample consisted of 103 healthcare workers, including nurses, doctors, and lay counsellors, who work directly with HIV and AIDS patients. Of the sample, 82 were nurses, 16 were doctors, and 5 were lay counsellors.

Data collection

To gather data for the study, the researcher used a closed-ended questionnaire administered to the HCWs (n=103) who worked closely with HIV and AIDS patients. The researcher explained the questionnaire to the participants and provided clarification where necessary. Since all the participants understood English, the questionnaire was in that language. The researcher collected the completed

questionnaires immediately. Participants who could not complete the questionnaire were allowed to take it home and return it the following day. The researcher collected these questionnaires on the participants' next day of work.

Data analysis

The collected data were analyzed using the Statistical Package for Social Sciences (SPSS) version 25. To ensure data accuracy, the questionnaire responses were checked for completeness and errors before being entered into the software. Punch (2005) emphasized the importance of data cleaning before analysis to eliminate errors. Each questionnaire was entered into SPSS one at a time, and the data were checked for appropriateness and meaningfulness. The findings were presented using frequency tables, pie charts, and graphs. The SPSS cross-tabulation function examined relationships and correlations among the respondents' answers.

Ethical considerations

The study adhered to ethical guidelines throughout the research process. The participants were informed of the study's purpose before consenting to participate, and they were not forced to participate. Before data collection, permission to conduct the study was obtained from the University of Venda Higher Degrees Committee, the Department of Health Sciences, the Faculty Higher Degree Committee, and the Research Ethics Committee of the University of Venda. Ethical clearance was also obtained from the Limpopo Department of Health and the Vhembe District Department of Health. The study was registered with the National health research database, and permission was obtained from the provincial Department of Health. These ethical measures were necessary to ensure the integrity of the research process, protect confidentiality, and uphold the rights of both the participants and the researcher.

RESULTS

DEMOGRAPHIC CHARACTERISTICS OF PARTICIPANTS

The demographic data collected from the questionnaire for this study played a crucial role in presenting and discussing the findings related to other variables. However, the study experienced a low response rate of less than 50 per cent. The participants included both female (67%), males (32%), and a small percentage of other genders (1%). The work experience of the participants varied from less than a year to 16 years and above. The majority of the respondents were of African ethnicity. The questions on knowledge, attitudes, and practices following occupational exposure to HIV were essential in identifying gaps in ensuring the safety and protection of HCWs and the implications this may have on them. To analyze and present the data, descriptive data analysis using frequency distribution and cross-tabulation of some variables was used to identify the relationship between the selected variables. The data was analyzed in percentages and frequencies and presented using tables, bar graphs, and pie charts

to provide detailed patterns on the selected respondents' knowledge, attitudes, and practices on measures to prevent occupational exposure. Table 1 provides a demographic distribution of the participants involved in the study.

Table 1: Demographic information of respondents

Table 1. Demographic Characteristics of participants						
		Profession			Inferential staticits	
		Doctor	Nurse	Lay counsellor	Pearson chi-square X^2	P=value
Age	18-25	0(0.0%)	7(8.5%)	0 (0.0%)	**17.570**	0.25
	26-35	8(50.0%)	12(14.6%)	1(20.0%)		
	36-45	5(31.3%)	36(43.9%)	2(40.0%)		
	46-55	2(12.5%)	20(24.4%)	0(0.0%)		
	56-65	1(6.3%)	7(8.5%)	2(40.0%)		
Ward	Casuality	3(18.8%)	4(4.9%)	0(0.0%)	15.214	0.509
	PSW	5(31.3%)	20(24.4%)	1(20.0%)		
	MMW	5(31.3%)	28(34.1%)	3(60.0%)		
	Paeds	0(0.0%)	7(8.5%)	0(0.0%)		
	ICU	0(0.0%)	7(8.5%)	1(20.0%)		
	Labour	1(6.3%)	10(12.2%)	0(0.0%)		
	OPD	2(12.5%)	2(2.4%)	0(0.0%)		
	ANC	0(0.0%)	1(1.2%)	0(0.0%)		
	Post Natal	0(0.0%)	3(3.7%)	0(0.0%)		
Gender	Male	8(50.0%)	24(29.3%)	1(20.0%)	9.059	.060
	Female	7(43.8%)	58(70.7%)	4(80.0%)		
	Other	1(6.3%)	0(0.0%)	0(0.0%)		
Marital status	Single	8(50.0%)	25(30.5%)	4(80.0%)	7.610[a] .268	
	Married	8(50.0%)	50(61.0%)	1 (20.0%)		
	Divorced/ separated	0(0.0%)	1(1.2%)	0 (0.0%)		
	Widowed	0(0.0%)	6 (7.3%)	0(0.0%)		
Education level	Bachelor/Medical degree	13(81.3%)	38(46.3%)	0(0.0%)	**14.496[a] .012**	
	Diploma	2(12.5%)	40(48.8%)	5(100.0%)		
	Masters degree/specialist	1(6.3%)	2(2.4%)	0(0.0%)		
	Postgraduate diploma	0(0.0%)	2(2.4%)	0(0.0%)		
Work experience	0-1 years	3(18.8%)	4(4.9%)	0(0.0%)	**10.040[a] .028**	
	2-5 years	3(18.8%)	10(12.2%)	0(0.0%)		
	6-10 years	3(18.8%)	18(22.0%)	0 (0.0%)		
	11-15 years	2(12.5%)	27(32.9%)	2(40.0%)		
	16 years & above	5(31.3%)	23(28.0%)	3(60.0%)		
Ever been exposed to HIV?	Yes	13(81.2%)	73(89.0%)	5(100.0)	**7.141[a] .034**	
	No	3(18.8%)	9(11.0%)	0(0.0%)		
How often?	Once	7(43.8%)	20(24.4%)	2(40.0%)	5.886[a] .413	
	Twice	3(18.8%)	19(23.2%)	1(20.0%)		
	3-4 times	4(25.0%)	18(22.0%)	2(40.0%)		
	> 5 times	2(12.5%)	25(30.5%)	0(0.0%)		

Knowledge of measures to prevent occupational exposure to HIV

According to the study's results, almost all participants (99%), comprising doctors (n=16), nurses (n=82), and lay counsellors (n=4), were aware of Post-Exposure Prophylaxis (PEP). While 100% of doctors, 98.8% of nurses, and 80% of lay counsellors knew about PEP, simply knowing about it is not enough. Understanding how PEP is used to prevent occupational exposure and actual practice is more important. The study found that most participants (65%) believed the maximum delay in taking PEP is 24 hours. The maximum possible knowledge score was 9, and participants' scores ranged from 1 to 9, with a mean of 6.60 (SD 1.40).

Table 2. Knowledge of Measures to Prevent Occupational Exposure to HIV

		Doctor	Nurse	Lay counsellor	X^2	P=value
Are you aware of PEP?	Yes	16(100.0%)	82(100.0%)	4(80.0%)	19.792[a]	
	No	0(0.0%)	0(0.0%)	1(20.0%)	.012	
Do you know the meaning of PEP?	Yes	16(100.0%)	81(98.8%)	4(80.0%)	9.105[a]	
	No	0(0.0%)	1(1.2%)	1(20.0%)	.049	
Are you aware of the availability of PEP guidelines in this hospital?	Yes	14(87.5%)	79(96.3%)	4(80.0%)	3.832[a]	
	No	2(12.5%)	3(3.7%)	1(20.0%)	.732	
When the source patient is at high risk for HIV	Yes	16(100.0%)	62(75.6%)	4(80.0%)	4.907[a]	
	No	0(0.0%)	20(24.4%)	1(20.0%)	.072	
When the source patient is known to be HIV positive	Yes	15(93.8%)	65(79.3%)	4(80.0%)	1.969[a]	
	No	1(6.3%)	17(20.7%)	1(20.0%)	.539	
When the HIV status of the source is unknown	Yes	16(100.0%)	65(79.3%)	4(80.0%)	4.013[a]	
	No	0(0.0%)	17(20.7%)	1(20.0%)	.085	
For any needle stick injury in the workplace	Yes	5(31.3%)	46(56.1%)	3(60.0%)	3.435[a]	
	No	11(68.8%)	36(43.9%)	2(40.0%)	.092	
Maximum delay to take PEP	12 hrs	1(6.3%)	17(20.7%)	0(0.0%)	3.060[a]	
	24 hrs	15(93.8%)	65(79.3%)	5(100.0%)	.587	
Preferable time to start PEP	Within an hour	0(0.0%)	9(11.0%)	0(0.0%)		2.526[a] .447
	After 6 hours	100.0%	73(89.0%)	5(100.0%)		
Duration of ART intake for PEP	For 28 days	0(0.0%)	5(6.1%)	0(0.0%)		1.346[a] .579
	For 40 days	16(100.0%)	77(93.9%)	5(100.0%)		
Do you know about PEP guideline	Yes	15(93.8%)	48(58.5%)	4(80.0%)		7.818[a] .072
	No	1(6.3%)	34(41.5%)	1(20.0%)		
Descriptive Statistics of Knowledge regarding PEP among HCWs						
	N	Min	Max	Mean		Std. Deviation
Total Knowledge Score	103	1.00	9.00	6.6019		1.40266

Attitudes towards preventing occupational exposure to HIV

The study results demonstrated that most participants had a positive attitude towards the importance of PEP in preventing occupational exposure to HIV. Expressly, 93.8% of the doctors, 79.3% of nurses, and 100% of lay counsellors agreed that PEP is crucial in preventing HIV transmission in the workplace.

Regarding the use of gloves when handling body fluids, nearly all participants disagreed with the notion that gloves are unnecessary, with 96.3% of nurses being the most opposed to this idea. As shown on the table below the highest possible knowledge score was 9. The total knowledge score obtained by all the participants ranged from 1 to 6, with a mean of 5.05 (SD 1.09).

Table 3. Attitude towards prevention of occupational exposure to HIV

		Doctor	Nurse	Lay counsellor	
I think PEP is important	Agree	15(93.8%)	65(79.3%)	5(100.0%)	3.060[a]
	Disagree	1(6.3%)	17(20.7%)	0(0.0%)	.587
PEP training is important for behavioural change	Agree	0(0.0%)	15(18.3%)	0(0.0%)	4.496[a]
	Disagree	16(100.0%	67(81.7%)	5(100.0%)	.310
PEP guidelines should be available in the work area	Agree	0(0.0%)	2(2.4%)	0(0.0%)	.522[a]
	Disagree	16(100.0%)	80(97.6%)	5(100.0%)	.729
Gloves are not necessary when handling body fluids	Agree	0(0.0%)	3(3.7%)	0(0.0%)	.791[a]
	Disagree	16(100.0%)	79(96.3%)	5(100.0%)	.670
PEP can reduce the likelihood of becoming HIV positive	Agree	15(93.8%)	47(57.3%)	5(100.0%)	10.640[a]
	Disagree	1(6.3%)	35(42.7%)	0(0.0%)	.182
PEP prevents further infection	Agree	0(0.0%)	7(8.5%)	0(0.0%)	1.923[a]
	Disagree	16(100.0%)	75(91.5%)	5(100.0%)	.866
PEP should be indicated for any type of sharp injuries	Agree	1(6.3%)	5(6.1%)	0(0.0%)	.326[a]
	Disagree	15(93.8%)	77(93.9%)	5(100.0%)	.732
PEP is not important if the exposure is not with the blood of a patient with known HIV positive	Agree	1(6.3%)	31(37.8%)	0(0.0%)	8.593[a]
	Disagree	15(93.8%)	51(62.2%)	5(100.0%)	.243
PEP is effective for HIV prevention	Agree	15(93.8%)	58(70.7%)	4(80.0%)	3.835[a]
	Disagree	1(6.3%)	24(29.3%)	1(20.0%)	.153

Descriptive Statistics of attitude towards PEP among HCWs

	N	Min	Max	Mean	Std. Deviation
Total Attitude Score	103	1.00	6.00	5.0485	1.09704

Practices on presentation of occupational exposure to HIV

As indicated on table 4 below the study found that most HCWs (94-100%) understand the risk of occupational exposure to HIV, and they reported receiving support from other HCWs after exposure. However, despite their understanding of the risk, some HCWs did not receive PEP after exposure. The

study also revealed negligence among the participants in protecting themselves from occupational exposure, with only 7% reporting wearing gloves when taking blood samples from patients. The results showed that 93.8% of doctors, 97.6% of nurses, and 100% of lay counsellors supported HIV-exposed individuals. However, 50% of doctors, 85.4% of nurses, and 60% of lay counsellors did not receive PEP after exposure. Most HCWs (87.5% of doctors, 89.0% of nurses, and 100% of lay counsellors) had experienced exposure through injury by a sharp object. Only a small percentage of participants (12.5% of doctors, 14.6% of nurses, and 0% of lay counsellors) agreed that PEP should be initiated within an hour after exposure. Moreover, only 15% of the participants reported consistently using personal protective equipment when treating patients, which is a critical issue.

Table 4 : The practice of PEP for HIV among HCW

		Doctor	Nurse	Lay counsellor
Occupational exposure to HIV is a risky condition	Yes	15(93.8%)	82(100.0%)	5(100.0%)
	No	1(6.3%)	0(0.0%)	0(0.0%)
Occupational exposure should be reported to the program coordinator	Yes	16(100.0%)	60(73.2%)	5 (100.0%)
	No	0(0.0%)	22(26.8%)	0(0.0%)
The reaction of HCWs towards HIV exposed individuals				
Supportive	Yes	15(93.8%)	80(97.6%)	5(100.0%)
Maintain confidentiality?	Yes	16(100.0%)	74(90.2%)	5(100.0%)
Did not show concern about my accidental exposure?	Yes	2(12.5%)	19(23.2%)	0(0.0%)
PEP after exposure				
Received	Yes	8(50.0%)	12(14.6%)	2(40.0%)
	No	8(50.0%)	70(85.4%)	3(60.0%)
Reasons for not receiving PEP				
Source of Exposure to Blood from				
Unknown HIV positive patients	Yes	16(100.0%)	75(91.5%)	5(100.0%)
A patient whose HIV status is unknown	Yes	16(100.0%)	73(89.0%)	5(100.0%)
Injury from any sharp object	Yes	14 (87.5%)	73 (89.0%)	5 (100.0%)
Time to initiate PEP after exposure -				
within 1 hour	Yes	2 (12.5%)	12 (14.6%)	0 (0.0%)
After 2-6 hours	Yes	12 (75.0%)	68 (82.9%)	5 (100.0%)
After 6-10 hours	Yes	2 (12.5%)	15 (18.3%)	0 (0.0%)
Duration of PEP -				
For 3 days	Yes	14 (87.5%)	78(95.1%)	5(100.0%)
For 15 days	Yes	1(6.3%)	6(7.3%)	0(0.0%)
For 28 days	Yes	16(100.0%)	76(92.7%)	5(100.0%)

Completed the prescribed ART for PEP	Yes	16 (100.0%)	78(95.1%)	5(100.0%)
Reason for discontinuation of the ART for PEP				
Fear of adverse effects	Yes	2(12.5%)	25(30.5%)	0(0.0%)
Assuming that it was enough	Yes	16(100.0%)	69(84.1%)	5(100.0%)
Assuming that the drug was not effective	Yes	0(0.0%)	7(8.5%)	0(0.0%)
Safety measures				
Do you always use personal protective equipment when anticipating contact with patient blood and body fluid?	Yes	0(0.0%)	1(1.2%)	0(0.0%)
	No	16(100.0%)	81(98.8%)	5(100.0%)
Do you always dispose of needles and sharp objects into dedicated biohazard bins?	Yes	1 (6.3%)	1 (1.2%)	0 (0.0%)
	No	15 (93.8%)	81 (98.8%)	5 (100.0%)
Do you always use personal protective equipment when treating patients?	Yes	0 (0.0%)	15 (18.3%)	0 (0.0%)
	No	16 (100.0%)	67 (81.7%)	5 (100.0%)
The last time you took a blood sample, did you wear gloves?	Yes	0 (0.0%)	7 (8.5%)	0 (0.0%)
	No	16 (100.0%)	75 (91.5%)	5 (100.0%)

Descriptive Statistics of practices of HCWs towards PEP

	N	Min	Max	Mean	Std. Deviation
Total Practice Score	103	10.00	16.00	13.4757	1.27452

Discussion

Knowledge towards preventing occupational exposure to HIV

The current study found that the participants had a high level of knowledge regarding the risk of occupational exposure to HIV. This is consistent with the study conducted by Mashoto, Mubyazi, and Mushi (2015), which showed that inadequate knowledge of risk and preventive measures for blood-borne pathogens contributes to needle stick and sharps injuries. National guidelines have been developed to protect healthcare workers and patients from occupational infections. However, research on the knowledge of occupational HIV transmission among healthcare workers in Sub-Saharan Africa is still limited. A study conducted in Asia by Mossburg et al. (2019) found that clinicians and nurses typically receive training on infection prevention and control and personal protective equipment, which may explain why nurses were found to have more comprehensive knowledge than non-clinical staff in the present study. While the current study found good knowledge among participants, some studies contradict these findings. For instance, Tshering, Wangchuk, and Letho (2020) found that poor knowledge of PEP against HIV was prevalent among healthcare workers in Cameroon and Nepal. This

could be attributed to demographic characteristics such as qualification, years of experience, and formal training attended. A study conducted in Iran found that only half of nursing and midwifery students had a good awareness of HIV PEP (Anteneh et al., 2019), indicating an information gap in healthcare settings regarding HIV PEP..

Attitudes towards preventing occupational exposure to HIV

The present study found that healthcare workers (HCWs) had a positive attitude towards measures to prevent exposure to HIV in the workplace. The study revealed that HCWs were willing to participate in occupational health and safety practices that would prevent exposure to HIV at work. A study by Yadzir, Ramly, and Suleiman (2021) similarly attested to the crucial importance of post-exposure prophylaxis (PEP) for preventing HIV infection, although completion issues still need to be addressed. Previous studies conducted in different countries have highlighted the importance of formal training on PEP for HIV and awareness of its availability. The low uptake of PEP among the study participants and their communities could be attributed to the low incidence of exposure to HIV. Other studies have revealed mostly favourable attitudes towards PEP and its use, such as the study by Monera and Ncube (2014), which found that HCWs had positive attitudes towards people living with HIV (PLHIV) despite their fears of contracting the virus. These findings are supported by studies conducted by Boakye et al. (2015) and Ledda et al. (2016), which suggest that although HCWs fear contracting HIV, their consciences and integrity allow them to display positive attitudes towards PLHIV. However, the study also found that some participants believed that certain key population groups, such as sex workers and youths, were responsible for spreading HIV.

Practices towards preventing occupational exposure to HIV

The study revealed that the healthcare workers were willing to practice health initiatives to avoid health hazards, such as wearing personal protective equipment, consistent with similar studies. However, the availability of isolation glass in patient vehicles was not well adhered to, although using public transport independently was associated with a high risk of contracting active HIV. These findings contrasted with a study by Lui et al. (2014), which found that almost half of medical and nursing students were willing

to buy food from HIV-positive people. Moreover, the findings were lower than those of Acharya et al. (2015), who discovered that healthcare professionals washed their hands frequently and wore gloves. In addition, a study conducted in Gujarat showed that their respondents had better practice than our study participants. These findings suggest that the practice of PEP for HIV in the study area needs improvement. A study in Ghana found that nurses put on gowns and gloves with any contact with PLHIV out of fear of contracting HIV during clinical practice, similar to the study's findings mentioned earlier.

A study of European medical students found that few students did not report needle stick injuries, and only 18% of London doctors sought advice regarding PEP despite over three-quarters of doctors reporting an occupational injury. The reason for the discontinuation of PEP was fear of adverse effects among the respondents. This finding agreed with another study conducted in Dar es Salaam, Tanzania, which showed that many respondents failed to use PEP for the prescribed time. However, studies conducted in Ethiopia and Gujarat, India, showed that their respondents had better practice than our study participants (Hakre et al., 2016). This finding reinforces the belief that the practice of PEP for HIV/HBV in the study area needs improvement.

Recommendations for future studies

The study recommends that future research employ a mixed-methods approach to reveal underlying perceptions regarding PEP. The researcher suggests expanding and explaining answers to understand the phenomenon and why participants answered the way they did. Future research should investigate attitudes and practices towards PEP among HCWs nationally, including different contexts from different geographical locations such as urban and rural areas. Additionally, a comparative study between public and private healthcare institutions could reveal significant patterns and lessons that could be learned.

Limitations of the study

The study had limitations regarding sample size, social and economic aspects of PEP, demographic patterns, and gender parity. Although the findings represent PEP among selected HCWs, further research with larger sample sizes and more diverse populations is needed to draw national-level policy recommendations. Additionally, social and economic aspects need to be considered, and future studies should aim for gender parity in data collection.

CONCLUSION

This study concludes that enhancing knowledge, attitudes, and practices regarding PEP among HCWs is a complex phenomenon that requires engagement from different contexts using mixed methods approaches. The lack of knowledge regarding PEP is a significant constraint towards implementing and using PEP among most HCWs. The findings strongly recommend that adherence to the universal precautions guidelines is substantial for preventing accidental exposure to blood and body fluids among HCWs. Appropriate management of exposed individuals and ART intake for PEP is essential. The study highlights the need for effective supporting structures, programs, and training focused on enhancing the knowledge regarding PEP among HCWs, which should focus on the individual rather than the group.

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Competing interests

There were no competing interests, such as financial or personal interests, that might have influenced the authors to conduct this study.

Authors' contribution

All the authors indicated in this study made full and equal contributions to the conceptualisation of this study.

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Data availability

The data supporting the findings of this research is available from the corresponding author of the study, Nemadandilana N. A., on reasonable request.

Disclaimer

This study's authors want to clarify that the opinions and views expressed in the study are solely their own, based on the findings they gathered, and do not necessarily represent the official policy or position of any affiliated agency they are associated with. These views do not undermine the current practice of the affiliated respondents in this study. Still, they represent the current trends in the knowledge, attitudes, and practices of the HCWs regarding occupational exposures to HIV.

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SECTION 3

STUDY CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

3.1 INTRODUCTION

This section summarises the study's findings and their implications on the knowledge, attitudes, and practices of PEP among HCWs, and how it affects their safety and occupational exposure to HIV. The chapter also discusses how the findings relate to previous studies and provides recommendations based on the study's conclusions. The conclusions and recommendations are solely based on the study's results, and limitations and recommendations for future studies are also identified.

3.2 CONCLUSIONS OF MANUSCRIPTS

Manuscript 1: Examining healthcare providers' knowledge, attitude, and practices regarding measures to prevent occupational exposure to HIV district: A systematic review- Conclusion

The literature highlights the importance of healthcare providers' knowledge, positive attitudes, and good practices in preventing occupational exposure to HIV. However, a mismatch between knowledge and practices leads to poor implementation of measures. Negative attitudes and work overload are some of the challenges linked to occupational exposure. Despite research efforts, more practical approaches are needed to improve knowledge, attitudes, and practices towards preventing occupational exposure to HIV. Accessible PEP, infrastructure, resources, communication, and training are critical for healthcare professionals. However, positively influencing attitudes towards proper practices remains a challenge that requires more strategies. While the literature provides insights into occupational exposure among healthcare providers, further improvements and practical efforts are needed.

Manuscript 2: Knowledge, attitude, and practices of health care providers concerning measures to prevent occupational exposure to HIV district: A cross-sectional study- Conclusion

This study concludes that enhancing knowledge, attitudes, and practices regarding PEP among HCWs is a complex phenomenon that requires engagement from different contexts using mixed methods approaches. The lack of knowledge regarding PEP is a significant constraint towards implementing and using PEP among most HCWs. The findings strongly recommend

that adherence to the universal precautions guidelines is substantial for preventing accidental exposure to blood and body fluids among HCWs. Appropriate management of exposed individuals and ART intake for PEP is essential. The study highlights the need for effective supporting structures, programs, and training focused on enhancing the knowledge regarding PEP among HCWs, which should focus on the individual rather than the group.

3.3. GENERAL DISCUSSIONS

In summary, the study results suggest that the participants have some awareness of PEP as a means of protecting themselves from occupational exposure to patient blood and fluids. However, the study also found limited knowledge about accessing and using PEP correctly to ensure their safety. The patterns of responses from the participants in the questionnaire used in this study support this conclusion. This study's findings are in line with previous research indicating that there is limited knowledge about PEP among HCWs. The study found that many HCWs demonstrated a lack of knowledge regarding PEP, which negatively impacts their attitudes and practices towards PEP. This lack of knowledge also highlights the prevalence of occupational exposure and the factors associated with it.

3.3.1 Achievement of the research objectives

The study achieved its set objectives of assessing the knowledge, attitudes, and practices of selected HCWs regarding measures to prevent occupational exposure to HIV. The findings showed that there is limited knowledge among the participants about the taking and adherence to PEP, which has negative implications on the attitudes and practices towards PEP. Despite the overwhelming reports on knowledge regarding PEP, the actual practices of PEP after experiencing occupational exposure are still very low. The study also found that the practices are extensively low regarding preventing potential occupational exposure to HIV among HCWs. The attitudes of HCWs towards PEP were positive, but they did not perceive the importance of having PEP guidelines in the work environment. The study recommends strategies to improve the practices of PEP for HIV among HCWs and calls for action to intervene and improve the practices to protect efforts from occupational exposure among HCWs.

3.3.2 Implications of the lack of knowledge and recommendation for redress

This study emphasizes the significance of PEP in preventing HIV transmission among healthcare workers (HCWs) but points out a deficiency of knowledge and comprehension about PEP among the participants. Although almost all participants (98%) knew what PEP was, only 52% knew of the maximum time delay to take PEP after exposure to HIV. This lack of knowledge could negatively impact the adoption and use of PEP among HCWs. The study recommends training programs to increase knowledge and awareness of PEP and strengthen access to guidelines and the supply chain of PEP to protect HCWs at high risk of exposure to HIV.

3.3.3 Implications of attitudes regarding PEP among HCWs and recommendations for redress

The study aimed to investigate attitudes towards PEP among HCWs. The findings revealed that most participants (82.5%) had positive attitudes towards PEP and acknowledged the availability of PEP guidelines in the workplace. However, the study also found that HCWs were generally reluctant to take PEP despite their awareness of its benefits. The study recommends that programs to enhance positive attitudes towards PEP should focus on the individual and address potential barriers to initiating ART for PEP, such as negative perceptions, beliefs, and social-related issues. The study also emphasized the importance of knowledge regarding PEP, such as the maximum delay to initiate PEP and the duration for taking ART for PEP. It recommended compulsory programs and training from the national to local levels to ensure HCWs are educated about PEP.

3.3.4 Implications of practices on PEP among HCWs and recommendation

Almost all participants (99%) in this study recognize that occupational exposure to HIV is risky, and 79% believe that accidental exposure should be reported to the program coordinator. However, the lack of knowledge, attitude, or accessibility of PEP may hinder HCWs from taking PEP, as indicated by the low proportion (21%) of participants who reported receiving PEP after experiencing occupational exposure to HIV. Therefore, the study suggests that hospital management should organize training programs to foster positive attitudes towards PEP and address knowledge gaps.

The study also found that HCWs need to be educated on the recommended time frame for initiating PEP. For example, 83% of the participants believed that PEP should only be initiated within 2-6 hours after exposure suggesting that they may assume that PEP is ineffective after 6 hours. To address this issue, hospitals could provide easy access to guidelines and knowledge regarding PEP and assess factors influencing positive PEP practices among HCWs.

3.4 STRENGTHS AND LIMITATIONS

While this study successfully achieved its objectives, some limitations were identified during the research process. Firstly, the sample size used in the study was limited and may not be representative of the entire population, which could impact the ability to generalize the findings at the national or provincial levels. However, the study's results are still relevant to provide insights into PEP practices among the selected HCWs. Secondly, the study's questions did not fully address social and economic factors that may influence the adoption and use of PEP, such as individual beliefs and the availability of resources in the working environment. Thirdly, the study's participants were exclusively black HCWs, which may limit the generalizability of the findings to a more diverse population. Future studies may consider including participants of different races and ensuring gender parity to ensure a more balanced population representation.

3.5 CONCLUSION

This study emphasizes the complexity of enhancing knowledge, attitudes, and practices regarding PEP among HCWs. It suggests that a mixed methods approach is needed to understand the phenomenon from different contexts. Training and knowledge-enhancing programs are essential in shaping positive attitudes and practices regarding PEP among HCWs. Compliance and adherence to PEP use are becoming increasingly crucial for HCWs. However, the lack of knowledge regarding PEP is a significant constraint to its implementation and use. Despite technological innovations that can improve HCWs' safety from accidental exposure to HIV, the lack of knowledge affects attitudes and practices regarding PEP. The study recommends that effective supporting structures, programs, and training focusing on the individual should be implemented to enhance understanding regarding PEP among

HCWs. Adherence to universal precautions guidelines is necessary to prevent accidental blood and body fluids exposure among HCWs. The study suggests that differences in awareness levels among different population groups, demographic conditions, contextual timeframes, education, and experiences may account for variations in findings from previous studies.

3.6 RECOMMENDATIONS

This study accomplished its objectives, but the researcher suggests that future research should use a mixed-methods approach to explore the underlying perceptions regarding PEP further. For instance, questions that elicit "yes" or "no" responses must be expanded and explained to understand participants' attitudes towards PEP better. The researcher believes that investigating the knowledge, attitudes, and practices towards PEP among HCWs on a national level, including diverse geographical locations, would provide a fuller picture of the experiences regarding PEP in South Africa. A comparative study between public and private healthcare institutions could reveal significant patterns and insights.

3.7 SUMMARY

In the first section of this study, the background and purpose of the research were outlined. The study aimed to explore healthcare providers' knowledge, attitudes, and practices towards measures for preventing occupational exposure to HIV at a regional hospital in the Vhembe district. The research methodology was described in detail, including the research paradigm, design, sampling, data collection methods, and data analysis. A quantitative approach was used, utilizing a questionnaire. Section two included two manuscripts that were published in accredited journals. Finally, section three presented the study's findings, conclusions, and recommendations, which were based solely on the data collected from this study. The recommendations for future research on knowledge, attitudes, and practices regarding PEP among HCWs were also derived from the findings of this study.

ANNEXURES

ANNEXURE A : ETHICAL CLEARANCE

ETHICS APPROVAL CERTIFICATE

RESEARCH AND INNOVATION
OFFICE OF THE DIRECTOR

NAME OF RESEARCHER/INVESTIGATOR:
Ms NA Nemadandila

STUDENT NO:
15000040

PROJECT TITLE: **Knowledge, attitude and practices of health care providers regarding measures to prevent occupational exposure to HIV in a regional hospital in Vhembe district.**

PROJECT NO: SHS/21/PH/13/1309

SUPERVISORS/ CO-RESEARCHERS/ CO-INVESTIGATORS

NAME	INSTITUTION & DEPARTMENT	ROLE
Prof L Makhado	University of Venda	Supervisor
Dr NS Mashau	University of Venda	Co - Supervisor
Ms NA Nemadandila	University of Venda	Investigator – Student

Type: Masters Research
Risk: Minimal risk to humans, animals or environment (Category 2)
Approval Period: September 2021 – September 2023

The Human and Clinical Trails Research Ethics Committee (HCTREC) hereby approves your project as indicated above.

General Conditions
While this ethics approval is subject to all declarations, undertakings and agreements incorporated and signed in the application form, please note the following.

- The project leader (principal investigator) must report in the prescribed format to the REC:
  - Annually (or as otherwise requested) on the progress of the project, and upon completion of the project
  - Within 48hrs in case of any adverse event (or any matter that interrupts sound ethical principles) during the course of the project.
  - Annually a number of projects may be randomly selected for an external audit.
- The approval applies strictly to the protocol as stipulated in the application form. Would any changes to the protocol be deemed necessary during the course of the project, the project leader must apply for approval of these changes at the REC. Would there be deviated from the project protocol without the necessary approval of such changes, the ethics approval is immediately and automatically forfeited.
- The date of approval indicates the first date that the project may be started. Would the project have to continue after the expiry date; a new application must be made to the REC and new approval received before or on the expiry date.
- In the interest of ethical responsibility, the REC retains the right to:
  - Request access to any information or data at any time during the course or after completion of the project.
  - To ask further questions; Seek additional information; Require further modification or monitor the conduct of your research or the informed consent process.
  - withdraw or postpone approval if:
  - Any unethical principles or practices of the project are revealed or suspected.
  - It becomes apparent that any relevant information was withheld from the REC or that information has been false or misrepresented.
  - The required annual report and reporting of adverse events was not done timely and accurately.
  - New institutional rules, national legislation or international conventions deem it necessary

ISSUED BY:
UNIVERSITY OF VENDA, RESEARCH ETHICS COMMITTEE
Date Considered: August 2021

Name of the HCTREC Chairperson of the Committee: Prof Pascal Bessong

Signature

UNIVERSITY OF VENDA
OFFICE OF THE DIRECTOR
RESEARCH AND INNOVATION
2021 -09- 13
Private Bag X5050
Thohoyandou 0950

ANNEXURE B : APPROVAL LETTER FROM PROVINCIAL DEPARTMENT OF HEALTH

LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
HEALTH

Ref : S4/1/5/1/4
Enq : Dr Ramovha M R
Tell. : 0159621001
Date : 11/01/2022

To : Nemadandila Ndumeliso Annikie

SUBJECT: PERMISSION TO COLLECT DATA AT REGIONAL HOSPITAL IN VHEMBE DISTRICT (TSHILIDZINI)

1. The above matters refer.

2. The Department of Health Vhembe District acknowledges the receipt of your communique regarding request for the permission to collect data at a regional hospital in Vhembe District which is Tshilidzini Hospital.

3. Kindly be informed that you are authorized to gain access and conduct your studies at the facility. You are therefore expected to comply with the rules and regulations that govern public institutions.

4. Be informed that the Department of Health is not liable for any harm or injuries that may occur whilst you are in the facility.

5. Hoping that you will find this in order.

CHIEF DIRECTOR 11/01/2022 **DATE**

Private Bag X5009 THOHOYANDOU 0950
Old Parliamentary Building Tel: (015) 962 1848, (015) 962 1852, (015)962 1001/2/3/4/5/6
Fax (015) 962 2373/ (015)9622274/ 462

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ANNEXURE C: RESEARCH QUESTIONNAIRE

Self-administered questionnaire. (knowledge, attitude and practices of health care providers regarding measures to prevent occupational exposure to HIV in a selected regional hospital in Vhembe district.)

Questionnaire no:…….Ward:…… Date:…….

SECTION A: DEMOGRAPHIC INFORMATION

Write or circle the number that represents your response to the statements or questions and fill in the provided spaces.

Age: _____ years

Gender:

1. Male [ ]
2. Female [ ]
3. Other……

Marital status

1. Single [ ]
2. Married [ ]
3. Divorced/separated [ ]
4. Widowed [ ]

Profession

1. Doctor [ ]
2. Nurse [ ]
3. Lay counsellor [ ]

Educational level

1. Bachelor degree/ Medical degree [ ]
2. Diploma [ ]
3. Masters degree or Specialist [ ]

4. Postgraduate Diploma [ ]

Work experience (in years) _____ **years**

Have you ever been exposed to HIV?

1. Yes [ ]
2. No [ ]

How often did you find yourself in a situation where you thought or knew you we exposed?

1. Once [ ]
2. Twice [ ]
3. 3-4 times [ ]
4. 5 and more times [ ]

Section B: Knowledge of measures to prevent occupational exposure to HIV

Knowledge question	**Yes**	**No**
Are you aware of PEP		
Do you know the meaning of PEP		
Are you aware of the availability of PEP guideline in this hospital		
Are the following indications for PEP		
When the source patient is at high risk for HIV		
When the source patient is known to be HIV positive		
When the HIV status of the source is unknown		
For any needle stick injury in the workplace		
The maximum delay to take PEP		
12 hours		
24 hours		
48 hours		
72 hours		
The preferable time to start PEP		

Within an hour		
After 6hours		
After 12hours		
After 72hour		
Duration of ART intake for PEP		
For 28 days		
For 40 days		
For six months		
For lifetime		
Know about the PEP guideline		

SECTION C

SECTION C: ATTITUDE TOWARDS PREVENTION OF OCCUPATIONAL EXPOSURE TO HIV

Tick only one (1) response per a statement by putting an X in the box of your chosen response

1=Agree, 2= Disagree

The attitude of HCWs about PEP	**Agree**	**Disagree**
I think PEP is important		
PEP training is important for behavioural change		
PEP guidelines should be available in the work area		
Gloves are not necessary when handling body fluids		
PEP can reduce the likelihood of becoming HIV positive		
PEP prevents further infection		
PEP should be indicated for any type of sharp injuries		
PEP is not important if the exposure is not with the blood of a patient with known HIV positive		
PEP is effective for HIV prevention		

SECTION D: PRACTICES ON PRESENTATION OF OCCUPATIONAL EXPOSURE TO HIV

The practice of PEP for HIV among HCW	**Yes**	**No**
Occupational exposure to HIV is a risky condition		
Occupational exposure should be reported to the program Coordinator		
The reaction of HCWs toward HIV exposed individuals		
Supportive		
Maintain confidentiality		
Did not show concern about my accidental exposure		
PEP after exposure		
Received		
If not received, give reason: _____ _____ _____ _____ _____		
Reason for receiving PEP		
Exposure to blood from known HIV positive patients		
Exposure to blood from a patient whose HIV status is unknown		
Injury from any sharp object		
Time to initiate PEP after exposure		
Within 1 hour		
After 2-6 hours		
After 6-10 hours		
After 72 hour		
Duration of PEP		

For 3 days		
For 15 days		
For 28 days		
Completed the prescribed ART for PEP		
Reason for discontinuation of the ART for PEP		
Fear of adverse effects		
Assuming that it was enough		
Assuming that the drug was not effective		
Do you always use personal protective equipment when anticipating contact with patient blood and body fluid?		
Do you always dispose of needles and sharp objects into dedicated biohazard bins?		
Do you always use personal protective equipment when treating patients?		
The last time you took a blood sample, did you wear gloves?		

THANK YOU FOR TAKING TIME TO PARTICIPATE AND COMPLETE THAT QUESTIONNAIRE