



Perceptions of Primary Healthcare Workers on Injectable HIV Pre-Exposure Prophylaxis (PrEP) in Campus Health Clinics in KwaZulu-Natal, South Africa

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Above all, I give thanks to **God Almighty**, my source of strength, wisdom, and grace. Thank you for sustaining me through this journey, for opening doors, and for blessing me with the people and opportunities that have brought me to this point. *“I can do all things through Christ who strengthens me”* (Philippians 4:13). To You alone be the glory.

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DEDICATION

To my late grandmother (Ninini), uGogo kaMzamo

This work is dedicated to the memory of my late grandmother, uNinini uGogo kaMzamo, the woman who believed in me even when I could barely believe in myself. I still remember the day I promised you that I would become a doctor, not a medical doctor, but a doctor nonetheless. You were so excited, Gogo, even though you didn't quite understand how that was possible. You would laugh and say, *"Yini leyo? Udokotela ongasizi abantu abagulayo?"* (What is that? A doctor who doesn't treat sick people?). But your confusion never dimmed your pride. You believed in me, and that belief became my anchor. There were countless moments during this journey when I wanted to give up, when the research felt too difficult, when the words wouldn't come, when doubt crept in and whispered that I wasn't enough. But then I would hear your voice, gentle and unwavering, reminding me of the promise I made to you. I would see your face, full of pride and hope, and I would find the strength to continue. The sadness I carry is that you are not here to see me reach this milestone. You are not here to witness this achievement, to celebrate with me as I take one step closer to becoming the doctor I promised you I would be. That pain is a weight I will carry forever. I long for you to hold this dissertation in your hands, to see your face light up with pride, to hear you tell the neighbours, *"My granddaughter is almost a doctor!"* But even though you are not here physically, Gogo, I feel your presence with me. Every page of this dissertation, every late night, every sacrifice has all been for you. I am almost there, Gogo. I am one step closer to fulfilling the promise I made to you. I wish you were here to see it, but I know your spirit has been with me every step of the way. Thank you, Gogo, for believing in me. Thank you for being my inspiration and my motivation. I am not there yet, but because of you, I will get there.

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October 2025

ABSTRACT

Background: HIV remains a significant public health challenge in South Africa, particularly among young people aged 15-24 years in KwaZulu-Natal. While oral pre-exposure prophylaxis (PrEP) has been available since 2016, adherence challenges limit its effectiveness. Long-acting injectable PrEP (cabotegravir) offers a promising alternative, but successful implementation depends on the perceptions and readiness of primary healthcare (PHC) workers who deliver these services in campus health clinics.

Aim: This study aimed to explore PHC workers' perceptions of the implementation and use of HIV injectable PrEP in campus health clinics at a public university in KwaZulu-Natal, identify factors influencing its adoption, and inform strategies for effective integration into campus-based HIV prevention services.

Methods: A qualitative, exploratory, cross-sectional study was conducted using semi-structured interviews with 18 PHC workers from six campus health clinics at a public university in KwaZulu-Natal. Purposive sampling was employed, and data were analyzed thematically using Babchuk's 10-step process guided by Rogers' Diffusion of Innovations Theory.

Results: PHC workers demonstrated limited awareness of injectable PrEP but expressed willingness to learn and adopt the intervention. Participants perceived relative advantages over oral PrEP, including improved adherence and reduced stigma. However, concerns about complexity, insufficient training, resource constraints, and workload challenges were identified as barriers. Facilitators included supportive policies, peer influence, and opportunities for pilot implementation.

Conclusion: While PHC workers in campus health clinics recognize the potential benefits of injectable PrEP, significant knowledge gaps and systemic barriers must be addressed. Targeted training programs, adequate resources, and supportive institutional policies are essential for successful implementation. These findings can inform national and institutional strategies for integrating injectable PrEP into youth-focused HIV prevention services.

Keywords: Injectable PrEP, cabotegravir, primary healthcare workers, campus health clinics, HIV prevention, KwaZulu-Natal, perceptions, implementation.

LIST OF PUBLICATIONS

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LIST OF ACRONYMS AND ABBREVIATIONS

ABBREVIATION	DESCRIPTION
AIDS	Acquired Immunodeficiency Syndrome
ART	Antiretroviral Therapy
CAB-LA	Cabotegravir Long-Acting
CFIR	Consolidated Framework for Implementation Research
DHET	Department of Higher Education and Training
DMPA	Depot Medroxyprogesterone Acetate
DOH	Department of Health
DOI	Diffusion of Innovations
FAIR	Findable, Accessible, Interoperable, and Reusable (Data Principles)
HBM	Health Belief Model
HCW	Healthcare Worker
HEAIDS	Higher Education and Training HIV/AIDS Programme
HIS	Health Information System
HIV	Human Immunodeficiency Virus
HREC	Human Research Ethics Committee
IREC	Institutional Research Ethics Committee
KZN	KwaZulu-Natal
MMAT	Mixed Methods Appraisal Tool
MSM	Men who have Sex with Men
NDOH	National Department of Health
PCC	Population, Concept, Context

PHC	Primary Health Care
PHCW	Primary Health Care Worker
PREP	Pre-Exposure Prophylaxis
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
SDG	Sustainable Development Goal
SEM	Socio-Ecological Model
SSA	Sub-Saharan Africa
STI	Sexually Transmitted Infection
TDF/FTC	Tenofovir Disoproxil Fumarate and Emtricitabine
TPB	Theory of Planned Behaviour
UNAIDS	Joint United Nations Programme on HIV/AIDS
WHO	World Health Organization

TABLE OF CONTENTS

PAGE NUMBER

ACKNOWLEDGEMENTS	IV
DEDICATION.....	VI
ABSTRACT	VIII
LIST OF PUBLICATIONS	IX
LIST OF ACRONYMS AND ABBREVIATIONS.....	X
LIST OF TABLES.....	XVII
LIST OF APPENDICES.....	XVIII
CHAPTER 1.....	1
INTRODUCTION AND BACKGROUND	1
1.1 INTRODUCTION	1
1.2 BACKGROUND OF THE STUDY	2
1.3 PROBLEM STATEMENT	5
1.4 JUSTIFICATION OF THE STUDY	6
1.5 RESEARCH AIM AND OBJECTIVES	8
1.6 RESEARCH QUESTIONS	8
1.7 SIGNIFICANCE OF THE STUDY	8
1.8 SCOPE AND DELIMITATIONS.....	10
1.9 DEFINITION OF KEY TERMS.....	11
1.10 CHAPTER LAYOUT	12
1.11 CONCLUSION	14

CHAPTER 2.....	15
LITERATURE REVIEW	15
2.1 INTRODUCTION	15
2.2. HIV EPIDEMIOLOGY IN SOUTH AFRICA AND KWAZULU-NATAL.....	16
2.4 THE ROLE OF HEALTHCARE WORKERS IN PREP DELIVERY.....	18
2.5 CAMPUS HEALTH CLINICS AS STRATEGIC SETTINGS	20
2.6 THEORETICAL PERSPECTIVES ON INNOVATION ADOPTION	20
2.7 CONCLUSION	21
CHAPTER 3.....	22
MANUSCRIPT 1	22
PERSPECTIVES OF PRIMARY HEALTHCARE WORKERS ON HIV INJECTABLE PRE- EXPOSURE PROPHYLAXIS (PREP): A SCOPING REVIEW PROTOCOL.....	22
3.1 INTRODUCTION	22
3.2 MATERIALS AND METHODS.....	22
3.4 DISCUSSION AND INTERPRETATION OF RESULTS.....	23
3.5 LIMITATIONS AND RECOMMENDATIONS	23
3.7 PUBLICATION DETAILS	24
CHAPTER 4.....	42
MANUSCRIPT 2	42
4.1 INTRODUCTION	42
4.2 MATERIALS AND METHODS.....	43
4.3 RESULTS.....	44
4.7 PUBLICATION DETAILS	47
THEORETICAL FRAMEWORK	62
5.1 INTRODUCTION	62
5.2 OVERVIEW OF THEORETICAL FRAMEWORKS CONSIDERED.....	63
5.3 DIFFUSION OF INNOVATIONS THEORY	64
5.4 RELEVANCE OF DOI TO HIV PREVENTION AND INJECTABLE PREP	66
5.5 APPLICATION TO THIS STUDY	66
5.6 CONCEPTUAL FRAMEWORK DIAGRAM.....	68
5.7 CONCLUSION	69

CHAPTER 6.....	70
RESEARCH METHODOLOGY	70
6.1 INTRODUCTION	70
6.2 RESEARCH PARADIGM	73
6.3 STUDY DESIGN	74
6.4 SETTING OF THE STUDY	75
6.5 STUDY POPULATION	75
6.6 SAMPLING SIZE AND SAMPLE STRATEGY	76
6.10 DATA COLLECTION METHOD AND TOOL	78
6.11 DATA COLLECTION PROCEDURES.....	80
6.12 DATA MANAGEMENT	81
6.13 TRUSTWORTHINESS	83
CHAPTER 7.....	89
FINDINGS.....	89
INTRODUCTION	89
OBJECTIVE 1: TO EXPLORE PHC WORKERS' KNOWLEDGE, ATTITUDES, AND BELIEFS ABOUT LONG-ACTING INJECTABLE HIV PREP IN CAMPUS HEALTH CLINICS	93
OBJECTIVE 2: TO EXPLORE THE POTENTIAL BENEFITS AND CONCERNS REGARDING THE IMPLEMENTATION OF HIV INJECTABLE PREP WITHIN CAMPUS HEALTH CLINIC SETTINGS.....	98
OBJECTIVE 3: TO EXPLORE THE PERCEIVED BARRIERS AND FACILITATORS INFLUENCING HEALTHCARE WORKERS' ADOPTION AND IMPLEMENTATION OF HIV INJECTABLE PREP.....	108
OBJECTIVE 4: TO DEVELOP RECOMMENDATIONS FOR IMPROVING THE UPTAKE AND INTEGRATION OF INJECTABLE PREP INTO EXISTING HIV PREVENTION SERVICES ON CAMPUS	123
CHAPTER 8.....	134
DISCUSSION AND INTERPRETATION OF FINDINGS.....	134
8.1 INTRODUCTION	134
8.2.1 <i>Objective 1: Awareness and Knowledge of Healthcare Workers Regarding HIV Injectable PrEP.....</i>	135
8.2.2 <i>Objective 2: Perceived Benefits and Concerns Regarding Implementation of HIV Injectable PrEP.....</i>	142

8.2.3 Objective 3: Barriers and Facilitators Influencing the Adoption and Implementation of HIV Injectable PrEP.....	149
8.2.4 Objective 4: Recommendations for Improving Uptake and Integration of Injectable PrEP	155
8.3 INTEGRATION WITH THEORETICAL FRAMEWORK.....	161
CHAPTER 9.....	174
CONCLUSION AND RECOMMENDATIONS	174
REFERENCES	191

LIST OF FIGURES

Figure 1: Conceptual Framework Diagram	69
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LIST OF TABLES

Table 1: Summary of the Research Methodology.....	71
Table 2: Profile of study participants.....	90
Table 3: Summary of themes and subthemes	91
Table 4: Healthcare Workers' Awareness and Understanding of Injectable PrEP by Cadre(N=18)	93
Table 5: Integration of Study findings with Rogers' Diffusion of Innovations Framework.....	161
Table 6: Summary of Key Findings and Conclusions	175

LIST OF APPENDICES

Appendix	Caption	Page
A	Letter of Information / Participant Information Sheet	
B	Informed Consent Form	
C	Interview Guide	
D	Research Ethics Training Certificate	
E	University Gatekeeper Permission Letter	
F	Campus Head of Clinics Permission Letter	
G	Recruitment Flyer	
H	Provisional Ethical Clearance	
I	Full Approval Ethics Clearance	
J	Codebook for Thematic Analysis	

CHAPTER 1

INTRODUCTION AND BACKGROUND

1.1 Introduction

Every week, approximately 4,200 young women aged 15–24 acquire HIV globally, with the highest rates in sub-Saharan Africa (Cohen, Benekigeri and Anastos 2024). This staggering statistic underscores the urgent need for innovative HIV prevention strategies, particularly in South Africa, which bears the world's largest HIV burden (Zakeyo and Nyashanu 2023). Despite significant progress in HIV prevention, treatment, and education interventions, young people, especially those in tertiary institutions, remain disproportionately affected (Zakeyo and Nyashanu 2023).

In response, biomedical innovations such as pre-exposure prophylaxis (PrEP) have emerged as critical tools in the fight against HIV (Hillis *et al.* 2020). While oral PrEP has been available for several years, its effectiveness is often undermined by challenges related to daily adherence, stigma, and accessibility (Mgodi *et al.* 2023). The recent introduction of long-acting injectable PrEP, such as cabotegravir, offers a promising alternative that may overcome some of these barriers and transform HIV prevention efforts (Liégeon, Delaugerre and Molina 2024).

Building on this potential, emerging evidence suggests that the long-acting injectable PrEP could be a transformative advancement in HIV prevention (Grace *et al.* 2023; Liégeon, Delaugerre and Molina 2024). Unlike oral PrEP, Cabotegravir injectable PrEP offers sustained protection with bi-monthly dosing, which could improve adherence and reduce stigma. However, the successful implementation of this intervention mainly depends on the healthcare providers who deliver these services, particularly within primary healthcare (PHC) settings, such as campus health clinics (Bleasdale *et al.* 2024; Mbatha, Mpofana and Gumede 2025a).

Campus health clinics play a vital role in providing accessible health services to students in higher learning institutions, an age group that is highly vulnerable to HIV (Khumalo *et al.* 2021b; Rasweswe, Bopape and Ntho 2024). PHC workers within these settings are uniquely positioned to influence the uptake and delivery of injectable PrEP (Barnighausen *et al.* 2020; Mbatha, Mpofana and Gumede 2025a). Their perceptions, knowledge, attitudes, and readiness to offer this service are crucial factors that may either support or hinder its integration into routine care (Moloi *et al.* 2023). Despite the potential of injectable PrEP, little is known about how PHC workers in campus clinics perceive this new technology or how prepared they are to implement it (Bleasdale *et al.* 2024).

The purpose of this chapter is to provide a comprehensive introduction to the study. It begins by presenting the contextual background on the HIV epidemic in South Africa and the evolution of PrEP as a preventive measure. This is followed by the problem statement, the research questions, and an explanation of the significance of the study. Collectively, these elements provide the reader with a clear understanding of the rationale for exploring PHC workers' perceptions of injectable PrEP within campus health clinics in KwaZulu-Natal. This chapter establishes the foundation for the detailed discussion presented in subsequent chapters.

1.2 Background of the Study

HIV and AIDS remain significant public health issues worldwide, with sub-Saharan Africa bearing nearly 70% of the global HIV burden (Payagala and Pozniak 2024). South Africa has one of the highest HIV prevalence rates globally (Zuma *et al.* 2022a), especially among young people aged 15 to 24 years, who continue to be disproportionately impacted (Cohen, Benekigeri and Anastos 2024). In KwaZulu-Natal, the epidemic is even more severe, making the province a key focus for HIV prevention efforts (Chireshe *et al.* 2025). According to the 2022 National HIV Prevalence Survey, KwaZulu-Natal had an HIV prevalence of 16.0% among adults aged 15-49, with approximately 1.98 million people living with HIV in the province (Zuma *et al.* 2022b). Among adolescents aged 15-24 years, HIV prevalence nationally increased from 3.0% in 2008 to 4.1% in 2017, with young people continuing to face substantial risk (Zuma *et al.* 2022b). In KwaZulu-Natal specifically, only 73.9% of

adolescents aged 15-24 are aware of their HIV status, falling short of the UNAIDS 95% target, and antiretroviral therapy (ART) coverage in this age group remains at 62.8%, significantly below the desired threshold (Zuma *et al.* 2022b).

Notably, significant sex differences exist in HIV prevalence among adolescents and young adults. Females have 2.24 times higher odds of HIV infection compared to males (adjusted odds ratio [AOR] = 2.24, 95% CI: 1.01-4.97), with adolescent girls being disproportionately affected across all provinces (Zuma *et al.* 2022a). ART coverage among males aged 15-24 was 58.8% compared to 64.0% among females, highlighting persistent gender disparities in both infection rates and treatment access (Zuma *et al.* 2022b).

To curb the incidence of new infections, the South African government has implemented a range of biomedical strategies, including oral PrEP, which was officially introduced in 2016 (Milimu *et al.* 2024). While oral PrEP is clinically effective, its success is heavily dependent on daily adherence, which poses challenges for many users, especially young people, due to stigma, forgetfulness, pill fatigue, and sociocultural barriers (Mgodi *et al.* 2023). Alongside oral PrEP, South Africa has implemented various other biomedical HIV prevention strategies, including post-exposure prophylaxis (PEP), voluntary medical male circumcision (VMMC), and treatment as prevention (TasP) through the U=U (undetectable equals untransmittable) approach (Delany-Moretlwe *et al.* 2022). Additional biomedical tools such as the dapivirine vaginal ring and microbicide gels have shown promise in clinical trials, particularly for women who face challenges with daily oral medication (Kuo *et al.* 2022).

Recognizing these challenges, the World Health Organization (WHO) recommended in 2022 the use of long-acting injectable PrEP, specifically cabotegravir (CAB-LA), which is administered every two months and has demonstrated superior efficacy in clinical trials (Delany-Moretlwe *et al.* 2022; Spinelli, Grinsztejn and Landovitz 2022; Durham *et al.* 2023). In the HPTN 083 trial among men who have sex with men and transgender women, CAB-LA reduced HIV risk by 66% compared to oral PrEP (Landovitz *et al.* 2021). The HPTN 084 trial among cisgender women in sub-Saharan Africa showed even more pronounced results, with CAB-LA reducing HIV risk by 89% compared to oral tenofovir disoproxil fumarate/emtricitabine (TDF/FTC) (Delany-

Moretlwe *et al.* 2022). A meta-analysis pooling data from both trials found a relative risk of 0.21 (95% CI: 0.07-0.61), representing an overall 79% reduction in HIV acquisition risk compared to oral PrEP (Spinelli, Grinsztejn and Landovitz 2022). Real-world effectiveness data from open-label extension studies demonstrate greater than 99% effectiveness among nearly 1,300 individuals (Durham *et al.* 2023). South Africa has since begun planning a phased rollout of injectable PrEP, with an emphasis on youth-friendly services such as those offered in campus health clinics (Shamu, Mullick and Christofides 2025). Campus health clinics are healthcare facilities located on college or university campuses that provide accessible, student-centred primary health and wellness services (such as treatment of common illnesses, sexual and reproductive health, immunisations, and mental health support), helping reduce barriers of cost, time, and travel for students (Moore *et al.* 2018). These clinics serve a high-risk population of young adults and offer an ideal platform for integrating new HIV prevention methods (Mugwanya and Kinuthia 2021).

Campus health clinics in South Africa serve as crucial access points for youth-centred healthcare, particularly for students in institutions of higher learning. Staffed by professional nurses and other PHC workers, these clinics provide essential services including HIV testing, counselling, contraception, and oral PrEP (Musakwa *et al.* 2021). With the planned rollout of long-acting injectable PrEP (CAB-LA) in South Africa, these clinics are expected to play a central role in delivering the intervention to young adults, a population at high risk for HIV acquisition. However, limited research exists on their capacity, institutional readiness, and staff preparedness to adopt and deliver injectable PrEP (Koss and Parikh 2025).

Preliminary evidence suggests that while many healthcare workers are aware of injectable PrEP, their understanding of its administration, effectiveness, and potential demand is still evolving (Moloi *et al.* 2023; Bleasdale *et al.* 2024; Koss and Parikh 2025). Factors such as training needs, operational challenges, and perceived acceptability by both providers and students remain uncertain (Bleasdale *et al.* 2025). Most existing studies on PrEP implementation have focused on public sector clinics and key populations such as sex workers and men who have sex with men (Grace *et al.* 2023; Romo *et al.* 2024). There is a notable gap in the literature regarding campus-

based settings and the unique potential of PHC workers to deliver injectable PrEP in these environments (Moloi *et al.* 2023; Yao *et al.* 2023).

Building on this background, this study aims to address gaps in the literature by examining how PHC workers in campus health clinics in KwaZulu-Natal perceive injectable PrEP and their level of preparedness to offer it. Their insights are essential for ensuring that rollout strategies are contextually appropriate, sustainable, and aligned with the real-world experiences of healthcare providers on the ground.

1.3 Problem Statement

Despite the availability of oral PrEP in South Africa, its uptake among young adults, particularly those in tertiary institutions, remains low (Muhumuza *et al.* 2021). Challenges such as daily pill fatigue, stigma, and lack of privacy hinder consistent adherence (Muhumuza *et al.* 2021). The introduction of long-acting injectable PrEP (CAB-LA), endorsed by the WHO in 2022, offers a promising alternative by providing bi-monthly protection and reducing the visibility of HIV prevention efforts (Pleaner *et al.* 2023; Bleasdale *et al.* 2024). South Africa has recently approved the use of CAB-LA, which offers up to two months of protection per dose, marking an important advancement in HIV prevention (Pike, Rousseau and Bekker 2023). However, the successful rollout of injectable PrEP depends not only on clinical efficacy but also on the perceptions, awareness, and readiness of PHC workers, who are central to HIV prevention efforts (Bleasdale *et al.* 2024; Bleasdale *et al.* 2025).

Within higher education settings, PHC workers in campus health clinics occupy a particularly strategic role. Campus health clinics are university- or college-based healthcare facilities that provide accessible, student-centred primary health and wellness services, including HIV prevention, contraception, mental health support, and routine care (Moore *et al.* 2018). In South Africa, all 26 public universities maintain campus health clinics to serve their large student populations, with approximately one million new students enrolling annually (Musakwa *et al.* 2021). These clinics are often the first point of care for young adults, a population at disproportionately high risk of HIV infection, and PHC workers working in them play a vital role in providing prevention, treatment, and health promotion services (Gobind and Ukpere 2014).

Evidence also shows that campus-based PHC workers have been involved in delivering oral PrEP, educating students about its use, and conducting risk assessments in line with national guidelines (Haffejee *et al.* 2023).

Yet, most research on PrEP implementation in South Africa has focused on public sector clinics and key populations such as sex workers and men who have sex with men, with little attention to the unique context of campus-based healthcare (Khumalo *et al.* 2021a; Romo *et al.* 2024). This creates a critical knowledge gap, as implementation efforts in universities may face resistance, inefficiencies, or low uptake if the perspectives of campus-based PHC workers are not adequately understood (Khumalo *et al.* 2021b). Without such insights, policymakers and institutions risk missing the opportunity to curb HIV transmission among young adults in higher education.

This study seeks to address this gap by exploring PHC workers' knowledge, perceptions, and readiness regarding injectable PrEP in campus health clinics in KwaZulu-Natal. Understanding their views is essential for designing contextually appropriate training programs, institutional policies, and implementation strategies that can strengthen youth-focused HIV prevention in academic settings (Shisana *et al.* 2014; Rousseau *et al.* 2021).

1.4 Justification of the Study

The persistent HIV epidemic among young people in South Africa calls for innovative and effective prevention strategies, particularly within environments where youth can be reached directly, such as institutions of higher learning (Muhumuza *et al.* 2021). With university students in South Africa identified as a key population at risk of HIV infection, campus health clinics are uniquely positioned to offer accessible, stigma-reducing prevention services (Muhumuza *et al.* 2021). As such, integrating long-acting injectable PrEP into campus health services represents a timely and potentially transformative approach to reducing new infections among this vulnerable group (Gashema *et al.* 2025). This study is directly aligned with Sustainable Development Goal (SDG) 3: Ensure healthy lives and promote well-being for all at all ages, and in particular with Target 3.3, which aims to end the epidemics of AIDS, tuberculosis,

malaria, and other communicable diseases by 2030 (UNAIDS 2023). By examining healthcare workers' perceptions of implementing injectable PrEP, the study contributes to SDG 3 by identifying practical pathways to strengthen HIV prevention among young adults in higher education, a population critical to achieving long-term epidemic control.

Despite the promise of injectable PrEP, its successful implementation depends heavily on the perceptions, attitudes, and preparedness of healthcare workers who deliver these services (Norwood and Zuñiga 2022; Butler *et al.* 2023; Moloi *et al.* 2023). PHC workers in campus clinics are gatekeepers of HIV prevention programs, and their willingness to adopt new interventions is shaped by a range of contextual, institutional, and personal factors (Moloi *et al.* 2023). However, there is a clear gap in the literature on how PHC workers in campus health settings in South Africa view the introduction of injectable PrEP. Most available studies focus on urban clinics, key populations, or community-level providers, leaving out an important segment of the healthcare system that serves young adults (Mahlare *et al.* 2023; Pleaner *et al.* 2023).

This study is justified by the need to fill this critical gap and contribute to an evidence base that informs the integration of injectable PrEP in campus settings. By exploring PHC workers' perceptions, the study will offer insights into potential barriers and enablers to implementation, staff training needs, and institutional readiness. The findings can inform health policy, guide implementation strategies, and support advocacy efforts to ensure that campus clinics are adequately equipped to deliver comprehensive HIV prevention services.

Practically, the study supports South Africa's national HIV prevention goals by addressing a key operational component of PrEP rollout: the role of frontline providers. Academically, it adds to the growing body of knowledge on implementation science and HIV prevention in youth-focused healthcare settings. If PHC workers' views are not understood and addressed, the rollout of injectable PrEP in campuses could face resistance, inefficiencies, or low uptake, ultimately limiting its impact. Therefore, this research is both timely and necessary for advancing public health and strengthening youth-focused HIV prevention efforts in South Africa.

1.5 Research Aim and Objectives

Aim

The aim of the study was to explore PHC workers' perceptions of the implementation and use of HIV injectable PrEP in campus health clinics of a public university in KwaZulu-Natal, identify factors influencing its adoption, and inform strategies for effective integration into campus-based HIV prevention services.

Objectives

1. To explore PHC workers' knowledge, attitudes, and beliefs about long-acting injectable HIV PrEP in campus health clinics.
2. To explore PHC workers' perceptions of the clinical benefits and potential concerns regarding the use of CAB-LA injectable PrEP.
3. To identify systematic, institutional, and individual-level barriers and facilitators that may influence the implementation of CAB-LA injectable PrEP in campus health clinics.
4. To generate recommendations for improving the uptake and integration of injectable PrEP into existing HIV prevention services on campus.

1.6 Research Questions

- 1.1 How do PHC workers in campus health clinics describe their awareness, knowledge, and understanding of long-acting injectable HIV PrEP?
- 1.2 What are the perceived benefits and concerns related to the implementation of injectable HIV PrEP in a campus health clinic setting?
- 1.3 What barriers and facilitators do healthcare workers perceive as influencing the adoption and implementation of injectable HIV PrEP?
- 1.4 What recommendations can be made to improve the uptake and integration of injectable PrEP into existing HIV prevention services on campus?

1.7 Significance of the Study

The significance of this study rests on three interconnected dimensions: its contribution to academic knowledge, its practical relevance for public health interventions, and the personal motivation that underpins its development.

Academic Contribution

This study contributes to the growing body of literature on HIV prevention by addressing an underexplored area concerning the perceptions and readiness of PHC workers to deliver injectable PrEP within campus health clinics in the South African context. While several studies have explored the implementation of oral PrEP (Celum *et al.* 2015; Joseph Davey, Dadan and Wara 2024; Milimu *et al.* 2024) and, more recently, injectable PrEP in general public health settings and among key populations (Landovitz *et al.* 2021; Delany-Moretlwe *et al.* 2022; Grace *et al.* 2023; Mgodini *et al.* 2023; Bleasdale *et al.* 2024; Romo *et al.* 2024), limited research exists on how these interventions are perceived within higher learning institutions (Moloi *et al.* 2023; Yao *et al.* 2023; Koss and Parikh 2025). By focusing specifically on campus health clinics in KwaZulu-Natal, a province with both high HIV prevalence (Kharsany *et al.* 2018; Chireshe *et al.* 2025) and a large student population, this study adds valuable context-specific knowledge to the field of public health and implementation science. It also enriches theoretical discussions on provider readiness, health system responsiveness, and the integration of biomedical innovations in youth-centred care environments (Mugwanya and Kinuthia 2021; Shamu, Mullick and Christofides 2025).

Practical Contribution

The findings of this study have the potential to inform national and institutional-level strategies for the rollout of injectable PrEP in South African campus settings. Understanding PHC workers' views, concerns, and readiness can guide the development of tailored training programs, resource allocation, and policy adjustments to support effective implementation. The study can also help university management, policy-makers, and health departments identify potential barriers early and design support mechanisms that encourage healthcare worker engagement and student uptake. Ultimately, this research can contribute to more youth-friendly, accessible, and sustainable HIV prevention services in institutions of higher learning, helping to reduce new infections and improve health outcomes for a highly vulnerable population.

Personal Motivation

As a researcher with both academic and personal interest in youth health and wellbeing, this topic is profoundly relevant. Having observed firsthand the challenges

faced by young people in accessing appropriate HIV prevention services, particularly in university settings, I was motivated to explore how healthcare systems can be strengthened from within. I believe that healthcare workers are not only service providers but also change agents. By understanding their perspectives, we can empower them to play a transformative role in the fight against HIV. This study, therefore, reflects both a professional commitment to improving public health interventions and a personal dedication to supporting safer, healthier futures for young South Africans. The researcher's commitment to advancing solutions that bridge policy and practice provides an additional layer of significance, ensuring that the study is not only academically rigorous but also personally driven by a deep concern for public health equity and the empowerment of vulnerable populations.

1.8 Scope and Delimitations

Scope of the Study

This study explored PHC workers' perceptions of the implementation and use of HIV injectable PrEP in campus health clinics of a public university in KwaZulu-Natal, identified factors influencing its adoption, and informed strategies for effective integration into campus-based HIV prevention services. The research specifically targeted professional nurses and other healthcare providers employed in health clinics located within institutions of higher learning. The study adopted a qualitative approach and drew data through semi-structured interviews conducted over a period of two months, from August to September 2025. It aimed to understand healthcare workers' knowledge, attitudes, perceived barriers, and facilitators related to the implementation of injectable PrEP, particularly cabotegravir (CAB-LA), in student-centred clinical environments.

Delimitations of the Study

This study was limited to campus health clinics within KwaZulu-Natal and did not include public clinics, private healthcare facilities, or other provinces. It focused exclusively on healthcare workers' perspectives and did not capture those of students, policymakers, or other stakeholders involved in HIV prevention programming. The study did not assess clinical outcomes, patient adherence, or the effectiveness of injectable PrEP itself, as the aim was not to evaluate the medication but to explore

provider perceptions for implementation. These delimitations were made to ensure a manageable scope, maintain methodological focus, and provide depth in exploring the specific role of PHC workers within campus-based settings.

1.9 Definition of Key Terms

- **Pre-Exposure Prophylaxis (PrEP):** A preventative HIV strategy where HIV-negative individuals take antiretroviral medication to reduce their risk of acquiring HIV (UNAIDS and (IHRI) 2020).
- **Oral PrEP:** A daily pill (usually tenofovir and emtricitabine) used to prevent HIV. Its effectiveness depends on consistent adherence (World Health Organization, 2021).
- **Injectable PrEP (Long-Acting Cabotegravir / CAB-LA):** A long-acting intramuscular antiretroviral drug administered every two months. It offers an alternative to oral PrEP and has shown higher efficacy due to improved adherence (Landovitz *et al.* 2021).
- **Adherence:** The extent to which a person correctly follows prescribed medication regimens. In the context of PrEP, adherence is critical to achieving full preventive efficacy (UNAIDS 2023).
- **Uptake:** The rate or extent to which an intervention, such as injectable PrEP, is accepted and used by the target population or implemented by healthcare providers (Eakle *et al.*, 2019).
- **High-Risk Population:** Groups at greater risk of contracting HIV, including young people aged 15–24, especially those in tertiary institutions (UNAIDS, 2021).
- **Primary Healthcare (PHC) Workers:** Frontline providers such as nurses and clinical associates who deliver basic primary healthcare services. In this study, they are based in campus health clinics (National Department of Health, 2023).
- **Campus Health Clinics:** Health units within institutions of higher learning that provide primary care services, including HIV prevention, to students and staff (Higher Health South Africa, 2020).

1.10 Chapter Layout

This thesis is structured into nine chapters, each contributing to the overall exploration of PHC workers' perceptions of delivering injectable HIV PrEP in campus health clinics in KwaZulu-Natal, South Africa.

Chapter 1: Introduction

This chapter introduces the study by outlining the background, problem statement, rationale, research aim and objectives, significance, scope, and key terms. It establishes the research context and highlights the importance of exploring healthcare workers' perspectives on injectable PrEP in campus settings.

Chapter 2: Literature Review

This chapter provides a comprehensive review of the literature relevant to HIV injectable PrEP. It is structured thematically to explore the key areas of knowledge that inform this study. The review examines the current evidence base on the efficacy and implementation of injectable PrEP, the role of healthcare workers in biomedical HIV prevention, and the specific contextual factors affecting PrEP delivery in Sub-Saharan Africa. Drawing on peer-reviewed journal articles, clinical trial reports, policy documents, and grey literature, this chapter synthesizes existing research to identify knowledge gaps and establish the theoretical and empirical foundation for the present study. The literature reviewed spans multiple disciplines, including public health, implementation science, health systems research, and social behavioural science, reflecting the multifaceted nature of PrEP implementation.

Chapter 3: Manuscript 1 Scoping Review Protocol

This chapter presents a published scoping review protocol titled *"Perspectives of Primary Healthcare Workers on Injectable PrEP: A Scoping Review Protocol."* Following the methodological framework established by Arksey and O'Malley (2005) and further developed by Levac, Colquhoun and O'Brien (2010), his protocol outlines a systematic approach to mapping the existing literature on primary healthcare workers' perspectives on injectable PrEP for HIV prevention.

Chapter 4: Manuscript 2 Narrative Review

This chapter presents a systematic narrative review titled *"Perceptions and Readiness of Healthcare Workers to Deliver Injectable HIV Pre-Exposure Prophylaxis in Sub-Saharan Africa: A Narrative Review,"* which has been submitted for publication in the *Frontier Public Health Journal*. Building upon the scoping review protocol, the narrative synthesis provides an in-depth qualitative, thematic analysis examining healthcare workers' knowledge, attitudes, preparedness, and capacity to implement injectable PrEP services in a region that bears a disproportionate burden of HIV.

Chapter 5: Theoretical Framework

This chapter introduces and explains the **Diffusion of Innovations (DOI) theory** as the primary framework for interpreting healthcare workers' perceptions of injectable PrEP. The chapter outlines the theory's core constructs, relative advantage, compatibility, complexity, trialability, and observability, and demonstrates how these concepts relate to the study's aims and findings. In addition, attention is given to the roles of communication channels, social systems, and opinion leaders in influencing the adoption of health innovations, such as injectable PrEP.

Chapter 6: Research Methodology

This chapter details the research design and methodology used in the study. It describes the research paradigm, the research design, study setting, study population, sampling strategies, data collection methods and tools, and data collection procedures. It also discusses data analysis procedures, ethical considerations, and measures taken to ensure data trustworthiness.

Chapter 7: Findings

This chapter presents the data collected from participants. The study's findings outline the demographic characteristics of the sample and report the key themes and sub-themes that emerged from interviews with PHC workers. The chapter is structured around the research objectives, highlighting PHC workers' knowledge, attitudes, and beliefs about long-acting injectable HIV PrEP; perceived benefits and concerns related to the implementation of HIV injectable PrEP; perceived barriers and facilitators influencing the adoption and implementation of HIV injectable PrEP; and recommendations for improving the uptake and integration of injectable PrEP into existing HIV prevention services.

Chapter 8: Discussion and Interpretation

This chapter interprets and critically discusses the findings about the literature reviewed and the research objectives. It highlights similarities, differences, and new insights gained from the study, with a focus on implications for practice and policy.

Chapter 9: Recommendations and Conclusion

This chapter summarises the research, reiterates the key findings, and reflects on the study's overall contribution. The chapter also acknowledges the limitations of the research and highlights the importance of continued efforts to strengthen HIV prevention among young adults. Finally, it provides practical recommendations for healthcare workers, campus clinic managers, policymakers, and other stakeholders engaged in, or preparing for, implementation of injectable PrEP, along with suggestions for future research.

1.11 Conclusion

This chapter introduces the study by outlining the context of the HIV epidemic in South Africa, particularly among young adults, and the emerging role of injectable PrEP as a promising prevention strategy. It presents the background, problem statement, rationale, significance, scope, and key terms relevant to the study. The importance of exploring the perceptions of PHC workers regarding the implementation and use of HIV injectable PrEP in campus health clinics of a public university in KwaZulu-Natal is highlighted, given their central role in delivering HIV prevention services to students. The chapter also defines the study's boundaries and explains its academic and practical relevance, providing the foundation for the research aim and direction. This foundational chapter establishes the context for the detailed methodological and empirical discussions that follow in subsequent chapters.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Sub-Saharan Africa remains the global epicentre of the HIV epidemic, a reality that requires ongoing updates to prevention strategies to achieve the ambitious UNAIDS 95-95-95 targets (UNAIDS 2023). Although expanding antiretroviral therapy has saved millions of lives, the number of new infections shows that traditional prevention methods alone are not enough to control the epidemic (UNAIDS 2023). For years, daily oral PrEP has been a key part of biomedical prevention; however, its real-world effectiveness has often been limited by significant barriers, including pill burden, adherence fatigue, and widespread social stigma related to daily medication use (Koss *et al.* 2018). As a result, the public health community has increasingly turned to long-acting injectable options, such as cabotegravir, which aim to transform prevention by providing a discreet, bimonthly alternative that addresses these adherence issues (Landovitz *et al.* 2021; Delany-Moretlwe *et al.* 2022).

In response to these limitations, the move toward long-acting injectable PrEP, specifically cabotegravir (CAB-LA), marks a significant advancement in HIV prevention science. Clinical trials cited (Landovitz *et al.* 2021; Delany-Moretlwe *et al.* 2022) have shown that this method is more effective than oral regimens, mainly because it reduces the daily behavioural burden on the user. Given intramuscularly every two months, injectable PrEP offers a discreet and convenient alternative that better suits individuals seeking privacy. By removing the daily visual reminder of medication, the injectable option gives users a sense of normalcy and protection against the social stigma often linked to daily HIV medication (Calabrese *et al.* 2017; Eaton *et al.* 2017; Golub 2018; Golub and Myers 2019).

Ultimately, the integration of injectable PrEP is seen not just as a medical upgrade but as a strategic necessity to close the prevention gap for those underserved by current interventions. The literature indicates that a one-size-fits-all approach that relies solely on oral medication is inadequate for diverse risk groups (Biello *et al.* 2018; Beymer *et*

al. 2019). Therefore, this shift aims to extend protection to high-risk individuals who face adherence challenges, thereby lowering overall incidence rates. However, both the protocol and the review warn that achieving this potential requires more than clinical effectiveness; it requires a health workforce that is adequately trained to handle the unique logistical and operational challenges of this new delivery method.

2.2. HIV Epidemiology in South Africa and KwaZulu-Natal

South Africa continues to bear the world's largest HIV burden, with approximately 7.5 million people living with HIV (Zuma *et al.* 2022b). Young people aged 15–24 years, particularly young women, remain disproportionately affected, with incidence rates significantly higher than those of their male counterparts (Cohen, Benekigeri and Anastos 2024). KwaZulu-Natal province consistently records the highest HIV prevalence in the country, making it a priority region for targeted prevention interventions (Chireshe *et al.* 2025).

The epidemiology of HIV among the target population, young adults in tertiary institutions, reveals particularly concerning patterns. Nationally, HIV prevalence among youth aged 15-24 has increased from 3.0% in 2008 to 4.1% in 2017, with the highest rates observed in KwaZulu-Natal province (Zuma *et al.* 2022b). Young women are disproportionately affected, with females aged 15-24 having 2.24 times higher odds of HIV infection compared to their male counterparts (Zuma *et al.* 2022b). In KwaZulu-Natal specifically, the 2022 National HIV Survey found that only 73.9% of adolescents and young adults aged 15-24 were aware of their HIV status, far below the UNAIDS 95% target (Zuma *et al.* 2022b). Furthermore, antiretroviral therapy coverage among this age group remains suboptimal at 62.8%, with males showing lower coverage (58.8%) compared to females (64.0%) (Zuma *et al.* 2022b). These statistics underscore the critical need for targeted, youth-friendly HIV prevention interventions within university settings, where students in this vulnerable age group are concentrated.

The persistence of high HIV incidence among youth, despite decades of intervention efforts, underscores the need for innovative and youth-friendly prevention strategies. University students represent a key population at risk due to factors such as high rates of concurrent partnerships, low and inconsistent condom use, gender-based violence, and limited access to tailored sexual health services (Dellar, Dlamini and Karim 2015;

Khumalo *et al.* 2021a). Campus health clinics, therefore, occupy a strategic position in reaching this vulnerable population with evidence-based HIV prevention tools.

2.3 Evolution of PrEP

PrEP is a biomedical HIV prevention strategy in which HIV-negative individuals take antiretroviral medication to reduce their risk of acquiring HIV (UNAIDS, 2020). Oral PrEP, typically consisting of tenofovir disoproxil fumarate and emtricitabine (TDF/FTC), was first approved for use in 2012 and has since been introduced in numerous countries, including South Africa in 2016 (Milimu *et al.* 2024).

While oral PrEP is highly effective when taken consistently, adherence remains a significant challenge, particularly among young people (Mgodi *et al.* 2023). Barriers to adherence include pill fatigue, forgetfulness, stigma associated with HIV prevention, privacy concerns, and socio-cultural factors that discourage daily medication use (Muhumuza *et al.* 2021). These challenges have prompted the development of long-acting formulations that reduce dosing frequency and potentially improve adherence.

Long-acting injectable PrEP, specifically CAB-LA, was recommended by WHO in 2022 following clinical trials that demonstrated superior efficacy compared to oral PrEP (Landovitz *et al.* 2021; Spinelli, Grinsztejn and Landovitz 2022; Durham *et al.* 2023). Administered via intramuscular injection every two months, injectable PrEP offers several potential advantages: improved adherence due to less frequent dosing, reduced visibility compared to daily pills, and sustained drug levels that may provide more consistent protection (Liégeon, Delaugerre and Molina 2024).

South Africa has since approved the use of CAB-LA and is planning a phased rollout, with particular emphasis on youth-friendly services such as those offered in campus health clinics (Shamu, Mullick and Christofides 2025). However, successful implementation depends not only on the intervention's clinical efficacy but also on the readiness and perceptions of the healthcare workers who will deliver the service.

2.4 The Role of Healthcare Workers in PrEP Delivery

Healthcare workers play a critical role as gatekeepers in the adoption and delivery of new health interventions (Barnighausen *et al.* 2020). Their knowledge, attitudes, beliefs, and perceived capacity to implement innovations significantly influence uptake and sustainability (Moloi *et al.* 2023). Several studies have explored healthcare workers' perspectives on oral PrEP, revealing both facilitators and barriers to effective service delivery.

The implementation of any biomedical HIV prevention strategy is fundamentally mediated by the healthcare workforce, whose role extends far beyond the mechanical administration of medication. As the primary gatekeepers of health services in Sub-Saharan Africa, healthcare workers serve as the critical interface between national health policies and the community members they serve (Greenhalgh *et al.* 2004). Their perspectives, encompassing knowledge, attitudes, beliefs, and perceived readiness, act as a filter that determines whether a new intervention, such as injectable PrEP, is successfully adopted or marginalized in clinical practice.

Research demonstrates that healthcare workers are not merely passive conduits for service delivery but active agents whose endorsement or hesitation can significantly influence a patient's decision to initiate and persist with prevention therapies (Krakower and Mayer 2016; Petroll *et al.* 2017). Consequently, their 'buy-in' is often cited as a prerequisite for the successful rollout of novel health technologies (Greenhalgh *et al.* 2004).

The influence of healthcare workers is especially important in HIV prevention, where stigma, privacy, and trust pose significant barriers to effective implementation (Golub 2018; Calabrese 2020). A provider's attitude toward injectable PrEP can directly impact the patient experience; enthusiastic and informed providers are more likely to foster patient confidence, effectively counsel on side effects, and reduce stigma related to using antiretrovirals for prevention. For example, Calabrese *et al.* (2017) found that when providers demonstrated non-judgmental attitudes and comprehensive knowledge about PrEP, patients reported higher satisfaction and greater likelihood of adherence.

Conversely, negative perceptions or misunderstandings among staff, such as confusion between PrEP and ART or moral judgments about patients' sexual behaviour, can create unseen barriers to access. Research shows that when providers feel they lack adequate training or question the safety of a new medication, they are less likely to prescribe it despite its proven clinical effectiveness (Krakower and Mayer 2012, 2016; Calabrese *et al.* 2017; Petroll *et al.* 2017). Therefore, the "provider-patient dyad" is a key area for intervention, where the provider's perspective can either help bridge the gap to care or widen it (Smith *et al.* 2023).

Furthermore, healthcare workers have a unique perspective on the practical feasibility of integrating injectable PrEP into already overstretched health systems. Their insights provide vital real-world data that clinical trials often overlook, such as the challenges of cold-chain storage, scheduling appointments for bimonthly injections, and managing increased patient loads (Moyo *et al.* 2022). By raising concerns about staffing shortages, infrastructure gaps, and the need for clear clinical guidelines, healthcare workers highlight systemic issues that policymakers must address (Wagner *et al.* 2023). Their insights clarify the difference between what is theoretically feasible in a controlled study and what is sustainable in a resource-limited rural clinic (Mantsios *et al.* 2021; Wagner *et al.* 2023; Joseph Davey, Dadan and Wara 2024).

Ultimately, understanding healthcare workers' perspectives is vital for creating implementation strategies that are both effective and equitable. When the workforce views a new intervention as an unmanageable burden rather than a valuable tool, implementation fidelity declines. For instance, Ntimani, Mokoena-de Beer and Phetlhu (2025) documented how South African nurses implementing HIV prevention guidelines experienced significant strain from additional responsibilities amid chronic resource constraints, leading to selective engagement with new protocols and compromised service quality. Therefore, assessing their readiness involves evaluating not only their clinical skills but also their psychological and operational preparedness. Recognizing healthcare workers as strategic partners rather than mere implementers can enable the development of targeted training and support systems that empower them to confidently deliver injectable PrEP, thereby enhancing the public health impact of this promising innovation.

2.5 Campus Health Clinics as Strategic Settings

Campus health clinics serve a unique population of young adults who are at elevated risk for HIV acquisition (Dellar, Dlamini and Karim 2015). These clinics provide accessible, student-centred PHC services, including HIV testing, counselling, contraception, and, increasingly, oral PrEP (Musakwa *et al.* 2021). In South Africa, all 26 public universities maintain campus health clinics that serve approximately 1 million students annually.

The campus setting offers several advantages for HIV prevention. Firstly, these clinics serve a concentrated high-risk population, as university students engage in behaviours that increase HIV risk, making campus clinics ideal sites for targeted interventions (Khumalo *et al.* 2021a). Secondly, universities provide ongoing opportunities for health education, peer support, and behaviour change communication through structured academic and social programming (Musakwa *et al.* 2021). Thirdly, campus clinics often serve as training sites for nursing and medical students, creating opportunities for capacity building and the adoption of innovation that can extend beyond the immediate university context (Cowan *et al.* 2016). However, campus clinics also face unique challenges, including limited resources, fluctuating student populations (due to academic calendars), privacy concerns, and potential stigma associated with accessing HIV services on campus (Rasweswe, Bopape and Ntho 2024). Understanding how healthcare workers in these settings perceive injectable PrEP is essential for tailoring implementation strategies to this specific context.

2.6 Theoretical Perspectives on Innovation Adoption

Multiple factors, including those at the individual, organizational, and systemic levels, influence the adoption of new health interventions. Rogers' Diffusion of Innovations (DOI) theory provides a useful framework for understanding how healthcare workers may adopt injectable PrEP (Rogers 2003; Miller 2015). According to DOI, the rate and extent of adoption are shaped by the perceived attributes of the innovation (relative advantage, compatibility, complexity, trialability, and observability), as well as

communication channels, time, and the social system within which adoption occurs (Rogers 2003).

Healthcare workers' perceptions of injectable PrEP's relative advantage, such as improved adherence and reduced pill burden, may facilitate adoption. However, concerns about complexity, such as the need for specialized training, injection technique, and monitoring for side effects, may act as barriers. Compatibility with existing workflows and values, opportunities for trialability through pilot projects, and the observability of positive outcomes will also influence adoption (Hornor 2022; Spinnewijn *et al.* 2024).

2.7 Conclusion

This traditional literature review has highlighted the persistent HIV burden among young people in South Africa, the evolution of PrEP from oral to long-acting injectable formulations, and the critical role of healthcare workers in implementing new prevention strategies. While injectable PrEP holds significant promise, its successful integration into primary healthcare, particularly in campus settings, depends on understanding and addressing providers' perceptions, readiness, and contextual challenges.

Acknowledging that a biomedical innovation is only as effective as the system that delivers it, it is essential to go beyond the general HIV prevention context and carefully examine the specific evidence for this workforce. Therefore, the following chapter presents a scoping review protocol, which was designed to guide a narrative review to map existing evidence and critically analyze current empirical data on provider preparedness, highlighting both the positive reception and the systemic barriers shaping the landscape of injectable PrEP delivery.

CHAPTER 3

MANUSCRIPT 1

Perspectives of Primary Healthcare Workers on HIV Injectable Pre-Exposure Prophylaxis (PrEP): A Scoping Review Protocol

3.1 Introduction

This chapter describes the *a priori* methodological blueprint that was carefully developed to guide a comprehensive scoping review. By presenting the protocol, this chapter establishes the scientific rigour and transparency on which the rest of this dissertation's findings are based.

3.2 Materials and Methods

The scoping review protocol by Mbatha, Mpofana and Gumede (2025b) follows the Arksey and O'Malley framework, enhanced by (Levac, Colquhoun and O'Brien 2010), and is guided by the PRISMA-ScR guidelines. The methodology comprises nine stages, beginning with defining the research questions using the PCC (Population, Concept, Context) framework. A comprehensive search strategy was developed using controlled vocabulary (e.g., MeSH terms) and free-text terms across databases, including PubMed, Scopus, CINAHL, Web of Science, and Google Scholar, with no language or date restrictions.

Thematic analysis was performed using NVivo software, following an inductive approach to identify emerging themes. Quality appraisal of included studies was conducted using the Mixed Methods Appraisal Tool (MMAT) 2018 version.

3.3 Results

A pilot search confirmed the study's feasibility by demonstrating the availability of relevant literature across major databases, such as PubMed and Scopus, to address the research questions. The protocol defined the specific analytical approach for identifying key themes regarding implementation barriers, training needs, and

systemic readiness gaps. Ultimately, it provided a structured blueprint for synthesizing evidence to guide policy and educational interventions for the rollout of long-acting prevention methods.

3.4 Discussion and interpretation of results

The scoping review methodology was intentionally chosen to gather a broad and diverse range of evidence on primary healthcare workers' perspectives on HIV injectable PrEP. Unlike a meta-analysis, which focuses on narrow and consistent data, this approach highlights breadth. Its strengths include rigour and transparency. Clearly outlined research questions, search strategy, and inclusion criteria ensure reproducibility and credibility. The planned use of the MMAT for quality assessment adds depth, enabling not only the synthesis of existing evidence but also an evaluation of its methodological quality.

3.5 Limitations and Recommendations

While the protocol offers a rigorous framework for mapping primary healthcare workers' perspectives on injectable PrEP, it is restricted by language, as only English-language publications were included, potentially excluding relevant studies from non-English-speaking regions. Additionally, the focus on South African healthcare settings, particularly KwaZulu-Natal, may limit the generalizability of findings to broader contexts. To address these limitations, future research should incorporate multilingual sources and expand the geographical scope to include diverse healthcare environments.

3.6 Conclusion

In conclusion, this scoping review protocol provides a structured approach to explore primary healthcare workers' perspectives on HIV injectable PrEP in South Africa. By identifying existing evidence and gaps, the study aims to guide future training, policy development, and implementation strategies that support the effective integration of long-acting PrEP into primary healthcare settings. Implementing this protocol led to the findings presented in Chapter 4, the Systematic Review, which is under review in the *Discover Public Health journal*.

3.7 Publication Details

The study protocol was published in the *International Journal of Environmental Research and Public Health* as follows:

Mbatha, N.N., Mpofana, N. and Gumedde, D., 2025. Perspectives of Primary Healthcare Workers on HIV Injectable Pre-Exposure Prophylaxis (PrEP): A Scoping Review Protocol. *International Journal of Environmental Research and Public Health*, 22(6), p.830. <https://doi.org/10.3390/ijerph22060830>



Protocol

Perspectives of Primary Healthcare Workers on HIV Injectable Pre-Exposure Prophylaxis (PrEP): A Scoping Review Protocol

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Abstract: South Africa continues to experience a high HIV prevalence, necessitating innovative prevention strategies aligned with the UNAIDS 95-95-95 targets. Long-acting injectable pre-exposure prophylaxis (PrEP), such as cabotegravir (CAB-LA), offers a promising alternative to daily oral regimens. However, the perspectives of primary healthcare workers (PHCWs)—key implementers of this intervention—remain underexplored. This scoping review aims to systematically map existing literature on PHCWs' knowledge, awareness, perceptions, barriers, facilitators, and implementation experiences related to injectable PrEP within the South African healthcare context. The review will follow the Arksey and O'Malley framework, enhanced by Levac et al., and will be reported following PRISMA-ScR guidelines. A comprehensive search will be conducted across PubMed, Scopus, CINAHL (EBSCOhost), Web of Science, and Google Scholar, without language or date restrictions. The search strategy will employ both controlled vocabulary (e.g., MeSH and CINAHL Subject Headings) and free-text terms. Studies meeting the inclusion criteria will be managed using EndNote X20 and appraised using the Mixed Methods Appraisal Tool (MMAT) 2018 version. Data will be synthesized thematically and presented narratively and in tabular form. By consolidating PHCWs' perspectives, this review will identify implementation challenges, training needs, and systemic barriers, informing the development of context-specific strategies for PrEP rollout. The findings are expected to support the design of effective, culturally relevant educational interventions and guide policymakers in strengthening HIV prevention efforts in high-burden settings.

Keywords: perceptions; awareness; injectable HIV pre-exposure prophylaxis (PrEP); primary healthcare workers; implementation challenges; healthcare provider perceptions; HIV prevention



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1. Introduction

According to UNAIDS 2023, approximately 39 million [33.1 million–45.7 million] people globally were living with HIV in 2022. Sub-Saharan Africa is the most affected region, with 25.7 million people living with HIV/AIDS and 470,000 deaths. South Africa has one of the highest HIV/AIDS burdens, with 7.8 million people living with the virus and 110,000 deaths (16% of the global total). KwaZulu-Natal province in South Africa has a particularly high prevalence rate [1]. Injectable PrEP can potentially address some of the challenges associated with daily oral PrEP. It offers a more discreet and convenient option for individuals who may struggle with adherence to daily pill-taking. By providing longer-lasting protection, injectable PrEP could help bridge the gap and reach more people at risk of HIV infection [2]. It is worth noting that while injectable PrEP shows promise,

it is not without its limitations [3]. It requires healthcare providers to administer the injections, which may be a barrier in some settings. Additionally, there are potential side effects and considerations for individuals who may have concerns about needles or medical procedures [4].

The development and availability of injectable PrEP (pre-exposure prophylaxis) marks a significant advancement in the fight against HIV/AIDS, particularly for populations at a higher risk of infection [3]. Injectable PrEP, administered through injections every few months, offers a promising alternative to daily oral pills, potentially improving adherence for individuals who may struggle with daily regimens [2]. This innovation can lead to higher levels of protection and help reduce new HIV infections, contributing to public health goals aimed at controlling and ultimately eradicating the virus. Moreover, the introduction of injectable PrEP is especially crucial in areas heavily affected by HIV, where traditional methods may not be as effective due to various barriers, including stigma, forgetfulness, or access to healthcare facilities [5]. This long-acting formulation could be a game changer, particularly for young people, men who have sex with men, and transgender individuals, who often face unique challenges in accessing preventive measures [6].

However, while the introduction of injectable PrEP is a promising development, it is essential to prioritize equitable access to all effective prevention methods. This involves addressing systemic barriers that disproportionately affect marginalized communities, such as socioeconomic disparities, lack of healthcare resources, and cultural stigma surrounding HIV and its prevention [7]. Public health initiatives should focus on comprehensive education, outreach programs, and policy changes that facilitate access to both injectable PrEP and other prevention strategies, such as oral PrEP, condoms, and regular testing [8]. By ensuring that these tools are available to everyone, regardless of their background or circumstances, we can move closer to achieving health equity and ultimately reducing the burden of HIV globally [9].

The rationale for reviewing primary healthcare workers' perspectives on injectable PrEP, particularly cabotegravir (CAB-LA), stems from the growing recognition of its potential as a viable HIV prevention strategy. Existing studies indicate a preference for injectable over oral PrEP due to improved adherence and convenience, especially among populations seeking privacy and discretion [10]. The perspectives of primary healthcare workers (PHCWs) are essential because they are on the front lines of healthcare delivery and play a critical role in the successful implementation of new interventions. Their insights can help identify practical barriers and facilitators to the adoption of injectable PrEP, ensuring that the intervention is both effective and feasible in real-world settings. PHCWs' acceptance and support are crucial for the successful rollout of injectable PrEP, as they are responsible for educating patients, administering the injections, and monitoring adherence and side effects.

In the context of South Africa, where the HIV epidemic is particularly severe, understanding the views of PHCWs is crucial [11]. South Africa has recently approved the use of long-acting injectable PrEP, such as Cabotegravir, which offers a promising new option for HIV prevention [12]. However, the implementation of this intervention in resource-limited settings presents unique challenges. These include logistical issues, such as the storage and administration of injectable medications, as well as socio-cultural barriers, such as stigma and misconceptions about HIV prevention methods [13].

Historically, reviews have focused on oral PrEP and its implementation challenges [14]. This current proposal builds on that foundation by specifically addressing injectable PrEP, which represents a significant advancement in HIV prevention strategies. The research team, comprising experts in scoping reviews and occupational health, developed the protocol. A librarian developed a highly sensitive search strategy without date or language limitations,

aiming for broad access to the existing literature. All information obtained in the scoping review stages enhances transparency, thus supporting methodological replication and minimizing biases and data duplication, according to the principles of open science.

By synthesizing the perspectives of healthcare workers, this review offers valuable insights into the potential challenges and opportunities associated with the rollout of injectable PrEP. These insights will assist policymakers and healthcare providers in creating effective strategies to enhance the uptake and delivery of this promising HIV prevention tool.

Understanding healthcare workers' insights is crucial for addressing these barriers and optimizing implementation strategies, ultimately enhancing HIV prevention efforts across diverse communities [15]. Injectable PrEP, particularly cabotegravir (CAB-LA), has emerged as a significant advancement in HIV prevention, demonstrating superior efficacy compared to oral PrEP [16]. Clinical trials have shown that consistent use of CAB-LA can reduce the risk of HIV acquisition by over 90%, making it a critical tool in combating the epidemic, especially among high-risk populations [10,17]. The World Health Organization has expanded its recommendations to include all individuals at substantial risk of HIV infection, thereby broadening the scope of PrEP beyond just key populations [18].

Despite these advancements, the implementation of injectable PrEP faces numerous challenges. Research indicates that awareness and knowledge deficits among healthcare workers (HCWs) significantly hinder the effective rollout of PrEP services. Many HCWs express concerns about patient adherence, potential behavioral risk compensation, and their readiness to deliver this new intervention [19]. Furthermore, while some studies have explored patient perspectives on injectable PrEP, there remains a lack of comprehensive understanding regarding HCWs' attitudes, beliefs, and perceived barriers to its implementation [20]. There is a gap in the knowledge and acceptance of HIV-injectable PrEP among primary healthcare workers [21,22]. This lack of awareness and understanding may hinder the effective implementation of PrEP programs and impact the overall success of HIV prevention efforts [19].

Most existing literature has concentrated on patient experiences and preferences regarding PrEP, particularly in high-income countries. There is insufficient attention given to the perceptions of HCWs, especially in low- and middle-income countries (LMICs), where they play a crucial role as gatekeepers in the delivery of HIV prevention services [11,23]. HCWs have reported feeling inadequately trained to prescribe and manage injectable PrEP. This lack of confidence could lead to reluctance in recommending PrEP to patients, which ultimately may affect uptake [24]. This scoping review aims to map evidence available in the literature on healthcare workers' (HCWs) perspectives regarding injectable pre-exposure prophylaxis (PrEP), specifically cabotegravir (CAB-LA), by understanding their views on acceptability, challenges, and facilitators for implementation, which may provide valuable insights to inform future training programs and policy decisions. Ultimately, enhancing HCW engagement with injectable PrEP is crucial for optimizing its integration into HIV prevention strategies globally, focusing on specific questions and objectives, and highlighting key elements such as the population, concepts, and context involved. Cabotegravir long-acting (CAB-LA) is an injectable form of pre-exposure prophylaxis (PrEP) for HIV prevention. It is administered intramuscularly, with the first two injections given four weeks apart, followed by an injection every eight weeks [25]. CAB-LA is highly effective in reducing the risk of HIV acquisition, with studies indicating a 79% relative reduction in HIV risk compared to oral PrEP [25]. CAB-LA is recommended as an additional HIV prevention option for people at substantial risk of HIV infection due to its high efficacy and the convenience of less frequent dosing compared to daily oral PrEP [10]. This makes it a valuable tool in the global effort to reduce new HIV infections and improve adherence to HIV prevention strategies [26].

1.1. Research Question

This scoping review aims to map evidence available in the literature on healthcare workers' (HCWs) perspectives regarding injectable pre-exposure prophylaxis (PrEP), specifically cabotegravir (CAB-LA), by understanding their views on acceptability, challenges, and facilitators for implementation. The research question that guides this scoping review is as follows:

What evidence exists on the knowledge, awareness, perceptions, barriers, and implementation experiences of primary healthcare workers in South Africa regarding the use of injectable HIV pre-exposure prophylaxis (PrEP)?

1. What are healthcare workers' perceptions regarding the acceptability of injectable PrEP among their patients?
2. What challenges do healthcare workers face in recommending and administering injectable PrEP?
3. What facilitators do healthcare workers identify that could enhance the implementation of injectable PrEP in clinical settings?
4. What training and support mechanisms do healthcare workers believe are necessary for the effective delivery of injectable PrEP?

General Objective: To provide a comprehensive understanding of primary healthcare workers' (PHCWs) perspectives on the use of injectable pre-exposure prophylaxis (PrEP) for HIV prevention.

1.2. Objectives

The objectives of this scoping protocol are as follows:

To identify existing literature on healthcare workers' views regarding injectable PrEP.
To assess the implications of these perspectives for future research and practice.

By addressing these objectives, this scoping review aims to provide a comprehensive understanding of HCW perspectives on injectable PrEP, ultimately informing strategies for its successful implementation in diverse healthcare contexts.

1.3. Search Strategy

("pre exposure prophylaxis"[MeSH Terms]) AND (Knowledge OR awareness OR "Health Knowledge, Attitudes, Practice" OR attitude OR "attitude of health personnel"[MeSH Terms] OR "implementation" OR "barriers" OR "facilitators" OR "training" OR "support mechanisms")

("Primary Health Care"[Mesh] OR "Health Personnel"[Mesh] OR "healthcare workers" OR "health care providers" OR "nurses" OR "clinicians") AND ("HIV"[Mesh] OR "Human Immunodeficiency Virus") AND ("Pre-Exposure Prophylaxis"[Mesh] OR "injectable PrEP" OR "long-acting PrEP" OR "cabotegravir" OR "CAB-LA") AND ("Attitude of Health Personnel"[Mesh] OR "perception" OR "perspective" OR "knowledge" OR "awareness" OR "experience" OR "acceptability" OR "barriers" OR "facilitators")

The review aims to capture a comprehensive view of the challenges and opportunities associated with implementing injectable PrEP in diverse healthcare contexts by including these databases and sources.

2. Methodology

This scoping review protocol was designed using the JBI manual and the theoretical framework proposed by Arksey and O'Malley. In addition, the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) guided its development (2018) [27]. The protocol follows nine steps, as shown in Figure 1.

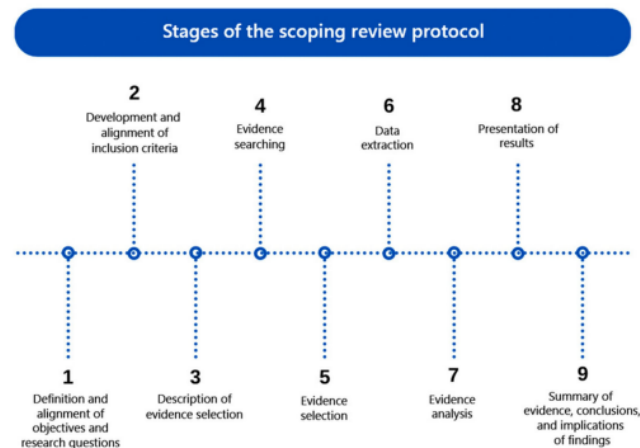


Figure 1. Stages of the scoping review protocol.

2.1. Stage One: Definition and Alignment of Objectives and Research Questions

The research questions are defined using the PCC (Population, Concept, Context) framework. For this review, the population is primary healthcare workers, the concept is their perspectives on HIV injectable PrEP, and the context is the healthcare settings in South Africa. The PCC framework enables the mapping of various information, identification of potential knowledge gaps, presentation of key concepts, broad quantification of aspects of interest, and determination of practices and evidence within a specific thematic area. This framework will be used to define the research question.

For this review, we establish P as the Primary healthcare workers, C as the Perspectives of healthcare workers on HIV Injectable PrEP, including their attitudes, beliefs, knowledge, challenges, and experiences, and C as the healthcare setting where HIV Injectable PrEP is being implemented, such as clinics, hospitals, community health centers, or public health programs (Table 1).

Table 1. Definition of concepts used in the review.

Mnemonic Elements	Concepts	Definition
Population	Primary healthcare workers	Healthcare workers are involved in HIV prevention, treatment, and care. This could include doctors, nurses, pharmacists, and public health professionals who interact with patients regarding HIV prevention methods. We include doctors, who diagnose and treat illnesses, prescribe medications, and provide preventive care; nurses, who provide patient care, administer medications, and support patient education and preventive measures; pharmacists, who dispense medications, provide medication counseling, and support patient adherence to prescribed treatments; community health workers, who provide basic health and medical care within the community, often focusing on preventive care and health education; and public health professionals, who work on health promotion, disease prevention, and health policy implementation at the community or population level. By explicitly defining these roles, we ensure clarity and comprehensiveness in identifying and analyzing the perspectives of primary healthcare workers on HIV injectable PrEP.

Table 1. Cont.

Mnemonic Elements	Concepts	Definition
Concept	Perspectives of healthcare workers on HIV Injectable PrEP, including their attitudes, beliefs, knowledge, challenges, and experiences	Perspectives encompass attitudes, beliefs, knowledge, challenges, and experiences of healthcare workers concerning Injectable Pre-Exposure Prophylaxis (PrEP) for HIV prevention. This includes their knowledge about PrEP, willingness to prescribe, perceived effectiveness, barriers to implementation, and overall support for PrEP among their patients.
Context	The healthcare setting where HIV Injectable PrEP is being implemented, such as clinics, hospitals, community health centers, or public health programs	The setting in which healthcare workers operate which may include hospitals, clinics, community health centers, and public health programs. It might also involve considerations of geographical location, such as urban versus rural settings, and the influence of local health policies and cultural attitudes toward HIV and preventive measures.

Thus, the research questions are as follows: What are healthcare workers' perceptions regarding the acceptability of injectable PrEP among their patients? What challenges do healthcare workers face in recommending and administering injectable PrEP? What facilitators do healthcare workers identify that could enhance the implementation of injectable PrEP in clinical settings? What training and support mechanisms do healthcare workers believe are necessary for the effective delivery of injectable PrEP?

2.1.1. Review Questions

Questions that will be guiding the study are as follows:

1. What are healthcare workers' perceptions regarding the acceptability of injectable PrEP among their patients?
2. What challenges do healthcare workers face in recommending and administering injectable PrEP?
3. What facilitators do healthcare workers identify that could enhance the implementation of injectable PrEP in clinical settings?
4. What training and support mechanisms do healthcare workers believe are necessary for the effective delivery of injectable PrEP?

Thus, the research questions are as follows:

2.1.2. Search Strategy

To ensure consistency between the search strategy and the review objectives, we have revised the search equation to align with the PCC framework. The revised search equation is as follows:

("Primary Health Care"[Mesh] OR "Health Personnel"[Mesh] OR "healthcare workers" OR "health care providers" OR "nurses" OR "clinicians") AND ("HIV"[Mesh] OR "Human Immunodeficiency Virus") AND ("Pre-Exposure Prophylaxis"[Mesh] OR "injectable PrEP" OR "long-acting PrEP" OR "cabotegravir" OR "CAB-LA") AND ("Attitude of Health Personnel"[Mesh] OR "perception" OR "perspective" OR "knowledge" OR "awareness" OR "experience" OR "acceptability" OR "barriers" OR "facilitators")

2.1.3. Criteria for Selection of Search Terms

The search terms were selected based on their relevance to the PCC framework and the specific objectives of the review. The criteria for selection included the following:

- **Relevance to Population:** Terms related to primary healthcare workers, such as “healthcare workers”, “attitude of health personnel”, and “primary health care workers”;
- **Relevance to Concept:** Terms related to perspectives on injectable PrEP, including “knowledge”, “awareness”, “attitudes”, “perceptions”, “implementation”, “barriers”, “facilitators”, “training”, and “support mechanisms”;
- **Relevance to Context:** Terms related to the healthcare settings in South Africa, ensuring the inclusion of studies conducted in relevant geographical and healthcare contexts.

2.1.4. Rationale for Database Selection

The selected databases provide a comprehensive and interdisciplinary approach to literature review. PubMed is chosen for its extensive coverage of biomedical literature, while Scopus offers broad interdisciplinary coverage. Google Scholar is included for its ability to capture gray literature and diverse sources. EBSCOhost provides access to multiple databases, including CINAHL and PsycINFO, which are valuable for nursing, allied health, and behavioral sciences literature. Medline is essential for comprehensive medical literature, and CINAHL focuses specifically on nursing and allied health. PsycINFO covers behavioral and social sciences, and Web of Science offers extensive citation data across various disciplines. Additional sources of gray literature will include conference abstracts, policy documents, and reports from relevant health organizations.

This selection ensures a robust and well-rounded literature review, capturing a wide range of relevant studies and sources.

2.1.5. Presentation of Results

The results will be reported following the PRISMA-ScR guidelines (2018) [27] and summarized to capture the perspectives of primary healthcare workers on HIV injectable pre-exposure prophylaxis in KwaZulu-Natal, South Africa, across various contexts. The contexts to be included are as follows:

- **Geographical Contexts:** Urban versus rural settings, and different regions within South Africa;
- **Healthcare Settings:** Clinics, hospitals, community health centers, and public health programs;
- **Socio-Cultural Contexts:** Influence of local health policies, cultural attitudes toward HIV, and preventive measures.

By including these contexts, the review aims to provide a comprehensive understanding of the challenges and opportunities associated with implementing injectable PrEP in diverse healthcare environments.

2.2. Stage Two: Development and Alignment of Inclusion Criteria

The eligibility criteria for sources of evidence included in this scoping review on the perspectives of healthcare workers regarding injectable PrEP (cabotegravir) are outlined below. These criteria are designed to ensure a comprehensive and relevant selection of literature while maintaining rigor in the review process.

The review will consider studies published from January 2018 to September 2023. This timeframe is selected to capture recent advancements in injectable PrEP, particularly after the clinical trials and subsequent approval of cabotegravir, which started gaining attention in the early 2010s. Only studies published in English will be included. This criterion is chosen due to resource constraints and the availability of translation services. However, if relevant studies in other languages are identified, they may be considered for inclusion if translation can be arranged. Both peer-reviewed articles and gray literature (such as reports, conference abstracts, and policy documents) will be included. This approach

is justified as it allows for a broader understanding of healthcare workers' perspectives beyond traditional academic publications, capturing insights from practice-based evidence and real-world experiences. Qualitative, quantitative, and mixed-method studies will be eligible for inclusion. This criterion is important because it enables a diverse range of perspectives to be analyzed, enriching the overall findings of the review. Studies must focus on healthcare workers involved in HIV prevention efforts, including, but not limited to, doctors, nurses, pharmacists, and community health workers. This focus is critical, as these individuals play a vital role in the implementation and administration of injectable PrEP. Eligible studies must explicitly address at least one of the following concepts related to injectable PrEP: acceptability, challenges/barriers to implementation, facilitators/enablers for uptake, or training needs. This ensures the review remains focused on the core objectives related to healthcare worker perspectives.

The rationale behind these eligibility criteria is to create a robust framework for identifying relevant literature that can inform our understanding of healthcare workers' perspectives on injectable PrEP. By including a range of study designs and types of literature, the review aims to capture a comprehensive view of the challenges and opportunities associated with implementing this critical HIV prevention strategy. Additionally, focusing on recent publications ensures that the findings reflect current practices and attitudes within the rapidly evolving field of HIV prevention.

2.3. Stage Three: Description of Evidence Selection

Using the following keywords: "Perceptions, Awareness, Injectable HIV Pre-Exposure Prophylaxis (PrEP), Primary Health Care Workers, and South Africa", we will create "index terms" by combining keywords and their synonyms. We will utilize Boolean operators such as "AND" and "OR" along with truncations to formulate search strings. For example, "Perceptions AND Awareness". The search terms have been carefully chosen to align with the PCC (Population, Concept, Context) framework, which guided the development of the scoping review protocol. These terms aim to capture individual and systemic factors influencing PrEP-related practices. Lastly, we have incorporated search terms specific to South Africa to maintain geographical relevance and ensure that the findings apply to the local healthcare landscape. The combination of these terms is designed to yield a comprehensive, focused set of results that will effectively inform the scope and direction of the review.

2.4. Stage Four: Evidence Searching

We conducted a pilot literature search on PubMed. Based on our inclusion criteria to demonstrate the feasibility of addressing our research question through a scoping review method. The findings from this pilot search are summarized in Table 2. The search summary table details the date of the search, the search query, the database name, and the search results.

2.4.1. Screening Process

All search results from the databases will be exported into a reference management tool (e.g., EndNote or Covidence) to facilitate organization and deduplication. Two independent reviewers will screen the titles and abstracts of all identified records against the pre-defined eligibility criteria. Each reviewer will assess whether the study meets inclusion criteria based on keywords related to healthcare workers and injectable PrEP. Disagreements between reviewers will be resolved through discussion, and if necessary, a third reviewer will be consulted. Studies that pass the initial screening will be retrieved in full text. The same two reviewers will independently evaluate the full texts against the eligibility criteria. Reasons for exclusion at this stage will be documented for transparency.

Table 2. Outcomes from PubMed search history.

Search Number	Query	Sort By	Search Details	Results	Time
4	((“primary healthcare workers” OR “healthcare personnel” OR “health workers” OR “nurses”[Mesh] OR “clinicians” OR “health personnel”[Mesh]) AND (“perspectives” OR “attitudes”[Mesh] OR “beliefs” OR “perceptions” OR “views” OR “knowledge”[Mesh] OR “awareness” OR “experience” OR “barrier” OR “challenge” OR “facilitator”) AND (“HIV”[Mesh] OR “HIV infections”[Mesh] OR “human immunodeficiency virus”) AND (“injectable PrEP” OR “long-acting PrEP” OR “cabotegravir” OR “CAB-LA” OR “Pre-Exposure Prophylaxis”[Mesh]) AND (“healthcare setting” OR “clinics” OR “hospitals” OR “community health centre” OR “primary health care”[Mesh] OR “public health program”))	Most Recent	((“primary healthcare workers”[All Fields] OR “healthcare personnel”[All Fields] OR “health workers”[All Fields] OR “nurses”[MeSH Terms] OR “clinicians”[All Fields] OR “health personnel”[MeSH Terms]) AND (“perspectives”[All Fields] OR “beliefs”[All Fields] OR “perceptions”[All Fields] OR “views”[All Fields] OR “knowledge”[MeSH Terms] OR “awareness”[All Fields] OR “experience”[All Fields] OR “barrier”[All Fields] OR “challenge”[All Fields] OR “facilitator”[All Fields] OR “HIV”[All Fields] OR “HIV infections”[MeSH Terms] OR “human immunodeficiency virus”[All Fields]) AND (“injectable PrEP”[All Fields] OR “long-acting PrEP”[All Fields] OR “cabotegravir”[All Fields] OR “CAB-LA”[All Fields] OR “Pre-Exposure Prophylaxis”[MeSH Terms]) AND (“healthcare setting”[All Fields] OR “clinics”[All Fields] OR “hospitals”[All Fields] OR “community health centre”[All Fields] OR “primary health care”[MeSH Terms] OR “public health program”[All Fields])	73	09:51:59
3	((“primary healthcare workers” OR “healthcare personnel” OR “health workers” OR “nurses”[Mesh] OR “clinicians” OR “health personnel”[Mesh]) AND (“perspectives” OR “attitudes”[Mesh] OR “beliefs” OR “perceptions” OR “views” OR “knowledge”[Mesh] OR “awareness” OR “experience” OR “barrier” OR “challenge” OR “facilitator”) AND (“HIV”[Mesh] OR “HIV infections”[Mesh] OR “human immunodeficiency virus”) AND (“injectable PrEP” OR “long-acting PrEP” OR “cabotegravir” OR “CAB-LA” OR “Pre-Exposure Prophylaxis”[Mesh]) AND (“healthcare settings” OR “clinics” OR “hospitals” OR “community health centres” OR “primary health care”[Mesh] OR “public health programs”) AND (“South Africa”[Mesh] OR “South Africa”))	Most Recent	((“primary healthcare workers”[All Fields] OR “healthcare personnel”[All Fields] OR “health workers”[All Fields] OR “nurses”[MeSH Terms] OR “clinicians”[All Fields] OR “health personnel”[MeSH Terms]) AND (“perspectives”[All Fields] OR “beliefs”[All Fields] OR “perceptions”[All Fields] OR “views”[All Fields] OR “knowledge”[MeSH Terms] OR “awareness”[All Fields] OR “experience”[All Fields] OR “barrier”[All Fields] OR “challenge”[All Fields] OR “facilitator”[All Fields]) AND (“HIV”[MeSH Terms] OR “HIV infections”[MeSH Terms] OR “human immunodeficiency virus”[All Fields]) AND (“injectable PrEP”[All Fields] OR “long-acting PrEP”[All Fields] OR “cabotegravir”[All Fields] OR “CAB-LA”[All Fields] OR “Pre-Exposure Prophylaxis”[MeSH Terms]) AND (“healthcare settings”[All Fields] OR “clinics”[All Fields] OR “hospitals”[All Fields] OR “community health centres”[All Fields] OR “primary health care”[MeSH Terms] OR “public health programs”[All Fields]) AND (“South Africa”[MeSH Terms] OR “South Africa”[All Fields])	6	09:50:10

Table 2. Cont.

Search Number	Query	Sort By	Search Details	Results	Time
2	((("primary care" OR "primary healthcare" OR "primary health care" OR "community health services"[Mesh]) AND ("healthcare workers" OR "health workers" OR "health personnel"[Mesh] OR "nurses"[Mesh] OR "clinicians")) AND ("HIV"[Mesh] OR "HIV infections"[Mesh] OR "human immunodeficiency virus" AND ("Pre-Exposure Prophylaxis" OR "injectable PrEP" OR "long-acting PrEP" OR "cabotegravir" OR "CAB-LA")) AND ("perceptions" OR "perspectives" OR "attitudes" OR "views" OR "knowledge" OR "awareness" OR "implementation experience" OR "barriers" OR "facilitators"))	Most Recent	("primary care"[All Fields] OR "primary healthcare"[All Fields] OR "primary health care"[All Fields] OR "community health services"[MeSH Terms]) AND ("healthcare workers"[All Fields] OR "health workers"[All Fields] OR "health personnel"[MeSH Terms] OR "nurses"[MeSH Terms] OR "clinicians"[All Fields]) AND ("HIV"[MeSH Terms] OR "HIV infections"[MeSH Terms] OR "human immunodeficiency virus"[All Fields]) AND ("Pre-Exposure Prophylaxis"[All Fields] OR "injectable PrEP"[All Fields] OR "long-acting PrEP"[All Fields] OR "cabotegravir"[All Fields] OR "CAB-LA"[All Fields]) AND ("perceptions"[All Fields] OR "perspectives"[All Fields] OR "attitudes"[All Fields] OR "views"[All Fields] OR "knowledge"[All Fields] OR "awareness"[All Fields] OR "implementation experience"[All Fields] OR "barriers"[All Fields] OR "facilitators"[All Fields])	92	09:43:17
1	("Primary Health Care"[Mesh] OR "Health Personnel"[Mesh] OR "healthcare workers" OR "health care providers" OR "nurses" OR "clinicians") AND ("HIV"[Mesh] OR "Human Immunodeficiency Virus") AND ("Pre-Exposure Prophylaxis"[Mesh] OR "injectable PrEP" OR "long-acting PrEP" OR "cabotegravir" OR "CAB-LA") AND ("Attitude of Health Personnel"[Mesh] OR "perception" OR "perspective" OR "knowledge" OR "awareness" OR "experience" OR "acceptability" OR "barriers" OR "facilitators")	Most Recent	("Primary Health Care"[MeSH Terms] OR "Health Personnel"[MeSH Terms] OR "healthcare workers"[All Fields] OR "health care providers"[All Fields] OR "nurses"[All Fields] OR "clinicians"[All Fields]) AND ("HIV"[MeSH Terms] OR "Human Immunodeficiency Virus"[All Fields]) AND ("Pre-Exposure Prophylaxis"[MeSH Terms] OR "injectable PrEP"[All Fields] OR "long-acting PrEP"[All Fields] OR "cabotegravir"[All Fields] OR "CAB-LA"[All Fields]) AND ("Attitude of Health Personnel"[MeSH Terms] OR "perception"[All Fields] OR "perspective"[All Fields] OR "knowledge"[All Fields] OR "awareness"[All Fields] OR "experience"[All Fields] OR "acceptability"[All Fields] OR "barriers"[All Fields] OR "facilitators"[All Fields])	62	09:09:50

Truncation symbol (*) used to retrieve all variants of a word stem in database searches.

2.4.2. Eligibility Criteria

Sources included in the review must meet the following criteria: Published between January 2018 and October 2023. Available in English. Focus on healthcare workers involved in HIV prevention efforts. Address concepts related to acceptability, barriers, or facilitators of injectable PrEP. This structured selection process aims to ensure that only relevant and high-quality studies are included in the scoping review, thereby providing a comprehensive overview of healthcare workers' perspectives on injectable PrEP.

2.5. Step Five: Evidence Selection

A standardized data charting form will be created based on the key variables identified from the research questions. This form will include fields for essential information such as

study characteristics (author, year, study design), participant demographics, key findings related to acceptability, barriers, facilitators, and any training needs identified by healthcare workers. The charting form will be piloted with a subset of included studies to ensure clarity and comprehensiveness before full implementation. Two independent reviewers will chart data from each included source using the standardized form. This dual-review process helps minimize errors and ensures reliability in data extraction. Each reviewer will extract data independently to maintain objectivity, and discrepancies between their extractions will be resolved through discussion or consultation with a third reviewer if necessary. The charting process is designed to be iterative; as data are extracted, additional relevant variables may be identified. The charting form can be updated accordingly to capture new insights that emerge during the review. If any uncertainties or ambiguities arise during the charting process, reviewers may reach out to the studies' original authors for clarification or additional data. This step ensures that the extracted information is accurate and comprehensive. Once all data have been charted, a descriptive summary will be generated to synthesize findings across studies. This summary will address the review's objectives and provide insights into healthcare workers' perspectives on injectable PrEP.

2.6. Step Six: Data Extraction

The researcher will extract key information from the selected studies, such as Study characteristics (authors, year, methodology). Key findings on perceptions and awareness. Themes identified in the qualitative data (e.g., barriers to PrEP uptake, knowledge gaps). An electronic information mapping document will be used to collect applicable records for each picked article. Screeners independently complete the data table form electronically with any literature that has characteristics and key information applicable to the review question (Table 3).

Table 3. Data charting form.

Title of the study
Author and year of publication
keywords
Study location
Study sector/setting
Study Aim
Study design
Study population(Primary healthcare managers, HIV nurses, HIV Counselling and Testing counsellors, and health promoters above 18)
Findings
Conclusion

2.7. Step Seven: Evidence Analysis

The researcher will organize the extracted data to identify themes and patterns. This will involve creating summary tables or thematic maps to illustrate perceptions and awareness levels and crafting narrative summaries to highlight significant findings and gaps in the literature. The analysis will be conducted using NVivo 12 software.

A standardized data charting form will be created based on the key variables identified from the research questions. This form will include fields for essential information such as study characteristics (author, year, study design), participant demographics, key findings related to acceptability, barriers, facilitators, and any training needs identified by healthcare workers. The charting form will be piloted with a subset of included studies to ensure clarity and comprehensiveness before full implementation. Two independent reviewers will chart data from each included source using the standardized form. This dual-review process helps minimize errors and ensures reliability in data extraction. Each reviewer

will extract data independently to maintain objectivity, and discrepancies between their extractions will be resolved through discussion or consultation with a third reviewer if necessary. The charting process is designed to be iterative; as data are extracted, additional relevant variables may be identified. The charting form can be updated accordingly to capture new insights that emerge during the review. If any uncertainties or ambiguities arise during the charting process, reviewers may reach out to the studies' original authors for clarification or additional data. This step ensures that the extracted information is accurate and comprehensive.

2.7.1. Thematic Analysis Process

The extracted data will be organized to identify themes and patterns. This will involve creating summary tables or thematic maps to illustrate perceptions and awareness levels and crafting narrative summaries to highlight significant findings and gaps in the literature. The analysis will be conducted using NVivo software.

We will employ an inductive thematic analysis approach to allow themes to emerge from the data without imposing preconceived categories. The steps involved in the thematic analysis process are as follows:

1. Familiarization with Data: Reviewers will read and re-read the data to become familiar with the content.
2. Generating Initial Codes: Initial codes will be generated based on significant features of the data. These codes will be applied to the entire dataset.
3. Searching for Themes: Codes will be collated into potential themes, gathering all data relevant to each potential theme.
4. Reviewing Themes: Themes will be reviewed and refined to ensure they accurately represent the data. This may involve merging, splitting, or discarding themes.
5. Defining and Naming Themes: Each theme will be clearly defined and named, capturing the essence of what the theme represents.
6. Producing the Report: A detailed report will be produced, including thematic maps, narrative summaries, and illustrative quotes from the data.

2.7.2. Quality Appraisal

To assess the methodological quality of the included studies, this review will employ the Mixed Methods Appraisal Tool (MMAT), version 2018. The MMAT is specifically designed for the critical appraisal of studies included in systematic and scoping reviews that incorporate qualitative, quantitative, and mixed methods research (REF). This quality appraisal method allows for the evaluation of five categories of study designs: (1) qualitative research, (2) randomized controlled trials, (3) non-randomized studies, (4) quantitative descriptive studies, and (5) mixed methods studies. Two independent reviewers will conduct the appraisal to ensure objectivity and minimize bias. Each study will be scored based on the MMAT criteria, with ratings categorized as follows: high quality (100%), above average (75%), average (50%), and low quality (25%). Discrepancies in scoring will be resolved through discussion or consultation with a third reviewer. This quality assessment process will enhance the reliability of the review findings and support informed interpretation of the included evidence.

2.8. Step Eight: Presentation of Results

The results will be presented following the PRISMA-ScR guidelines using a structured approach that includes descriptive statistics, thematic synthesis, and narrative reporting. Extracted data will be analyzed to identify and organize themes relevant to the research aim, which is to map existing evidence on primary healthcare workers' views of injectable PrEP.

Key outcomes such as knowledge, awareness, perceptions, barriers, and implementation strategies will be highlighted. These findings will be contextualized with the review question and broader study objectives. A narrative summary will accompany the thematic results, and the review will be submitted for publication in a peer-reviewed journal to ensure transparency and dissemination of findings.

2.9. Step Nine: Summary of Evidence

In this stage, we will summarize the findings of the included studies regarding the primary objective of the scoping review: to explore the perspectives of primary healthcare workers on the implementation and delivery of HIV injectable PrEP. The extracted data will be collated and categorized according to major thematic domains, such as knowledge of PrEP, attitudes toward its use, perceived barriers, training needs, and readiness for implementation. The summarized evidence will be presented using tables and figures to facilitate clarity and comparison across studies. For example, a frequency table will highlight the number of studies reporting specific themes, while bar graphs and stacked charts will illustrate the distribution of perspectives and identify knowledge gaps across different domains.

This summary will allow us to perform the following tasks:

- Highlight areas where perspectives are consistently reported across contexts (e.g., strong support for PrEP efficacy);
- Identify domains with limited or inconsistent evidence (e.g., training and capacity-building needs);
- Suggest priority areas for future primary research, particularly in underrepresented regions or settings;
- Inform policymakers and implementation planners about healthcare worker readiness and concerns regarding the injectable PrEP rollout.

By mapping the current landscape of knowledge, this stage will also guide the development of targeted interventions, training programs, and support mechanisms aimed at improving the integration of HIV injectable PrEP into primary healthcare services.

Below are examples of how we will summarise our findings: Table 4, Figures 2–4

Table 4. Summary of included studies (Example).

Study ID	Author(s), Year	Country	Study Design	Healthcare Workers	Setting	Key Findings Related to Perspective
001	Smith et al., 2021	Kenya	Qualitative	Nurses, CHWs	Rural Clinic	Positive attitudes but limited training
002	Zhang et al., 2022	USA	Mixed methods	Physicians, Nurses	Urban Hospital	Concern about long-term adherence
003	Nguyen et al., 2023	Vietnam	Quantitative	Nurses	Community Health Center	Supportive but unclear guidelines

This bar chart illustrates the frequency of different themes identified across studies regarding primary healthcare workers' perspectives on HIV injectable PrEP.

This stacked bar chart summarizes the evidence identified in the review across key domains and visually highlights knowledge gaps where fewer studies were found. The lighter bars indicate areas needing further research.

This updated bar chart illustrates the number of studies that reported each major theme regarding healthcare workers' perspectives on injectable PrEP for HIV prevention.

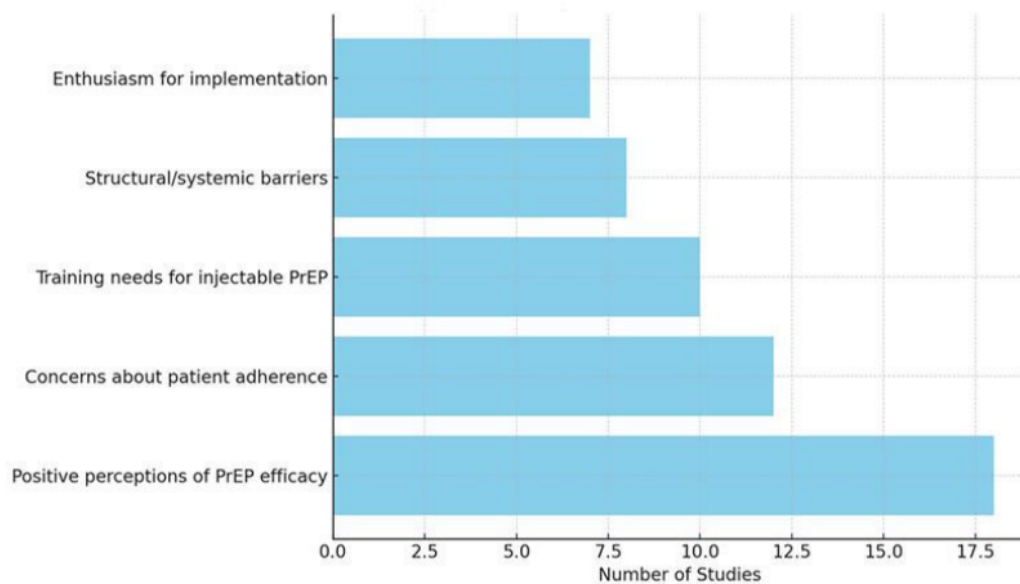


Figure 2. Types of perspectives identified across studies (illustrative).

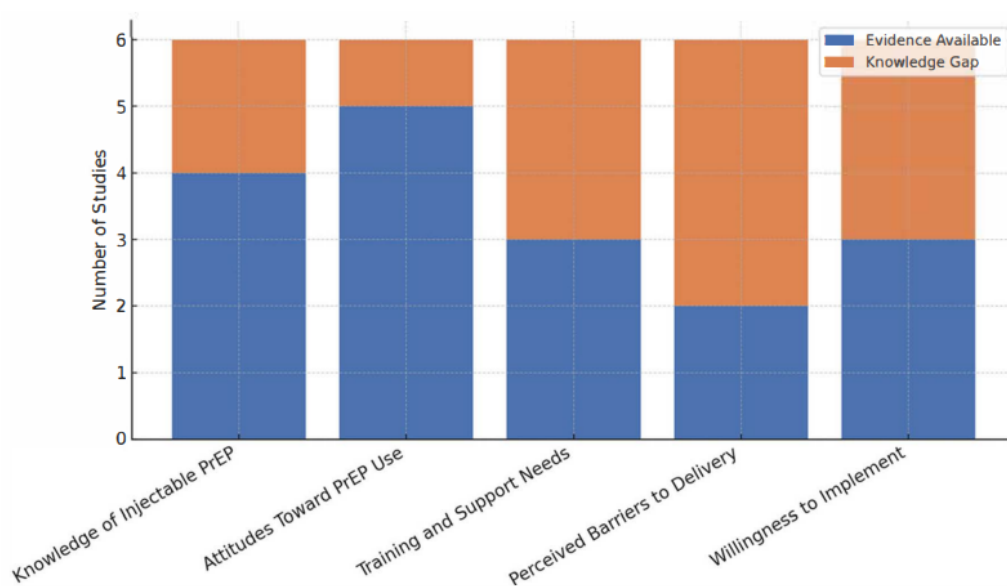


Figure 3. Summary of evidence and knowledge gaps.

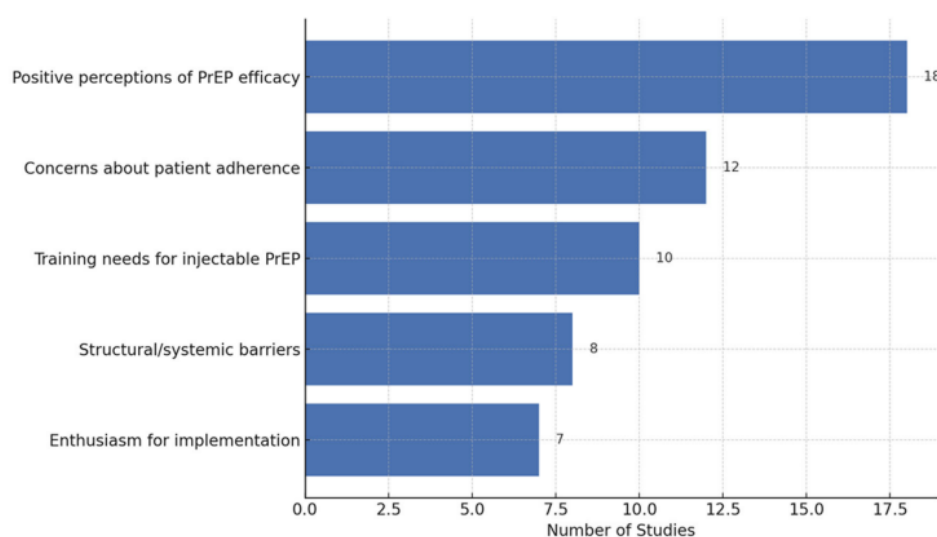


Figure 4. Types of perspectives identified across studies (bar chart).

3. Discussion

This study aims to address the high burden of HIV, aligning with the Joint United Nations Programme on HIV/AIDS (UNAIDS) 95-95-95 targets, by exploring the interplay of factors shaping healthcare workers' knowledge and perceptions. The goal is to propose recommendations for the PrEP education program in KwaZulu-Natal, South Africa.

The scoping review on healthcare workers' perspectives regarding injectable pre-exposure prophylaxis (PrEP) has revealed several key findings, highlighting the acceptability, barriers, and facilitators associated with this innovative HIV prevention method. The review synthesized data from various studies, leading to the identification of prominent concepts and themes that aligned with the review questions and objectives. A significant theme across studies is the overall acceptability of injectable PrEP among various populations, including people who inject drugs (PWID), men who have sex with men (MSM), and healthcare workers.

4. Conclusions

The proposed scoping review protocol allows for the methodological identification of studies on the perspectives of primary healthcare workers on HIV injectable pre-exposure prophylaxis in KwaZulu-Natal, South Africa. The results will be published in peer-reviewed open-access journals to disseminate.

The researcher will comprehensively analyze the practical implications stemming from the study's findings, specifically targeting areas such as policy, practice, and future research directions. For instance, one of the key recommendations may involve developing and implementing targeted training programs for healthcare workers to enhance their understanding and knowledge of injectable PrEP (pre-exposure prophylaxis). This initiative would not only equip healthcare professionals with vital information but also empower them to effectively educate patients about the benefits and usage of this preventive measure. Additionally, the researcher may advocate for improved communication strategies within healthcare settings to ensure that information regarding PrEP is conveyed clearly and effectively, thereby fostering a more informed patient population and promoting greater

uptake of this critical health intervention. Changes to this protocol will be reported in the final version, including dates and justifications.

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References

- Govender, R.D.; Hashim, M.J.; Khan, M.A.; Mustafa, H.; Khan, G. Global epidemiology of HIV/AIDS: A resurgence in North America and Europe. *J. Epidemiol. Glob. Health* **2021**, *11*, 296–301. [\[CrossRef\]](#)
- Biello, K.B.; Mimiaga, M.J.; Santostefano, C.M.; Novak, D.; Mayer, K.H. MSM at Highest Risk for HIV Acquisition Express Greatest Interest and Preference for Injectable Antiretroviral PrEP Compared to Daily, Oral Medication. *AIDS Behav.* **2018**, *22*, 1158–1164. [\[CrossRef\]](#) [\[PubMed\]](#)
- Spinelli, M.A.; Grinsztajn, B.G.J.; Landovitz, R.J. Promises and challenges: Cabotegravir for preexposure prophylaxis. *Curr. Opin. HIV AIDS* **2022**, *17*, 186–191. [\[CrossRef\]](#)
- Mantsios, A.; Murray, M.; Karver, T.S.; Davis, W.; Galai, N.; Kumar, P.N.; Swindells, S.; Bredeek, U.F.; García, R.R.; Antela, A.; et al. Multi-level considerations for optimal implementation of long-acting injectable antiretroviral therapy to treat people living with HIV: Perspectives of health care providers participating in phase 3 trials. *BMC Health Serv. Res.* **2021**, *21*, 255. [\[CrossRef\]](#) [\[PubMed\]](#)
- Abdool Karim, Q. Enhancing HIV Prevention with Injectable Preexposure Prophylaxis. *New Engl. J. Med.* **2021**, *385*, 652–653. [\[CrossRef\]](#)
- Rogers, B.G.; Chan, P.A.; Suttan-Coats, C.; Zanolwick-Marr, A.; Patel, R.R.; Mena, L.A.; Goedel, W.C.; Chu, C.T.; Silva, E.; Galipeau, D.; et al. Perspectives on long-acting formulations of pre-exposure prophylaxis (PrEP) among men who have sex with men who are non-adherent to daily oral PrEP in the United States. *BMC Public Health* **2023**, *23*, 1643. [\[CrossRef\]](#) [\[PubMed\]](#)
- Valente, P.K.; Operario, D.; Rusley, J.C.; Bauermeister, J.A.; Biello, K.B. The need for a health equity framework in next-generation pre-exposure prophylaxis implementation. *Lancet HIV* **2023**, *10*, e266–e268. [\[CrossRef\]](#)
- Mayer, K.H.; Agwu, A.L.; Malebranche, D.J. Barriers to the Wider Use of Pre-exposure Prophylaxis in the United States: A Narrative Review. *Adv. Ther.* **2020**, *37*, 1778–1811. [\[CrossRef\]](#)
- Brennan-Ing, M.; Mattas, E. Aging with HIV: Working to Ensure Equity and Inclusion. *Gerontology* **2023**, *69*, 946–952. [\[CrossRef\]](#)
- Fonner, V.A.; Ridgeway, K.; van der Straten, A.; Lorenzetti, L.; Dinh, N.; Rodolph, M.; Schaefer, R.; Schmidt, H.-M.A.; Nguyen, V.T.T.; Radebe, M.; et al. Safety and efficacy of long-acting injectable cabotegravir as preexposure prophylaxis to prevent HIV acquisition. *AIDS* **2023**, *37*, 957–966. [\[CrossRef\]](#)
- Asabor, E.N.; Lett, E.; Moll, A.P.; Sheno, S.V. “We’ve Got Our Own Beliefs, Attitudes, Myths”: A Mixed Methods Assessment of Rural South African Health Care Workers’ Knowledge of and Attitudes Towards PrEP Implementation. *AIDS Behav.* **2021**, *25*, 2517–2532. [\[CrossRef\]](#) [\[PubMed\]](#)
- Pike, C.; Rousseau, E.; Bekker, L.-G. Promises and potential pitfalls of long-acting injectable pre-exposure prophylaxis. *South. Afr. J. HIV Med.* **2023**, *24*, 1497. [\[CrossRef\]](#)
- Moyo, E.; Murewanhema, G.; Musuka, G.; Dzinamarira, T. Long-acting injectable drugs for HIV-1 pre-exposure prophylaxis: Considerations for Africa. *Trop. Med. Infect. Dis.* **2022**, *7*, 154. [\[CrossRef\]](#) [\[PubMed\]](#)
- Ahmed, N.; Pike, C.; Bekker, L.-G. Scaling up pre-exposure prophylaxis in sub-Saharan Africa. *Curr. Opin. Infect. Dis.* **2019**, *32*, 24–30. [\[CrossRef\]](#) [\[PubMed\]](#)
- Mutambo, C.; Hlongwana, K.W. Healthcare Workers’ Perspectives on the Barriers to Providing HIV Services to Children in Sub-Saharan Africa. *AIDS Res. Treat.* **2019**, *2019*, 8056382. [\[CrossRef\]](#)
- Thomas, T.L. Injectable PrEP superior to oral PrEP. *Nat. Rev. Urol.* **2021**, *18*, 576. [\[CrossRef\]](#)

17. Marshall, B.D.; Goedel, W.C.; King, M.R.; Singleton, A.; Durham, D.P.; Chan, P.A.; Townsend, J.P.; Galvani, A.P. Potential effectiveness of long-acting injectable pre-exposure prophylaxis for HIV prevention in men who have sex with men: A modelling study. *Lancet HIV* **2018**, *5*, e498–e505. [\[CrossRef\]](#)
18. Hodges-Mameletzis, I.; Dalal, S.; Msimanga-Radebe, B.; Rodolph, M.; Baggaley, R. Going global: The adoption of the World Health Organization's enabling recommendation on oral pre-exposure prophylaxis for HIV. *Sex. Health* **2018**, *15*, 489–500. [\[CrossRef\]](#)
19. Pleuhs, B.; Quinn, K.G.; Walsh, J.L.; Petroll, A.E.; John, S.A. Health Care Provider Barriers to HIV Pre-Exposure Prophylaxis in the United States: A Systematic Review. *AIDS Patient Care STDs* **2020**, *34*, 111–123. [\[CrossRef\]](#)
20. Bleasdale, J.; McCole, M.; Cole, K.; Hequembourg, A.; Morse, G.D.; Przybyla, S.M. Perspectives on Injectable HIV Pre-Exposure Prophylaxis: A Qualitative Study of Health Care Providers in the United States. *AIDS Patient Care STDs* **2024**, *38*, 177–184. [\[CrossRef\]](#)
21. Mahlare, E.; Ramutshila, M.E.; Musekiwa, M.A.; Kuonza, P.L.; MB ChB, M.; Mabuto, T. Knowledge, attitudes and practices of oral HIV pre-exposure prophylaxis (PrEP) among healthcare workers in the Ekurhuleni District, South Africa. *South Afr. Med. J.* **2023**, *113*, 46. [\[CrossRef\]](#)
22. Monera, T.; Ncube, P. Assessment of knowledge, attitudes and practices of healthcare workers on occupational HIV post-exposure prophylaxis at a Zimbabwean referral hospital. *J. Int. AIDS Soc.* **2012**, *15*, 523–530.
23. Zhang, L.; Song, Y.; Zheng, X.; Liu, Y.; Chen, H. The experience of healthcare workers to HIV pre-exposure prophylaxis (PrEP) implementation in low- and middle-income countries: A systematic review and qualitative meta-synthesis. *Front. Public Health* **2023**, *11*, 1224461. [\[CrossRef\]](#)
24. Pinto, R.M.; Berringer, K.R.; Melendez, R.M.; Mmeje, O. Improving PrEP Implementation Through Multilevel Interventions: A Synthesis of the Literature. *AIDS Behav.* **2018**, *22*, 3681–3691. [\[CrossRef\]](#)
25. Durham, S.H.; Milam, A.; Waer, D.; Chahine, E.B. Cabotegravir: The first long-acting injectable for HIV preexposure prophylaxis. *Ann. Pharmacother.* **2023**, *57*, 306–316. [\[CrossRef\]](#)
26. Liégeon, G.; Delaugerre, C.; Molina, J.-M. HIV Pre-exposure Prophylaxis. *Infect. Dis. Clin. North Am.* **2024**, *38*, 453–474. [\[CrossRef\]](#)
27. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Ann. Intern. Med.* **2018**, *169*, 467–473. [\[CrossRef\]](#)

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CHAPTER 4

MANUSCRIPT 2

Healthcare Workers' Perspectives on HIV Pre-Exposure Prophylaxis Delivery in Sub-Saharan Africa: Implications for Injectable Formulation Rollout - A Narrative Review

4.1 Introduction

This chapter presents a narrative review titled “Healthcare Workers’ Perspectives on HIV Pre-Exposure Prophylaxis Delivery in Sub-Saharan Africa: A Narrative Review,” which has been submitted for publication and is currently undergoing peer review in the Discover Public Health Journal.

HIV prevention has evolved significantly over the past four decades, with multiple biomedical interventions now available to reduce transmission risk. These include oral pre-exposure prophylaxis (PrEP) using tenofovir-based regimens, post-exposure prophylaxis (PEP), voluntary medical male circumcision (VMMC), treatment as prevention through achieving viral suppression, and most recently, long-acting injectable PrEP formulations such as cabotegravir (Landovitz *et al.* 2021; Delany-Moretlwe *et al.* 2022; Kuo *et al.* 2022). Each prevention modality offers distinct advantages and faces unique implementation challenges across different populations and healthcare settings.

Pre-exposure prophylaxis represents a particularly important advancement, with oral PrEP (TDF/FTC) demonstrating high efficacy when taken consistently. However, oral PrEP requires daily adherence, which has proven challenging for many populations, particularly adolescents and young adults (Mgodi *et al.* 2023). Long-acting injectable PrEP, administered every two months, addresses adherence challenges and offers improved efficacy compared to oral PrEP, with clinical trials showing 66-89% risk reduction relative to daily oral medication (Landovitz *et al.* 2021; Delany-Moretlwe *et al.* 2022; Kuo *et al.* 2022).

Healthcare worker knowledge about HIV prevention methods is derived from multiple sources, including pre-service education, in-service training programs, continuing professional development, clinical guidelines, peer interactions, and increasingly,

digital information sources such as medical websites and online forums (Moloi et al. 2023; Bleasdale et al. 2024). Understanding healthcare workers' knowledge sources and gaps is essential for designing effective training programs to support new intervention rollouts. Previous research has identified that knowledge deficits, misconceptions, and lack of confidence in counseling clients about PrEP represent significant barriers to implementation (Koss and Parikh 2025).

This narrative review addresses a critical gap in the literature by synthesizing evidence on healthcare workers' knowledge, attitudes, and perceptions regarding injectable PrEP. While substantial research exists on oral PrEP implementation, the evidence base for injectable PrEP remains limited, particularly in healthcare settings serving young adults such as campus health clinics. This review aims to inform implementation strategies, identify training needs, and highlight areas requiring further research to support the successful integration of injectable PrEP into HIV prevention services.

Building on the scoping review protocol outlined in Chapter 3 (Mbatha, Mpofana and Gumede 2025b), this systematic narrative review employs a complementary methodological approach to synthesize and critically examine the literature on healthcare workers' perceptions and preparedness to deliver long-acting injectable PrEP within the Sub-Saharan African context.

While the scoping review protocol (Chapter 3) was designed to systematically map the range of available literature on primary healthcare workers' perspectives regarding injectable PrEP, this systematic narrative review offers an in-depth qualitative synthesis and critical interpretation of the evidence, focusing on healthcare workers' knowledge, attitudes, readiness, and capacity to implement injectable PrEP services in Sub-Saharan Africa, a region heavily affected by HIV.

4.2 Materials and Methods

This narrative review was conducted in accordance with the foundational work established in the scoping review protocol (Chapter 3). While the scoping review protocol provided a structured framework for systematically mapping the literature, this systematic review adopts a narrative synthesis approach to enable deeper thematic

interpretation and critical analysis of healthcare workers' perspectives across diverse Sub-Saharan African contexts (Popay *et al.*, 2006).

4.3 Results

The review synthesized evidence from five qualitative studies across Sub-Saharan Africa examining healthcare workers' perspectives on oral PrEP implementation. Notably, no studies specifically examining injectable PrEP met inclusion criteria, as injectable formulations are only recently being introduced in Sub-Saharan Africa through demonstration projects and early implementation programs, with limited published research on healthcare worker perspectives available to date. Healthcare workers generally held positive attitudes toward PrEP as a biomedical prevention tool, recognizing its potential to expand prevention options for at-risk populations and reduce stigma. However, actual readiness to implement varied considerably. Knowledge levels differed substantially based on prior exposure to PrEP programming, with deep understanding mainly in demonstration project settings, while the wider workforce demonstrated significant gaps in clinical protocols, eligibility criteria, and counseling approaches. Major systemic barriers hindered implementation, including inadequate training, insufficient infrastructure (medication stockouts, lack of private counseling spaces), staff shortages and workload constraints, absence of clinical guidelines, and stigma concerns. Conversely, facilitators for successful implementation included strong government commitment and policy support, task-shifting strategies empowering nurses and counselors to deliver services, structured training with ongoing mentorship, service integration with maternal and child health and family planning platforms, and peer learning networks. While findings derive from oral PrEP experiences, they provide critical insights for injectable PrEP rollout, as both formulations operate within the same health system contexts and face similar structural challenges, though additional infrastructure requirements (cold-chain, injection-competent providers, clinical spaces for intramuscular administration) will intensify existing barriers.

4.4 Discussion and Interpretation of Results

The systematic review findings revealed that healthcare workers in Sub-Saharan Africa demonstrate variable awareness and knowledge of PrEP, with understanding

substantially mediated by prior exposure to demonstration projects and structured training programs. While healthcare workers generally expressed positive attitudes toward PrEP as a biomedical prevention tool, recognizing its potential to expand prevention options for at-risk populations, their actual readiness to implement varied considerably based on training received, resource availability, and organizational support. The review identified consistent patterns across studies examining oral PrEP implementation: healthcare workers recognized PrEP's potential advantages but simultaneously expressed significant concerns about implementation feasibility, training adequacy, and health system readiness. Knowledge gaps extended beyond basic biomedical understanding to clinical protocols, side effect management, and counselling approaches. Multiple interconnected barriers emerged, including training deficits, infrastructure and supply chain challenges (medication stockouts, lack of private counselling spaces), workload pressures, inadequate staffing, absence of clinical guidelines, and stigma concerns. Conversely, key facilitators included task-shifting to nurses and counsellors with supportive supervision, service integration with maternal and child health and family planning platforms, structured training with ongoing mentorship, government commitment and policy support, and peer learning networks. While all included studies examined oral PrEP, implementation lessons transfer directly to injectable formulations, with challenges likely intensified given additional technical requirements, including cold-chain infrastructure, injection-competent providers, and appropriate clinical spaces for intramuscular administration. These findings directly informed the primary study design by highlighting specific knowledge gaps requiring investigation in the South African context, identifying key stakeholder concerns to explore through interviews, and confirming the relevance of implementation science frameworks for understanding provider readiness within broader regional implementation challenges.

4.5 Limitations and Recommendations

This systematic review has several important limitations that warrant consideration. Most significantly, no studies specifically examining injectable PrEP implementation met the inclusion criteria, as injectable formulations are only recently being introduced in Sub-Saharan Africa through demonstration projects and early implementation programs, with limited published research on healthcare worker perspectives available to date. However, this evidence gap is itself a significant finding, revealing that research infrastructure has not kept pace with programmatic rollout and defining

urgent research priorities. The absence of injectable PrEP studies necessitated extrapolation from oral PrEP experiences, which provide necessary but insufficient evidence for injectable PrEP planning: oral PrEP lessons reveal systemic patterns of provider readiness and transferable barriers and facilitators, but cannot substitute for direct investigation of injectable-specific implementation challenges. Only five studies met the inclusion criteria, all employing qualitative designs in specific contexts, limiting generalizability across diverse Sub-Saharan African settings. Single-reviewer screening and data extraction introduce potential bias, and the search was restricted to English-language peer-reviewed publications, excluding grey literature that might contain valuable implementation insights. The review focused primarily on provider perspectives, giving limited systematic attention to client experiences and community factors. Future research priorities include rigorous implementation studies examining healthcare worker experiences with injectable PrEP delivery, training effectiveness and competency development, delivery models and task-shifting arrangements, client perspectives and equity considerations for key populations, and health system readiness factors, including cold-chain infrastructure and sustainable financing mechanisms. Future reviews should incorporate broader search strategies, including multiple languages and grey literature, and employ team-based screening and extraction to minimize bias.

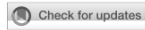
4.6 Conclusion

This narrative review demonstrates that healthcare workers in Sub-Saharan Africa hold generally positive attitudes toward PrEP as a biomedical prevention innovation but face significant readiness gaps that will directly affect injectable PrEP implementation. Evidence from oral PrEP experiences reveals that provider willingness, while present, cannot overcome structural barriers, including inadequate training, knowledge gaps, infrastructure limitations, workload pressures, absent guidelines, and stigma concerns. Successful injectable PrEP introduction requires comprehensive, multi-level strategies addressing training through competency-based programs with ongoing mentorship, task-shifting with clear role definitions and supportive supervision, service integration with existing platforms, infrastructure strengthening including cold-chain capacity, policy development encompassing guidelines and financing, and demand creation alongside provider readiness. The facilitators identified, government commitment, structured training, task-shifting arrangements, service integration, peer learning networks, and demonstration

projects, provide a critical roadmap, though injectable PrEP introduces additional complexities requiring expanded technical competencies, enhanced infrastructure, and more intensive supply chain coordination. Most fundamentally, oral PrEP implementation experiences provide necessary but insufficient evidence for injectable PrEP planning: while systemic patterns revealed through this review will inevitably shape injectable PrEP implementation, direct investigation of injectable-specific challenges is imperative. By rigorously synthesizing current knowledge while systematically documenting evidence gaps, this review guides both immediate implementation planning and defines the research agenda that must accompany injectable PrEP rollout. Realizing injectable PrEP's transformative potential in high-burden Sub-Saharan African settings requires sustained, systematic investment in health system strengthening and provider capacity building, informed by rigorous implementation research and responsive to the real-world conditions healthcare workers face.

4.7 Publication Details

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Healthcare workers' perspectives on HIV pre-exposure prophylaxis delivery in Sub-Saharan Africa: implications for injectable formulation rollout—a narrative review

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Background: Long-acting injectable Human Immunodeficiency Virus (HIV) pre-exposure prophylaxis (PrEP), particularly cabotegravir, presents a promising HIV prevention option in Sub-Saharan Africa (SSA), where HIV prevalence remains high. As frontline providers, healthcare workers (HCWs) are central to PrEP delivery. Given the emerging introduction of injectable PrEP in SSA, this review examines HCW perspectives on PrEP delivery broadly, including both oral and injectable formulations, with particular attention to how oral PrEP implementation experiences inform injectable PrEP readiness.

Methods: A narrative review was conducted with a comprehensive literature search across PubMed, Scopus, Web of Science, EBSCOhost, and Google Scholar for English-language studies published 2020–2025. Eligible studies comprised qualitative, quantitative, and mixed-methods primary research that examined healthcare workers' knowledge, perceptions, attitudes, and readiness to deliver HIV PrEP in SSA. Relevant studies were identified, reviewed, and analyzed thematically to identify key patterns and implementation considerations.

Results: A total of 742 records were identified across databases, and following review, 5 primary studies met the scope criteria, all examining oral PrEP implementation in Uganda, South Africa, Kenya, and Zimbabwe. Findings revealed varied HCW awareness and knowledge, often influenced by prior exposure to pilot initiatives. Attitudes were generally positive, emphasizing PrEP's potential to enhance adherence and reduce stigma. Reported barriers included limited training, inadequate infrastructure, increased workload, and the absence of clinical guidelines. Key facilitators included task-shifting, government commitment, targeted capacity-building, and peer-led learning. These oral PrEP implementation lessons directly inform the readiness of injectable PrEP rollout.

Conclusion: Healthcare workers in SSA display positive attitudes but uneven readiness to deliver PrEP. While most evidence derives from oral PrEP implementation, lessons learned on training needs, infrastructure requirements, task-shifting strategies, and health system readiness directly inform the introduction of injectable PrEP. Addressing gaps in training, guidelines, and resources, alongside strengthening policy and system support, is essential for the effective integration and scale-up of both oral and injectable PrEP formulations.

KEYWORDS

cabotegravir, healthcare workers, HIV pre-exposure prophylaxis, implementation science, injectable PrEP, narrative review, oral PrEP, Sub-Saharan Africa

1 Introduction

Human Immunodeficiency Virus (HIV) pre-exposure prophylaxis (PrEP), a biomedical prevention strategy in which HIV-negative individuals take antiretroviral medicines to significantly reduce their risk of HIV acquisition, was formally introduced into public sector healthcare systems in Sub-Saharan Africa (SSA) beginning in 2016, with South Africa among the earliest countries in the region to launch a national oral PrEP programme (65). Since then, countries including Kenya, Zimbabwe, Uganda, Tanzania, and Nigeria have progressively expanded access (55) (1). SSA continues to bear a disproportionate burden of the global HIV epidemic (57, 64), and PrEP has emerged as a cornerstone of the comprehensive combination prevention framework endorsed by the WHO, encompassing behavioral, biomedical, and structural strategies (56, 63) (1). Despite these foundational advances, the translation of PrEP policy into equitable, population-level uptake has remained inconsistent across SSA, revealing structural and systemic barriers that continue to undermine programme effectiveness.

In SSA, oral PrEP, primarily tenofovir disoproxil fumarate/emtricitabine (TDF/FTC), is delivered predominantly through primary healthcare (PHC) settings, including sexual and reproductive health (SRH) clinics, maternal and child health (MCH) services, family planning units, and HIV testing and counselling sites (1–3). Nurse-led, task-shifted delivery models have been central to scale-up, particularly in South Africa, Kenya, and Uganda (4–6). Despite WHO endorsement and national rollouts across more than 20 SSA countries, UNAIDS (2023) estimates that PrEP coverage remains substantially below the 10 million people targeted by 2025, with significant disparities across countries and between urban and rural settings. Adherence difficulties, pill fatigue, stigma, and frequent clinic visits have further constrained uptake and persistence, particularly among adolescent girls and young women, key populations, and other groups at substantial HIV risk (7, 8, 52).

These persistent implementation gaps have catalysed renewed interest in alternative PrEP modalities that may circumvent the adherence and stigma-related limitations inherent to daily oral regimens. Injectable PrEP, particularly long-acting cabotegravir (CAB-LA), offers a promising alternative (9, 10). CAB-LA, administered by intramuscular injection every 2 months, has demonstrated superior or equivalent protection compared to daily oral PrEP in major clinical trials (9, 11). The HPTN 083 trial among men who have sex with men and transgender women, and the HPTN 084 trial among cisgender women, both showed significant reductions in HIV incidence with CAB-LA compared to oral tenofovir disoproxil fumarate/emtricitabine. These findings position injectable PrEP as a potentially transformative innovation for HIV prevention in SSA (10, 12). Other PrEP modalities under investigation or early implementation include event-driven oral dosing (2–1–1 regimen), the dapivirine vaginal ring, and lenacapavir, a long-acting injectable requiring administration only twice yearly (every 6 months) (51, 58, 59).

Despite this promise, the introduction and scale-up of injectable PrEP in SSA face substantial implementation challenges (14). These include the need for cold-chain infrastructure to maintain medication integrity, injection-competent healthcare providers, appropriate private clinical spaces for administration, updated national clinical guidelines and standard operating procedures, robust supply chain management systems, and sustainable financing mechanisms (14, 15). Moreover, as with any health innovation, successful implementation depends critically on the readiness, knowledge, attitudes, and working conditions of frontline healthcare workers who will deliver these services (16). Against this backdrop, the present review seeks to critically examine the available evidence on long-acting injectable PrEP, particularly cabotegravir (CAB-LA), within the SSA context, assessing both its transformative potential and the implementation realities that will determine its public health impact.

Healthcare workers serve as the critical interface between biomedical innovations and the communities they serve (17). Their perceptions, technical competencies, confidence levels, organizational support, and working conditions directly influence both the quality-of-service provision and client acceptance. Understanding HCW perspectives is therefore essential for designing implementation strategies that are contextually appropriate, feasible, and sustainable (18). Healthcare workers' knowledge about PrEP derives from diverse sources, including pre-service medical and nursing education, in-service training through national programs and implementing partners, participation in demonstration projects, informal peer learning, and clinical guidelines when available (19, 20). This heterogeneity in knowledge acquisition contributes to variable awareness and competence across cadres, settings, and countries (19–21).

Two recent systematic reviews directly address HCW perspectives in Africa/LMICs. Zhang et al. (22) synthesized 14 qualitative studies on HCW experiences implementing PrEP in low- and middle-income countries, extracted 122 findings, and identified barriers, facilitators, and recommendations. Femi-Lawal et al. (19) conducted a meta-analysis of 34 studies across 12 African countries, finding high PrEP awareness (85%) but poor knowledge (18%) among HCWs, with moderate positive attitudes (46%) and 58% willingness to prescribe.

However, both reviews noted significant limitations. Zhang et al. (22) rated the overall evidence quality as “low” using the ConQual approach. Femi-Lawal et al. (19) emphasized that knowledge gaps and attitudinal barriers hinder implementation despite awareness. Thus, while HCW perspectives have been synthesized, the evidence base remains limited in quality and scope, supporting the need for continued research on context-specific HCW barriers and facilitators.

Few published studies have examined HCW perspectives on injectable PrEP specifically, as most countries are only beginning to introduce it through demonstration projects. Mbatha et al. (23) explicitly state that “perspectives of primary healthcare workers... remain underexplored,” motivating their scoping review protocol. Only a handful of studies specifically address injectable PrEP and HCW perspectives. However, implementation experiences with oral PrEP provide critical insights into health system readiness, HCW training needs, service delivery models, and barriers and facilitators

that will directly inform the rollout of injectable PrEP (14). Many implementation considerations, including task-shifting approaches, integration strategies with sexual and reproductive health or maternal and child health services, client counseling frameworks, stigma reduction efforts, and health system strengthening needs, transfer across PrEP modalities, as both formulations operate within the same health system contexts and face similar structural challenges (14, 16, 24).

Therefore, this narrative review examined HCW perspectives on PrEP delivery broadly, synthesizing evidence from both oral and injectable PrEP experiences, with focused synthesis on implications for injectable formulation introduction. This approach enables us to: (1) understand current HCW awareness, knowledge, and attitudes toward PrEP as a biomedical prevention technology; (2) identify common implementation barriers and facilitators relevant across formulations; (3) map training and capacity-building needs; (4) assess health system readiness factors; and (5) derive lessons from oral PrEP implementation that can inform more effective injectable PrEP rollout strategies. Taken together, the foregoing historical trajectory, current implementation challenges, and the emergence of long-acting injectable alternatives establish the rationale and urgency for the present review, whose methods are described in the following section.

2 Methods

2.1 Study design and approach

This study adopted a narrative review design. A thorough and transparent approach was applied to literature identification, selection, and synthesis to ensure credibility and coherence. This approach is particularly suitable for examining healthcare worker perspectives across diverse contexts and study designs in SSA, where evidence is still evolving and where both qualitative and quantitative findings contribute valuable implementation insights.

2.2 Eligibility criteria

2.2.1 Inclusion criteria

Population: Studies involving healthcare workers, including doctors, nurses, pharmacists, clinical officers, counselors, and community health workers working in HIV prevention, sexual and reproductive health, maternal and child health, or related services in Sub-Saharan Africa.

Intervention/focus: Studies addressing healthcare workers' knowledge, perceptions, attitudes, readiness, or experiences delivering or implementing HIV PrEP services. Studies examining oral PrEP (tenofovir-based regimens), injectable PrEP (cabotegravir), or PrEP broadly, without specifying formulation, were eligible.

Geographic focus: Studies conducted in Sub-Saharan African countries.

Study design: Primary research using qualitative (in-depth interviews, focus group discussions, ethnographic studies), quantitative (surveys, cross-sectional studies), or mixed methods approaches.

Language: Published in English.

Time period: Published between 2020 and 2025, reflecting the period during which PrEP implementation expanded across SSA and evidence on provider perspectives began accumulating.

2.2.2 Exclusion criteria

Studies that focused exclusively on client or community perspectives without including healthcare worker data were excluded. Non-empirical publications such as systematic reviews, scoping reviews, commentaries, editorials, protocols, and policy documents without original primary data were excluded. Studies conducted outside SSA or published in languages other than English were not considered. Grey literature, including conference abstracts, unpublished dissertations, and program reports, was excluded. Studies were not excluded based on quality assessment scores, as methodological diversity in this emerging field provides valuable contextual insights and reflects the pragmatic realities of implementation research. However, methodological strengths and limitations of all included studies were carefully noted during data extraction and considered during synthesis.

2.2.3 Rationale for including oral PrEP studies to inform injectable PrEP implementation

While our primary interest is injectable PrEP implementation, few published studies have specifically examined healthcare workers' perspectives on injectable formulations in SSA, as most countries are only beginning to introduce them through demonstration projects. Therefore, we included studies examining HCW perspectives on PrEP delivery broadly, regardless of formulation, with a focused synthesis of lessons applicable to the injectable PrEP rollout. This approach was justified for several reasons:

Limited injectable PrEP evidence: Injectable PrEP is an emerging technology in SSA with limited implementation experience and published research on provider perspectives to date.

Transferable implementation lessons: Healthcare worker perspectives on oral PrEP implementation reveal broader patterns regarding readiness to deliver biomedical prevention innovations, professional norms regarding HIV prevention services, and systemic barriers (training gaps, infrastructure limitations, workload constraints, policy gaps) that apply across PrEP modalities.

Common implementation considerations: Many implementation factors transfer across PrEP formulations, including task-shifting approaches, service integration strategies with sexual and reproductive health or maternal and child health platforms, client counselling frameworks, stigma reduction efforts, and health system readiness requirements.

Shared health system context: Both oral and injectable PrEP operate within the same health system contexts in SSA and face similar structural challenges, including provider capacity, supply chain management, policy development, and resource allocation. Understanding how these factors have affected oral PrEP implementation directly informs planning for the introduction of injectable PrEP.

During synthesis, findings were analyzed with explicit attention to their implications for injectable PrEP implementation, including considerations unique to long-acting formulations, such as injection

administration competencies, cold-chain requirements, logistics for bimonthly scheduling, and management of prolonged pharmacologic effects.

2.3 Literature search strategy

A comprehensive and systematic literature search was conducted across five electronic databases: PubMed (MEDLINE), Scopus, Web of Science, EBSCOhost (including Academic Search Complete and CINAHL), and Google Scholar. The search was conducted between May and June 2025 to capture the most recent publications. The lead reviewer (NNM) developed the search strategy with methodological guidance from a research librarian. The search strategy combined four concept blocks using Boolean operators. The first block included PrEP-related terms: *"pre-exposure prophylaxis" OR "PrEP" OR "cabotegravir" OR "CAB-LA" OR "long-acting PrEP" OR "injectable PrEP" OR "tenofovir" OR "TDF" OR "emtricitabine" OR "FTC" OR "Truvada" OR "Descovy."* The second block captured healthcare worker terms: *"healthcare worker" OR "health worker" OR "healthcare provider" OR "health provider" OR "nurse" OR "doctor" OR "physician" OR "clinician" OR "pharmacist" OR "counselor" OR "counselor" OR "community health worker."* The third block included outcome-related terms: *"perception" OR "attitude" OR "knowledge" OR "awareness" OR "readiness" OR "willingness" OR "view" OR "perspective" OR "experience" OR "barrier" OR "facilitator" OR "implementation" OR "acceptability."* The fourth block specified geographic scope: *"Sub-Saharan Africa" OR "Africa" OR individual country names (South Africa, Kenya, Uganda, Zimbabwe, Tanzania, Nigeria, etc.).* All concept blocks were combined using the AND operator. Medical Subject Headings (MeSH) were utilized in PubMed to enhance search sensitivity and specificity. The search was limited to English-language publications from January 2020 to June 2025. No restrictions were placed on study design during the search phase. Additional studies were identified through manual screening of reference lists from included articles and relevant systematic reviews.

All retrieved citations were exported to EndNote 20 (Clarivate Analytics, US) for citation management. Duplicate records were identified and removed using EndNote's automated deduplication function, supplemented by manual verification to ensure accuracy. The final deduplicated citation library was used for subsequent screening stages.

2.4 Study identification and selection

Literature identification and selection proceeded through three stages: title review, abstract review, and full-text assessment. The lead reviewer (NNM) conducted all screening stages with methodological guidance from a research librarian who assisted with database search strategies and retrieval processes. Predefined scope criteria guided decisions at each stage.

In the first phase, titles of all retrieved records were screened to identify and exclude obviously irrelevant studies (e.g., studies not conducted in SSA, not focusing on HCWs, or addressing topics unrelated to PrEP). In the second phase, abstracts of remaining articles were screened against the full eligibility criteria to assess potential relevance. Studies that clearly did not meet the inclusion

criteria were excluded at this stage, while those with insufficient information in the abstract were retained for full-text assessment. In the final phase, full-text articles were retrieved and reviewed comprehensively to determine final eligibility. Studies excluded at the full-text stage were documented with specific reasons.

Throughout the selection process, any uncertainties regarding study eligibility were discussed with the supervisory team (NM and DG) to ensure consistent application of the scope criteria. The selection process is summarised in Figure 1, which shows the number of records identified, reviewed, and included at each stage, along with reasons for exclusion.

2.5 Data review and synthesis preparation

Relevant information from included studies was reviewed and organised to facilitate thematic synthesis. The lead reviewer (NNM) conducted an in-depth reading of each included study, extracting relevant information into a structured framework aligned with the review objectives. Extracted information and emerging interpretations were discussed with the supervisory team (NM and DG) throughout the process to ensure completeness and accuracy.

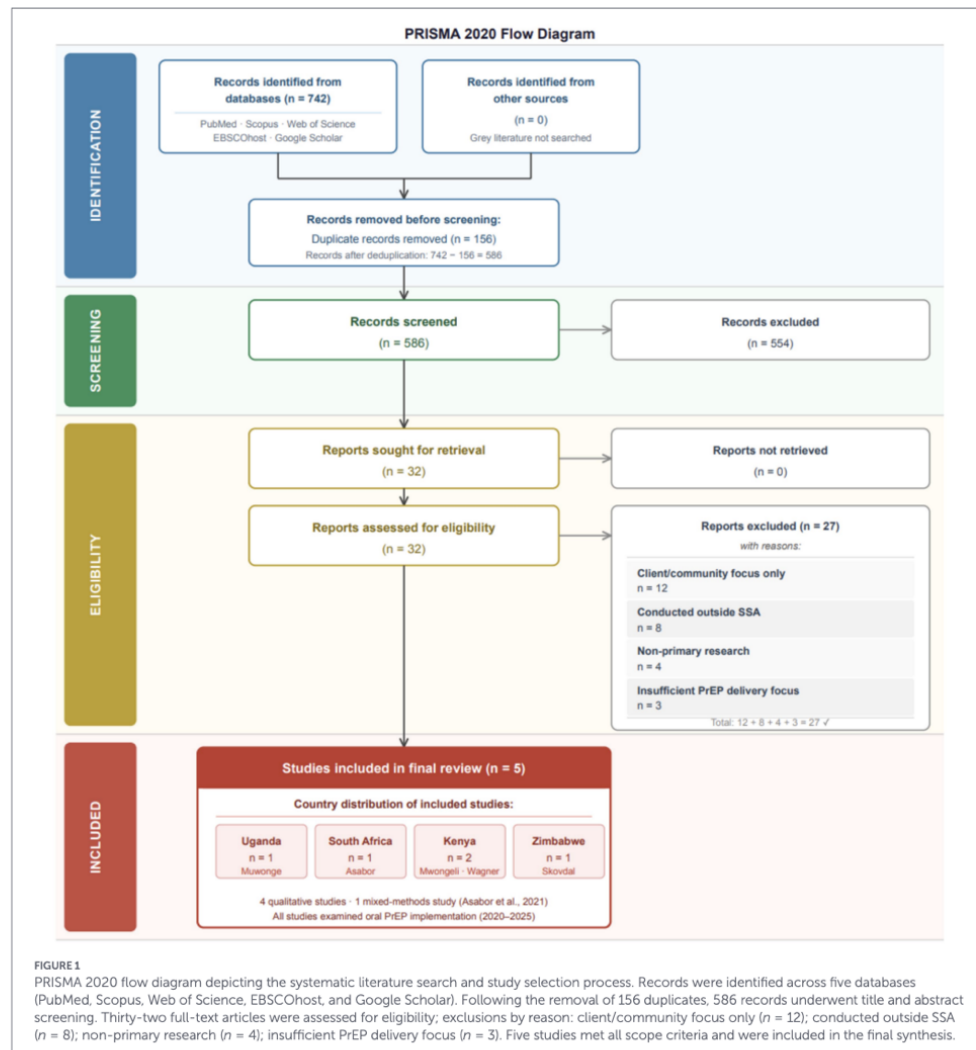
For each study, key information was noted, including study characteristics (author, year, country, setting, design, methods, sample composition) and substantive findings related to healthcare workers' perspectives on PrEP delivery. The review focused on identifying findings across five thematic areas: awareness and knowledge of PrEP, attitudes and perceptions toward PrEP as a prevention strategy, readiness and willingness to deliver PrEP services, barriers to implementation at individual, facility, and health system levels, and facilitators or enabling conditions supporting successful delivery. Information on the PrEP formulation in each study (oral, injectable, or unspecified) was also noted to inform synthesis of the implications for injectable PrEP implementation.

The review proceeded iteratively, with continuous comparison across studies to identify recurring patterns, contrasts, and unique contextual factors. This approach preserved the nuance and context essential for meaningful synthesis of evidence from diverse settings and methodological approaches and formed the foundation for the narrative thematic synthesis described in Section 2.7.

2.6 Quality assessment

The lead reviewer conducted a quality assessment to evaluate the methodological rigor and report quality of the included studies, using criteria adapted from the Consolidated Criteria for Reporting Qualitative Research (COREQ; (25)). Each study was assessed against key criteria adapted for qualitative research, including: (1) clarity of research aims and objectives; (2) appropriateness of study design and methods for addressing research questions; (3) relevance to the review questions; and (4) transparency and clarity of reporting of methods and findings.

Additional qualitative quality dimensions were noted during assessment, including sampling strategies, use of theoretical or conceptual frameworks, data collection approaches (interview guides, focus group protocols), analytical rigor (coding procedures, thematic analysis methods), and quality enhancement strategies such as



reflexivity statements, triangulation, and member checking or validation procedures.

Studies were not excluded based on quality scores, as methodological diversity provides valuable contextual insights in this emerging field. However, the methodological strengths and limitations of the included studies were documented and considered during synthesis to assess confidence in findings.

2.7 Thematic synthesis

Findings from included studies were synthesized using a narrative thematic approach, which allows for in-depth exploration of healthcare workers' perspectives across diverse contexts and study

designs. Studies were read closely to identify recurring concepts and patterns, which were grouped into themes through an iterative process of comparison and categorization. During synthesis, particular attention was paid to identifying findings with direct implications for injectable PrEP rollout. The synthesis specifically examined evidence related to healthcare worker training and capacity-building requirements, infrastructure and supply chain considerations, task-shifting and staffing models, client counseling approaches, service integration strategies, and broader health system readiness factors. This focused approach to synthesis was designed to ensure that the review would provide actionable insights for injectable PrEP implementation planning, moving beyond general PrEP evidence to address the specific requirements and considerations relevant to long-acting injectable

formulations. The narrative synthesis approach was selected as most appropriate given the heterogeneity of included studies in terms of design, geographic context, and healthcare worker populations. This approach enabled a comprehensive understanding of factors influencing PrEP delivery and uptake within the SSA healthcare context while maintaining attention to contextual variations and implementation nuances that quantitative meta-analysis would not capture.

3 Results

3.1 Study selection and characteristics

A literature search across the five databases identified 742 records. After removing 156 duplicates, 586 records were reviewed at the title and abstract level. Of these, 32 full-text articles were assessed for relevance. Five primary research studies met the scope criteria and were included in the final synthesis.

The most common reasons for full-text exclusion were focus on client or community perspectives rather than HCW perspectives ($n = 12$), conducted outside SSA ($n = 8$), non-primary research including systematic reviews and protocols ($n = 4$), and insufficient focus on PrEP delivery perspectives or primarily focused on treatment rather than prevention ($n = 3$).

3.2 Characteristics of included studies

The five included studies were conducted in four countries across SSA: Uganda (20) ($n = 1$), South Africa (26) ($n = 1$), Kenya (16, 27) ($n = 2$), and Zimbabwe (28) ($n = 1$). Four of the five studies employed qualitative designs using in-depth interviews or focus group discussions with healthcare workers; Asabor et al. (26) employed a convergent mixed-methods design comprising a structured quantitative survey administered to $n = 215$ healthcare workers and in-depth qualitative interviews with $n = 24$ healthcare workers, enabling integration of statistical breadth and interpretive depth. Sample sizes across qualitative studies ranged from $n = 18$ to $n = 24$ participants drawn from frontline provider populations in specific clinic settings.

Notably, all five included studies examined oral PrEP implementation experiences. No studies specifically examining injectable PrEP implementation met the review's scope criteria, reflecting that injectable formulations are only recently being introduced in SSA, and published research on HCW perspectives remains limited. However, as discussed in our methods, oral PrEP implementation experiences provide critical insights directly applicable to injectable PrEP rollout (Table 1).

3.3 Quality assessment

All five included studies met the quality assessment criteria, demonstrating clear research aims, appropriate methodological designs, relevance to the review questions, and transparent reporting of methods and findings. Studies employed rigorous qualitative methods including purposive sampling strategies, semi-structured interview guides informed by implementation science frameworks, iterative data collection and analysis, and systematic coding and thematic analysis procedures. Most studies reported the use of established qualitative

quality frameworks and included reflexivity statements regarding researcher positionality.

Methodological strengths included the use of theoretical frameworks (e.g., the Consolidated Framework for Implementation Research), triangulation through multiple data collection methods (interviews and focus groups), and member checking or validation strategies with participants. Limitations noted across studies included potential selection bias toward more engaged or motivated HCWs, limited generalizability beyond specific clinic settings or regions, and, in some cases, small sample sizes that may not capture the full diversity of perspectives. The full quality assessment instrument and completed per-study appraisals are publicly available at: FIGSHARE (23).

3.4 Main findings

The studies included in this review identified five main thematic areas influencing PrEP implementation in SSA from healthcare workers' perspectives: (1) awareness and knowledge of PrEP; (2) attitudes and perceptions toward PrEP; (3) readiness and willingness to implement PrEP services; (4) barriers to service delivery; and (5) facilitators and enabling conditions. Each theme is presented below.

3.4.1 Awareness and knowledge of PrEP

Healthcare workers across the included studies demonstrated varied levels of awareness and knowledge regarding PrEP, with differences based on prior exposure to PrEP programming, geographic location, and facility type.

Muwonge et al. (20) in Uganda found that HCWs working in facilities implementing PrEP demonstration projects in Uganda had substantially higher awareness and knowledge compared to providers in facilities without such programs. Providers familiar with PrEP could articulate basic eligibility criteria, dosing schedules, and monitoring requirements for oral PrEP. However, knowledge gaps persisted regarding specific clinical protocols, management of side effects, and risk assessment procedures.

Asabor et al. (26) documented significant knowledge gaps among rural primary care providers in South Africa. In the quantitative component ($n = 215$), only 58% of surveyed HCWs reported adequate PrEP knowledge, and nurses scored significantly higher on PrEP knowledge assessments than doctors ($p < 0.05$). The qualitative component ($n = 24$ IDIs) corroborated these findings: many HCWs in facilities without pilot programme exposure had heard of PrEP only through informal channels such as media or peer discussions but lacked structured training on clinical protocols, contraindications, or counselling approaches. Some providers confused PrEP with post-exposure prophylaxis (PEP) or antiretroviral treatment (ART).

Wagner et al. (16) in Kenya found that HCWs working in sexual and reproductive health and family planning services in Kenya had variable knowledge, with nurses and counselors often having better practical knowledge than doctors. Operational knowledge regarding integrating PrEP into existing workflows, documentation requirements, and supply management remained inconsistent.

Skovdal et al. (28) reported that knowledge about delivering PrEP to specific populations, particularly adolescent girls and young women,

TABLE 1 Characteristics of included studies.

Author, year/ country	Setting and design	Study objectives	Sample	Key findings
Muwonge et al. (20) Uganda	Urban public health facilities; Qualitative (IDIs, FGDs)	To explore HCW perspectives on PrEP service delivery in central Uganda, including awareness, attitudes, barriers, and facilitators.	HCWs ($n = 24$)	Higher awareness in PrEP-programme facilities. Positive attitudes, persistent protocol, and side-effect management knowledge gaps. Mentorship is identified as a key enabler.
Asabor et al. (26) South Africa	Rural primary care clinics; Convergent mixed-methods	To assess HCW knowledge, attitudes, and practices regarding PrEP delivery in rural South African PHC settings using a mixed-methods design.	Quantitative survey: $n = 215$ HCWs; Qualitative IDIs: $n = 24$ HCWs	Quantitative: 58% adequate PrEP knowledge; 72% willing to prescribe; nurses scored significantly higher than doctors ($p < 0.05$). Qualitative: Knowledge gaps in rural facilities; PrEP/PEP/ART confusion; supportive attitudes; need for structured training.
Mwongeli et al. (27) Kenya	MCH clinics; Qualitative (IDIs)	To examine MCH provider perspectives on integrating PrEP into antenatal and postpartum care in Kenya.	MCH providers ($n = 18$)	Strong support for PrEP-MCH integration; pregnancy framed as a heightened vulnerability window. Barriers: heavy workloads, competing priorities, and limited counselling training.
Wagner et al. (16) Kenya	SRH/family planning services; Qualitative (IDIs, FGDs)	To identify implementation determinants and strategies for PrEP integration into SRH/family planning services from frontline provider perspectives.	Frontline providers ($n = 22$)	Task-shifting willingness among nurses and counsellors. PrEP-FP service synergies identified. Barriers: absent national guidelines, infrastructure constraints, and workload. Peer learning is valued.
Skovdal et al. (28) Zimbabwe	Primary healthcare centres; Qualitative (IDIs)	To document HCW recommendations for improving PrEP access for adolescent girls and young women in eastern Zimbabwe.	Healthcare providers ($n = 20$)	Willingness to provide PrEP to AGYW. Concerns: limited adolescent SRH counselling experience, confidentiality and consent for minors, community awareness needs.

HCW, healthcare worker; IDI, in-depth interview; FGD, focus group discussion; MCH, maternal and child health; SRH, sexual and reproductive health; FP, family planning; PHC, primary healthcare; AGYW, adolescent girls and young women; PrEP, pre-exposure prophylaxis.

was limited in Zimbabwe. Providers expressed uncertainty about how to counsel young clients, obtain appropriate consent, maintain confidentiality, and address concerns about sexual behavior disinhibition.

3.4.2 Attitudes and perceptions toward PrEP

HCWs across studies generally expressed positive attitudes toward PrEP as a biomedical prevention tool, recognizing its potential to expand HIV prevention options for at-risk populations.

Muwonge et al. (20) documented that Ugandan HCWs viewed PrEP favorably, particularly for key populations including female sex workers, serodiscordant couples, and young women in high-prevalence settings. Providers noted that PrEP offered an additional layer of protection beyond condoms and could be user-initiated.

Asabor et al. (26) provide important cadre-level insights into healthcare workers' attitudes towards PrEP. The quantitative component ($n = 215$) included both prescribers (doctors and professional nurses) and non-prescribers (e.g., staff nurses, counsellors, and other cadres), with prescribers comprising approximately 30% of the sample. The qualitative component ($n = 24$) consisted exclusively of nurses, including both professional and staff nurses, all of whom had substantial experience in HIV care. Qualitative findings indicated that nurses expressed a strong sense of professional ownership over PrEP delivery, positioning it as an extension of their existing HIV and sexual health responsibilities. These cadre distinctions are important for informing task-shifting strategies and workforce training as PrEP implementation expands.

Mwongeli et al. (27) reported that maternal and child health providers in Kenya strongly supported integrating PrEP into antenatal

and postpartum care. These providers emphasized that pregnancy and the postpartum period represent windows of heightened HIV vulnerability, and offering PrEP could protect both mothers and infants.

Wagner et al. (16) documented positive attitudes toward PrEP integration with family planning services, with providers noting natural synergies in target populations, counseling approaches, and service delivery platforms. Some providers viewed PrEP as a means of addressing the dual concerns of unintended pregnancy and HIV acquisition among young women.

Skovdal et al. (28) found that providers in Zimbabwe expressed enthusiasm about offering PrEP to adolescent girls and young women but also voiced ethical concerns about providing prevention services to minors, navigating parental consent requirements, and ensuring clients fully understood the long-term commitment required for adherence.

3.4.3 Readiness and willingness to deliver PrEP

Healthcare workers across studies expressed general willingness to deliver PrEP services, describing it as part of their professional responsibility in HIV prevention. However, readiness varied considerably based on training received, resource availability, and organizational support.

Muwonge et al. (20) found that HCWs in facilities with PrEP programs in Uganda felt reasonably prepared to deliver services after receiving training and ongoing mentorship. Providers in facilities without established programs expressed hesitation, citing a lack of training, unclear guidelines, and concerns about managing potential side effects or drug interactions without specialist support.

Asabor et al. (26) documented that, despite 72% of surveyed HCWs ($n = 215$) expressing willingness to prescribe PrEP, rural South African providers felt ill-equipped due to insufficient training and absence of clinical support systems. Importantly, nurses reported significantly higher readiness than doctors, attributing this to their closer engagement with patients' daily health needs and their existing roles in HIV testing and reproductive health counselling. Many HCWs expressed concern about taking on additional responsibilities without corresponding staffing increases or resource allocation.

Wagner et al. (16) found strong willingness among nurses and counselors in Kenya to deliver PrEP through task-shifting arrangements, describing it as a logical extension of their existing roles in HIV testing, family planning, and sexual health counseling. They emphasized the need for clear scope-of-practice guidelines, supportive supervision, and mechanisms for referring complex cases to clinicians.

Mwongeli et al. (27) reported that maternal and child health providers in Kenya were willing to integrate PrEP into their services but identified significant barriers, including already heavy workloads, competing priorities in antenatal care, and the need for additional training in PrEP-specific counseling for pregnant and postpartum women.

Skovdal et al. (28) documented willingness to provide PrEP to adolescent girls and young women in Zimbabwe but noted that readiness was constrained by limited experience with adolescent sexual health counseling, concerns about confidentiality and consent processes, and the need for youth-friendly service delivery training.

3.4.4 Barriers to PrEP implementation

Healthcare workers identified multiple interconnected barriers spanning individual, facility, and health system levels.

Training and knowledge gaps emerged as a primary barrier across all studies. Providers consistently emphasized the lack of formal training in PrEP protocols, eligibility assessment, side-effect management, and client counseling. Muwonge et al. (20) noted that even when training occurred, it was often a one-off workshop without ongoing refresher training or supportive supervision. Asabor et al. (26) found that knowledge gaps led to provider hesitation and inconsistent service delivery.

Inadequate infrastructure and supplies represented another critical barrier. Wagner et al. (16) and Skovdal et al. (28) documented challenges with medication stockouts, unreliable supply chains, and a lack of point-of-care HIV testing supplies necessary for PrEP initiation and monitoring. Several studies noted that facilities lacked private counseling spaces.

Workload and staffing constraints featured prominently. Mwongeli et al. (27) found that integrating PrEP into already-busy maternal and child health services was challenging due to time pressures and competing demands. Providers worried that adding PrEP without additional staff would compromise the quality of care across all services. Asabor et al. (26) documented concerns about burnout and inadequate staffing levels to accommodate expanded service offerings.

Lack of clinical guidelines and protocols created uncertainty and inconsistency. Multiple studies noted the absence of nationally endorsed, context-specific PrEP guidelines adapted to local realities. This left providers uncertain about standard procedures, documentation requirements, and how to handle clinical scenarios not explicitly addressed in training.

Stigma and confidentiality concerns emerged as barriers affecting both HCW comfort in delivering PrEP and client willingness to access services. Skovdal et al. (28) found that some providers worried about being associated with services for key populations or young sexually active individuals due to community stigma. Wagner et al. (16) noted that integrated service delivery could inadvertently signal PrEP use to other clients, raising confidentiality concerns.

Limited community awareness and demand were identified as a barrier. Providers noted that clients' limited knowledge of PrEP reduced uptake, even when services were available. Muwonge et al. (20) emphasized the need for community education and demand creation to complement provider readiness.

3.4.5 Facilitators and enabling conditions

Studies identified several facilitators that supported PrEP implementation.

Task-shifting and role clarification emerged as a key facilitator. Wagner et al. (16) found that clearly defining roles and empowering nurses and lay counselors to deliver PrEP services (with appropriate training and supervision) expanded access and reduced burden on doctors. Providers responded positively to task-shifting when accompanied by supportive supervision and referral mechanisms for complex cases.

Service integration facilitated PrEP uptake. Mwongeli et al. (27) demonstrated that integrating PrEP into maternal and child health services normalized it as part of comprehensive healthcare rather than a standalone HIV prevention service. Wagner et al. (16) found that integration with family planning services created natural entry points for PrEP counseling and initiation.

Structured training and mentorship were consistently identified as enabling successful implementation. Muwonge et al. (20) noted that

facilities with ongoing mentorship and supportive supervision from experienced providers or program staff demonstrated better PrEP delivery quality and provider confidence compared to facilities relying solely on one-time training.

Government commitment and policy support facilitated implementation. Studies conducted in settings with national PrEP guidelines, government endorsement, and budget allocation for PrEP commodities reported more systematic implementation compared to settings where PrEP remained mainly donor-funded or project-based.

Peer learning and provider networks enabled knowledge sharing and problem-solving. Asabor et al. (26) and Skovdal et al. (28) documented that providers valued opportunities to learn from peers implementing PrEP in similar settings, exchange practical strategies, and troubleshoot challenges collectively.

Client demand and positive experiences motivated providers. Muwonge et al. (20) found that seeing clients benefit from PrEP, particularly clients who had been at high risk and successfully remained HIV-negative, reinforced provider commitment to service delivery.

Demonstration projects and implementation support provided learning opportunities. Multiple studies noted that facilities participating in demonstration projects or receiving implementation support (training, mentorship, commodity supplies, monitoring systems) achieved more successful integration than facilities attempting implementation without external support.

4 Discussion

This narrative review synthesized healthcare workers' perspectives on PrEP delivery in SSA to inform the implementation of injectable PrEP. While all included studies examined oral PrEP, the implementation lessons directly transfer to injectable formulations, with many challenges likely intensified given additional technical requirements.

4.1 Knowledge gaps signal extensive training needs

HCWs demonstrated variable PrEP knowledge strongly mediated by prior exposure to structured programs. Providers in demonstration project facilities showed substantially better understanding than those learning through informal channels, with some confusing PrEP with PEP or ART. This pattern reflects established implementation science principles: passive awareness does not translate to clinical competency without structured training, hands-on practice, and ongoing mentorship (29, 30). Knowledge gaps extended beyond biomedical facts to operational understanding of workflow integration, risk assessment, and counseling approaches, particularly for adolescent populations (31).

The field of long-acting HIV prevention is evolving rapidly, with the PURPOSE 1 trial demonstrating 100% efficacy of twice-yearly subcutaneous lenacapavir among cisgender women in Uganda and South Africa (58) and PURPOSE 2 showing a 96% reduction in HIV incidence among men and gender-diverse persons (59). Lenacapavir received FDA approval in June 2025 (51), and several SSA countries have initiated rollout. These developments reinforce the central argument of this review: the window for systematic preparation of healthcare workers is narrow, and research must keep pace with programmatic rollout.

For injectable PrEP, these knowledge deficits signal substantial preparatory work required. The specialized competencies needed, injection technique, cold-chain management, and managing prolonged pharmacologic effects represent expanded training domains beyond oral PrEP. Evidence from injectable contraceptive programs demonstrates that successful introduction requires comprehensive, competency-based training addressing not just technical skills but counseling about long-acting interventions and managing discontinuation scenarios (32, 33).

4.2 Positive attitudes tempered by implementation concerns

Healthcare workers expressed generally positive attitudes toward PrEP, recognizing its potential to expand prevention options for high-risk populations. Strong support emerged for integration with maternal and child health and family planning services, reflecting provider recognition of heightened HIV vulnerability during pregnancy and postpartum periods (34, 35). However, concerns about behavioral disinhibition persisted despite evidence from systematic reviews finding no meaningful risk compensation among PrEP users (36, 37). These concerns often reflected normative judgments about sexual behavior rather than evidence-based assessment (36), requiring interventions addressing underlying values alongside information provision.

For injectable PrEP, ethical concerns intensify given the long-acting nature and inability to discontinue immediately. Ensuring informed consent requires counseling protocols addressing the extended pharmacologic tail, continued need for other prevention methods, and what committing to bimonthly injections entails, considerations parallel to those for long-acting reversible contraception (38).

4.3 Conditional readiness requires systems support

Healthcare workers expressed willingness to deliver PrEP, but readiness varied dramatically based on training, resources, and organizational support. This conditional nature reflects implementation science principles: individual motivation cannot compensate for organizational and systems-level barriers (39, 40). Workload concerns were particularly prominent, with providers worried that adding PrEP without corresponding staffing increases would compromise all services, a legitimate concern given that healthcare worker workload in SSA often exceeds sustainable levels (41).

Asabor et al. (26) provide particularly instructive cadre-level evidence on readiness differentials. Quantitative data ($n = 215$) demonstrated that nurses scored significantly higher on PrEP knowledge than doctors ($p < 0.05$) and expressed greater willingness to prescribe (72% overall, with nurses disproportionately driving this figure). Qualitative data ($n = 24$ IDIs) revealed the underlying logic: nurses and counsellors articulated PrEP delivery as a natural extension of their existing HIV testing and reproductive health roles, whereas doctors more frequently cited scope-of-practice uncertainty, time constraints, and concerns about managing adverse events without specialist backup. These findings have direct implications for task-shifting policy design: training investments and role clarification

should prioritize the nurse and counsellor cadres who demonstrate the strongest readiness and the closest alignment with the service delivery contexts in which PrEP will be integrated.

Task-shifting to nurses and counselors emerged as both necessary and effective when accompanied by clear guidelines, training, and supervision. Extensive evidence supports task-shifting for HIV services, with nurses achieving outcomes comparable to doctors when appropriately prepared (42, 43). For injectable PrEP, nurse administration will be essential given physician shortages, with precedent from injectable contraceptive programs demonstrating safety and effectiveness (33).

However, task-shifting itself remains a contested strategy, and the manuscript's endorsement of it warrants critical contextualisation. A persistent tension exists between task-shifting as a pragmatic necessity driven by physician shortages and task-shifting as a potential driver of professional deskilling, role ambiguity, and overburdening of lower-cadre workers who are already stretched (60, 61). Qualitative evidence from LMICs documents that nurses and community health workers frequently perceive task-shifting as cost-cutting rather than genuine scope expansion, leading to resentment, burnout, and high attrition among the very cadres on whom expanded PrEP delivery depends (66). Regulatory frameworks governing scope-of-practice remain highly fragmented across SSA, with task-shifting reforms described as "often lengthy and controversial" even in high-income settings (62). For injectable PrEP specifically, questions of who is authorised to administer intramuscular or subcutaneous injections, initiate PrEP, and manage adverse events will require country-specific regulatory decisions that cannot be assumed to follow oral PrEP precedent. Successful task-shifting models must therefore address not only training and supervision but also formal scope-of-practice legislation, commensurate remuneration, and workload protections, conditions that remain inconsistently met across the region.

4.4 Systemic barriers demand comprehensive solutions

Multiple interconnected barriers emerged, spanning training gaps, infrastructure inadequacies, supply chain vulnerabilities, staffing constraints, absent guidelines, stigma, and limited community awareness. These reflect broader health system fragilities in SSA rather than PrEP-specific problems (44, 53, 54). For injectable PrEP, cold-chain requirements will intensify infrastructure challenges, as cabotegravir requires refrigeration, creating additional constraints (14). The absence of national guidelines creates uncertainty and inconsistency, requiring policy development well before implementation (45).

Provider stigma and concerns about stigma by association represent persistent challenges requiring multi-level interventions including education, supportive organizational cultures, and broader social change efforts (46). Integration strategies positioning injectable PrEP within comprehensive sexual and reproductive health services may reduce stigma while creating confidentiality challenges requiring careful service design (16, 47).

4.5 Facilitators provide implementation roadmap

Key facilitators consistently supporting implementation included task-shifting with clear role definitions, service integration with

existing platforms, structured training with ongoing mentorship, government commitment and policy support, peer learning networks, and demonstration projects building evidence and capacity. These findings align with implementation science frameworks emphasizing multi-level strategies (48).

Government commitment will be especially critical given cabotegravir's higher costs compared to oral PrEP, requiring domestic financing and policy support for sustainable scale-up (49). Demonstration projects should generate actionable implementation knowledge through systematic documentation before broader roll-out (50).

For injectable PrEP specifically, primary healthcare settings represent the most appropriate and equitable delivery platform. The evidence from oral PrEP implementation consistently demonstrates that integration into existing PHC-based SRH, MCH, and family planning services, rather than vertical, facility-specific HIV programmes, normalizes PrEP as part of routine healthcare and reaches women, adolescents, and key populations at existing service touchpoints. Injectable PrEP delivery should follow the same logic, with bimonthly injection visits aligned with routine PHC appointment cycles (e.g., quarterly depot contraceptive visits). In terms of provider cadre, NIMART-trained nurses (Nurse-Initiated Management of Antiretroviral Therapy) and PIMART-trained pharmacists (Pharmacist-Initiated Management of Antiretroviral Therapy) represent the most feasible task-shifted delivery cadre in SSA countries where these frameworks exist, given their established scope of practice for ART initiation and their demonstrated competency with injectable administration in contraceptive programmes. HIV specialist clinicians, including HAST nurses and HIV specialist doctors, should serve as referral and supervisory resources for complex cases and adverse event management rather than primary delivery agents, to preserve equitable geographic and systemic access.

4.6 Strengths, limitations, and implications

4.6.1 Strengths

This narrative review offers several methodological and contextual strengths. The literature search was systematic and comprehensive, spanning five major electronic databases (PubMed, Scopus, Web of Science, EBSCOhost, and Google Scholar) with clearly defined eligibility criteria, yielding an initial pool of 742 records. The included studies span four SSA countries, Uganda, South Africa, Kenya, and Zimbabwe, providing geographic diversity that captures variation in health system contexts, PrEP programme maturity, and HCW cadre composition. The synthesis was conducted with explicit attention to the implications for injectable PrEP implementation, a distinction that differentiates this review from the two existing broader syntheses (19, 22). Quality assessment was conducted using adapted COREQ criteria, and included studies demonstrated overall methodological rigour, including the use of implementation science frameworks, purposive sampling, and established qualitative analytical procedures.

4.6.2 Limitations

A notable limitation of this review is the small number of primary studies ($n = 5$) meeting the predefined scope criteria. We wish to be transparent that this reflects the current state of the peer-reviewed evidence base in SSA on this specific topic, not a deficiency of the

search strategy: a comprehensive search across five major databases from 742 initial records, filtered by stringent eligibility criteria, yielded only five primary empirical studies that specifically examined HCW perspectives on PrEP delivery in SSA within the 2020–2025 period. The existing broader evidence base, synthesised in the systematic review by Zhang et al. (22) and the meta-analysis by Femi-Lawal et al. (19), is explicitly cited throughout this manuscript as the complementary broader foundation. Our contribution is a more focused narrative synthesis of SSA-specific primary studies, with explicit attention to injectable PrEP implications, a contribution distinct from and not duplicative of these existing reviews. Beyond the limited volume of primary studies, it is important to acknowledge the possibility of selection bias arising from the geographic and contextual distribution of the included studies. The five studies identified may disproportionately represent specific SSA countries or healthcare settings, particularly those with more established PrEP infrastructure, such as South Africa and Kenya, which could limit the generalisability of findings to lower-resourced or more epidemiologically diverse contexts within the region. Countries where injectable PrEP trials or implementation pilots are nascent or unpublished remain underrepresented in the available evidence base, and this structural gap in the literature is itself a significant finding. Consequently, conclusions regarding healthcare system readiness, community acceptability, and delivery feasibility should be interpreted with appropriate caution and may not be uniformly applicable across the heterogeneous health systems of SSA.

Beyond sample size, additional limitations include: the absence of any primary studies specifically examining HCW perspectives on injectable PrEP in SSA (requiring extrapolation from oral PrEP experiences that may not fully capture injectable-specific concerns); cross-sectional designs in all included studies, limiting causal inference and longitudinal understanding of readiness trajectories; limited attention to client experiences and community-level factors that interact with provider readiness; and the exclusion of grey literature, including conference abstracts, implementation reports, and programme evaluations, which may contain valuable implementation data not yet published in peer-reviewed journals. While prior systematic reviews have made important contributions to the PrEP literature in SSA, notably Zhang et al. (22), who examined HCW experiences implementing PrEP across low- and middle-income countries, and Femi-Lawal et al. (19), whose meta-analysis addressed HCW knowledge, attitudes, and willingness to prescribe PrEP across 12 African countries, neither review centred the implementation implications of long-acting injectable cabotegravir (CAB-LA) as their primary analytical focus. The present review is specifically oriented toward the PHC-level delivery considerations, nurse-led implementation feasibility, and health system readiness requirements that are prerequisite to CAB-LA scale-up in SSA. This distinct focus addresses an emerging and time-sensitive evidence gap: as CAB-LA transitions from clinical trial contexts into real-world programmatic deployment, evidence synthesising its implementation landscape at the primary care level is critically needed to inform rollout strategy, policy adaptation, and resource allocation. In this respect, the current synthesis offers a complementary rather than duplicative contribution to the existing literature.

4.6.3 Research implications

The identification of only five eligible primary studies constitutes, in itself, a substantive finding: it reveals that peer-reviewed implementation research on HCW perspectives in SSA has not

kept pace with the rapid programmatic rollout of both oral and injectable PrEP. This evidence gap is particularly acute for injectable formulations, for which no studies meeting the review's scope criteria were identified. To facilitate strategic planning and guide future scholarly inquiry, the following research priorities are organised into short-term and longer-term agendas. In the short term, the most pressing research needs include: (1) implementation science studies examining the feasibility and acceptability of CAB-LA delivery within existing nurse-led PHC platforms, particularly in high-burden, resource-constrained settings across SSA; (2) mixed-methods investigations into community-level acceptability and demand generation, with specific attention to key populations and gender-disaggregated outcomes; and (3) health system readiness assessments evaluating cold-chain logistics, injection supply infrastructure, and HCW training requirements at the facility level. These priorities directly address the implementation gaps identified in this review and are most proximal to the current programmatic rollout timeline for CAB-LA and lenacapavir. Over the longer term, research should prioritise: (1) longitudinal cohort studies examining real-world adherence, retention, and virological outcomes under programmatic conditions, as distinct from controlled trial environments; (2) cost-effectiveness analyses comparing CAB-LA with oral TDF/FTC across diverse SSA health system typologies; (3) implementation trials co-designing and evaluating community health worker-mediated delivery models as a strategy to extend injectable PrEP reach into rural and peri-urban settings; and (4) cadre-specific task-shifting and scope-of-practice adaptation studies. Future systematic reviews should incorporate broader search strategies, including multiple languages, grey literature, and team-based screening and extraction protocols to minimise bias and maximize evidence capture. Establishing this tiered research agenda will enable evidence generation that is both methodologically responsive to current gaps and practically aligned with the programmatic timelines of national HIV prevention strategies across SSA.

4.6.4 Policy and practice implications

For policy and practice, findings from this review consistently point to PHC-based delivery as the most equitable and scalable platform for injectable PrEP in SSA. Both the included studies and broader oral PrEP implementation evidence demonstrate that integration into existing SRH, MCH, and family planning services, rather than vertical HIV-specific programmes, normalises PrEP as part of routine healthcare and reaches priority populations at existing care touchpoints. Injectable PrEP delivery should follow this model, with bimonthly injection visits incorporated into routine PHC appointment cycles.

In terms of provider cadre, NIMART-trained nurses and PIMART-trained pharmacists represent the most feasible task-shifted delivery cadre, given their established scope of practice for ART initiation and their existing competency with injectable administration in contraceptive programmes (33, 43). General practitioners and specialist HIV clinicians should serve as referral and supervisory resources for complex cases, adverse event management, and counselling on the extended pharmacologic tail of long-acting formulations, not as primary delivery agents.

Policymakers across SSA should urgently review and, where necessary, update scope-of-practice legislation to explicitly

authorise NIMART nurses and PIMART pharmacists to initiate and administer injectable PrEP. Preparation for the introduction of injectable PrEP must also include: national clinical guideline development and adaptation; competency-based pre-service and in-service training curricula; cold-chain infrastructure investment; robust supply chain management systems; sustainable domestic financing mechanisms; and community-level demand creation strategies. Demonstration projects with integrated implementation research components should precede broad rollout to generate context-specific evidence and systematically build health system capacity.

4.6.5 Synthesis

Healthcare workers in SSA demonstrate positive attitudes but significant readiness gaps that will affect injectable PrEP implementation (16, 20, 26–28). Successful introduction requires multi-level strategies addressing training, task-shifting, service integration, infrastructure, policy, and financing, leveraging facilitators and mitigating barriers identified through oral PrEP implementation experiences.

5 Conclusion

This narrative review synthesised evidence on HCWs' perspectives on HIV PrEP delivery in SSA to inform the introduction and scale-up of injectable PrEP formulations. Across five primary studies conducted in Uganda, South Africa, Kenya, and Zimbabwe, consistent patterns emerged: HCWs demonstrated positive attitudes toward PrEP as a biomedical prevention strategy but exhibited variable readiness shaped by training exposure, resource availability, cadre-specific roles, and the degree of organizational and policy support available. Nurses and lay counsellors consistently demonstrated stronger knowledge, more favourable attitudes, and greater willingness to deliver PrEP than doctors, underscoring the critical importance of task-shifting as a delivery strategy, provided that scope-of-practice regulations, training frameworks, and workload protections are concurrently addressed.

The identification of only five eligible primary studies reflects a substantive evidence gap: peer-reviewed implementation research on HCW perspectives in SSA has not kept pace with the rapid programmatic rollout of both oral and injectable PrEP. This gap is especially acute for injectable formulations, for which no primary studies met the review's scope criteria. As CAB-LA are introduced across SSA, including in Zimbabwe, Zambia, and South Africa, there is an urgent need for country-specific implementation research on provider readiness, competency-based training models, and delivery system integration.

For policy and practice, this review identifies primary healthcare as the most appropriate and equitable delivery platform for injectable PrEP, with NIMART-trained nurses and PIMART-trained pharmacists serving as the most feasible provider cadre for task-shifted administration. Policy development, including updated scope-of-practice legislation, investment in cold-chain infrastructure, and adaptation of clinical guidelines, must precede a broad rollout. Injectable PrEP offers a transformative opportunity to

enhance HIV prevention for those who face the greatest barriers to daily oral adherence; however, realising this potential demands sustained investment in health system strengthening and a research agenda that keeps pace with the rapidly evolving PrEP pipeline.

Author contributions

NNM: Conceptualization, Data curation, Formal analysis, Funding acquisition, Methodology, Validation, Writing – original draft, Writing – review & editing. NM: Methodology, Supervision, Validation, Writing – review & editing. DG: Methodology, Supervision, Validation, Writing – review & editing.

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Conflict of interest

The author(s) declared that this work was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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References

- WHO. *Consolidated guidelines on HIV prevention, testing, treatment, service delivery and monitoring: recommendations for a public health approach*. Geneva: WHO (2021).
- Eshleman SH, Mwelase N, Hughes JP, Richardson P, Wang J, Berzins B, et al. Lamivudine/tenofovir disoproxil fumarate is an appropriate PrEP regimen. *EClinicalMedicine*. (2020) 29:100629. doi: 10.1016/j.eclinm.2020.100629
- Mwanga MJ, Ngowi EE, Msuya SE, Mahande MJ. Uptake of oral HIV pre-exposure prophylaxis (PrEP) and associated factors among female sex workers in Tanga, Tanzania. *PLoS One*. (2023) 18:e0292049. doi: 10.1371/journal.pone.0292049
- Fehr J, Nicca D, Labhardt ND, Haerry D, Sander PM, Battegay M, et al. Human resource needs and costs for HIV pre-exposure prophylaxis provision in nurse-led primary care in Eswatini and opportunities for task sharing. *Hum Resour Health*. (2022) 20:68. doi: 10.1186/s12960-022-00770-9
- Hlongwane K, Wassenaar D, Naidoo S. Knowledge, attitudes and practices of primary care nurses regarding HIV pre-exposure prophylaxis in Mhlontlo sub-district municipality, eastern cape, South Africa. *Afr J Prim Health Care Fam Med*. (2025) 17:a4671. doi: 10.4102/phcfm.v17i1.4671
- Nichols BE, Boucher CAB, van der Valk M, Wensing AM, Wit FW. Scaling-up PrEP delivery in sub-Saharan Africa: what can we learn from the scale-up of ART? *EClinical Medicine*. (2019) 10:10–31. doi: 10.1016/j.eclinm.2019.04.006
- Kraker DS, Mayer KH. The role of healthcare providers in the roll out of preexposure prophylaxis. *Curr Opin HIV AIDS*. (2016) 11:41–8. doi: 10.1097/COH.0000000000000206
- Rousseau E, Katz AW, O'Rourke S, Bekker L-G, Delany-Moretlwe S, Bukusi E, et al. Adolescent girls and young women's PrEP-user journey during an implementation science study in South Africa and Kenya. *PLoS One*. (2021) 16:e0258542. doi: 10.1371/journal.pone.0258542
- Durham SH, Milam A, Waer D, Chahine EB. Cabotegravir: the first long-acting injectable for HIV preexposure prophylaxis. *Ann Pharmacother*. (2023) 57:306–16. doi: 10.1177/10600280221102532
- Fonner VA, Ridgeway K, van der Straten A, Lorenzetti L, Dinh N, Rodolph M, et al. Safety and efficacy of long-acting injectable cabotegravir as preexposure prophylaxis to prevent HIV acquisition. *AIDS*. (2023) 37:957–66. doi: 10.1097/QAD.0000000000003494
- Landovitz RJ, Donnell D, Clement ME, Hanscom B, Cottle L, Coelho L, et al. Cabotegravir for HIV prevention in cisgender men and transgender women. *N Engl J Med*. (2021) 385:595–608. doi: 10.1056/NEJMoa2101016
- Spinelli MA, Grinsztajn BGJ, Landovitz RJ. Promises and challenges: cabotegravir for preexposure prophylaxis. *Curr Opin HIV AIDS*. (2022) 17:186–91. doi: 10.1097/COH.0000000000000733
- Beymer MR, Holloway IW, Pulsipher C, Landovitz RJ. Current and future PrEP medications and modalities: on-demand, injectables, and topicals. *Curr HIV AIDS Rep*. (2019) 16:349–358. doi: 10.1007/s11904-019-00450-9
- Moyo E, Murewanhema G, Musuka G, Dzinarimara T. Long-acting injectable drugs for HIV-1 pre-exposure prophylaxis: considerations for Africa. *Tropical Med. Inf. Dis.* (2022) 7:154. doi: 10.3390/tropicalmed7080154
- Ahmed N, Pike C, Bekker L-G. Scaling up pre-exposure prophylaxis in sub-Saharan Africa. *Curr Opin Infect Dis*. (2019) 32:24–30. doi: 10.1097/QCO.0000000000000511
- Wagner AD, Beima-Sofie K, Awuor M, Owade W, Neary J, Dettinger JC, et al. Implementation determinants and strategies in integration of PrEP into maternal and child health and family planning services: experiences of frontline healthcare workers in Kenya. *Front Reprod Health*. (2023) 5:1205925. doi: 10.3389/frph.2023.1205925
- Wilkes M, Papageorgiou S, Kim TY, Baldrias L, Aguilar E, Kelly T, et al. One health workers: innovations in early detection of human, animal, and plant disease outbreaks. *J. Global Health Rep*. (2019) 3:e2019093. doi: 10.29392/jogh.3.e2019093
- Grant M, Wilford A, Haskins L, Phakathi S, Mntambo N, Horwood CM. Trust of community health workers influences the acceptance of community-based maternal and child health services. *Afr. J. Primary Health Care Family Med*. (2017) 9:1–8. doi: 10.4102/phcfm.v9i1.1281
- Femi-Lawal VO, Olawuyi DA, Oke GI, Kabiawu YN, Ogunlana O, Ibekwe JL, et al. Knowledge, attitudes, and willingness of healthcare workers to offer pre-exposure prophylaxis in Africa: a systematic review and meta-analysis. *AIDS Res Ther*. (2025) 22:68. doi: 10.1186/s12981-025-00768-y
- Muwonge TR, Nsubuga R, Ware NC, Wyatt MA, Pisarski E, Kamusiime B, et al. Health care worker perspectives of HIV pre-exposure prophylaxis service delivery in Central Uganda. *Front Public Health*. (2022) 10:658826. doi: 10.3389/fpubh.2022.658826
- Daniels B, Yi Chang A, Gatti R, Das J. The medical competence of health care providers in sub-Saharan Africa: evidence from 16 127 providers across 11 countries. *Health Affairs Scholar*. (2024) 2:qxae066. doi: 10.1093/haschl/qxae066
- Zhang L, Song Y, Zheng X, Liu Y, Chen H. The experience of healthcare workers to HIV pre-exposure prophylaxis (PrEP) implementation in low- and middle-income countries: a systematic review and qualitative meta-synthesis. *Front Public Health*. (2023) 11:1224461. doi: 10.3389/fpubh.2023.1224461
- Mbatha NN, Mpofana N, Gumede D. Perspectives of primary healthcare workers on HIV injectable pre-exposure prophylaxis (PrEP): a scoping review protocol. *Int J Environ Res Public Health*. (2025) 22:830. doi: 10.3390/ijerph22060830
- Joseph Davey DL, Dadan S, Wara N. Transforming HIV prevention: the promise of long-acting preexposure prophylaxis in high HIV burden settings. *Curr Opin HIV AIDS*. (2025) 20:32–38. doi: 10.1097/COH.0000000000000895
- Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *Int J Qual Health Care*. (2007) 19:349–57. doi: 10.1093/intqhc/mzm042
- Asabor EN, Lett E, Moll AP, Shenoi SV. "We've got our own beliefs, attitudes, myths": a mixed methods assessment of rural south African health care workers' knowledge of and attitudes towards PrEP implementation. *AIDS Behav*. (2021) 25:2517–32. doi: 10.1007/s10461-021-03213-z
- Mwongeli N, Wagner AD, Dettinger JC, Pintye J, Brown Trinidad S, Awuor M, et al. "PrEP gives the woman the control": healthcare worker perspectives on using pre-exposure prophylaxis (PrEP) during pregnancy and postpartum in Kenya. *JIAAPAC*. (2022) 21:23259582221111068. doi: 10.1177/23259582221111068
- Skovdal M, Magoge-Mandizvidza P, Dzamatira F, Maswera R, Nyamukapa C, Thomas R, et al. Improving access to pre-exposure prophylaxis for adolescent girls and young women: recommendations from healthcare providers in eastern Zimbabwe. *BMC Infect Dis*. (2022) 22:399. doi: 10.1186/s12879-022-07376-5
- Bluestone J, Johnson P, Fullerton J, Carr C, Alderman J, BonTempo J. Effective in-service training design and delivery: evidence from an integrative literature review. *Hum Resour Health*. (2013) 11:51. doi: 10.1186/1478-4491-11-51
- Grimshaw JM, Eccles MP, Lavis JN, Hill SJ, Squires JE. Knowledge translation of research findings. *Implement Sci*. (2012) 7:50. doi: 10.1186/1748-5908-7-50
- Kägesten A, Båge K, Sundewall J, Litorp H, Puranen B, Uthman O, et al. *Sexual and Reproductive Health and Rights: Measuring Values and Norms to Guide Swedish Development Cooperation*. Stockholm: EBA (2021).
- Hubacher D, Spector H, Monteith C, Chen P-L, Hart C. Long-acting reversible contraceptive acceptability and unintended pregnancy among women presenting for short-acting methods: a randomized patient preference trial. *Am J Obstet Gynecol*. (2017) 216:101–9. doi: 10.1016/j.ajog.2016.08.033
- Stanback J, Twum-Baah K. Why do family planning providers restrict access to services? An examination in Ghana. *Int Fam Plan Perspect*. (2001) 22:37–41.
- Drake AL, Wagner A, Richardson B, John-Stewart G. Incident HIV during pregnancy and postpartum and risk of mother-to-child HIV transmission: a systematic review and meta-analysis. *PLoS Med*. (2014) 11:e1001608. doi: 10.1371/journal.pmed.1001608
- Thomson KA, Hughes J, Baeten JM, John-Stewart G, Celum C, Cohen CR, et al. Increased risk of HIV acquisition among women throughout pregnancy and during the postpartum period: a prospective per-coital-act analysis among women with HIV-infected partners. *J Infect Dis*. (2018) 218:16–25. doi: 10.1093/infdis/jiy113
- Marcus JL, Hurley LB, Hare CB, Nguyen DP, Phengrasamy T, Silverberg MJ, et al. Preexposure prophylaxis for HIV prevention in a large integrated health care system: adherence, renal safety, and discontinuation. *JAIDS*. (2016) 73:540–6. doi: 10.1097/QAI.0000000000001129
- Traeger MW, Schroeder SE, Wright EJ, Hellard ME, Cornelisse VJ, Doyle JS, et al. Effects of pre-exposure prophylaxis for the prevention of human immunodeficiency virus infection on sexual risk behavior in men who have sex with men: a systematic review and meta-analysis. *Clin Infect Dis*. (2018) 67:676–86. doi: 10.1093/cid/ciy182
- Meyers K, Nguyen N, Zucker JE, Kutner BA, Carnevale C, Castor D, et al. The long-acting cabotegravir tail as an implementation challenge: planning for safe discontinuation. *AIDS Behav*. (2023) 27:4–9. doi: 10.1007/s10461-022-03816-0
- Damschroder LJ, Aron DC, Keith RE, Kirsh SR, Alexander JA, Lowery JC. Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. *Implement Sci*. (2009) 4:50. doi: 10.1186/1748-5908-4-50
- Weiner BJ. "A theory of organizational readiness for change". In: Nilsen P and Birken SA, editors. *Handbook on Implementation Science*. New York, NY: Edward Elgar Publishing (2020). p. 215–32.
- Pleaner M, Scorgie F, Martin C, Butler V, Muhwava LS, Mojaele M, et al. Introduction and integration of PrEP and sexual and reproductive health services for young people: health provider perspectives from South Africa. *Front Reprod Health*. (2023) 4:1086558. doi: 10.3389/frph.2022.1086558
- Callaghan M, Ford N, Schneider H. A systematic review of task-shifting for HIV treatment and care in Africa. *Hum Resour Health*. (2010) 8:8. doi: 10.1186/1478-4491-8-8
- Iwu EN, Holzemer WL. Task shifting of HIV management from doctors to nurses in Africa: clinical outcomes and evidence on nurse self-efficacy and job satisfaction. *AIDS Care*. (2014) 26:42–52. doi: 10.1080/09540121.2013.793278
- Mack N, Wong C, McKenna K, Lemons A, Odhiambo J, Agot K. Human resource challenges to integrating HIV pre-exposure prophylaxis (PrEP) into the public health system in Kenya: a qualitative study. *Afr J Reprod Health*. (2015) 19:54–62.
- Grimshaw J, Eccles M, Tetroe J. Implementing clinical guidelines: current evidence and future implications. *J Contin Educ Health Prof*. (2004) 24:S31–7. doi: 10.1002/chp.1340240506

46. Rao D, Elshafei A, Nguyen M, Hatzenbuehler ML, Frey S, Go VF. A systematic review of multi-level stigma interventions: state of the science and future directions. *BMC Med.* (2019) 17:41. doi: 10.1186/s12916-018-1244-y
47. Heck CJ, Dam A, Yohannes K, Deacon J, Kripke K, Meyers K, et al. Lessons learnt from daily oral PrEP delivery to inform national planning for PrEP ring introduction for women in low-income and middle-income countries: a qualitative inquiry of international stakeholders. *BMJ Glob Health.* (2024) 9:e014709. doi: 10.1136/bmjgh-2023-014709
48. Greenhalgh T, Robert G, Macfarlane F, Bate P, Kyriakidou O. Diffusion of innovations in service organizations: systematic review and recommendations. *Milbank Q.* (2004) 82:581–629. doi: 10.1111/j.0887-378X.2004.00325.x
49. Jamieson L, Johnson LF, Nichols BE, Delany-Moretlwe S, Hosseinipour MC, Russell C, et al. Relative cost-effectiveness of long-acting injectable cabotegravir versus oral pre-exposure prophylaxis in South Africa based on the HPTN 083 and HPTN 084 trials: a modelled economic evaluation and threshold analysis. *Lancet HIV.* (2022) 9:e857–67. doi: 10.1016/S2352-3018(22)00251-X
50. Howard N, Mounier-Jack S, Gallagher K, Kabakama S, Griffiths U, Feletto M, et al. The value of demonstration projects for new interventions: the case of human papillomavirus vaccine introduction in low-and middle-income countries. *Hum Vaccin Immunother.* (2016) 12:2475–7. doi: 10.1080/21645515.2016.1178433
51. AVAC. *Lenacapavir for PrEP*. New York, NY: AVAC: Global Advocacy for HIV Prevention (2025).
52. Ayenigbara IO. The urgent need for the use of pre-exposure prophylaxis (PrEP) in the prevention of HIV/AIDS in sub-Saharan Africa. *J Appl Health Sci.* (2019) 5:197–204. doi: 10.24141/1/5/2/5
53. Ward H, Garnett GP, Mayer KH, Dallabetta GA. Maximizing the impact of HIV prevention technologies in sub-Saharan Africa. *J Int AIDS Soc.* (2019) 22:e25319. doi: 10.1002/jia2.25319
54. Watt N, Sigfrid L, Legido-Quigley H, Hogarth S, Maimaris W, Otero-García L, et al. Health systems facilitators and barriers to the integration of HIV and chronic disease services: a systematic review. *Health Policy Plan.* (2017) 32:iv13–26. doi: 10.1093/heapol/czw149
55. Pillay, D, Stankevitz, K, Lanham, M, Ridgeway, K, Murire, M, Briedenhann, E, et al. Factors influencing uptake, continuation, and discontinuation of oral PrEP among clients at sex worker and MSM facilities in South Africa. *PLoS One.* (2020) 15:e0228620. doi: 10.1371/journal.pone.0228620
56. World Health Organization. *Guideline on when to start antiretroviral therapy and on preexposure prophylaxis for HIV*. Geneva: WHO; (2015). Available online at: <https://www.who.int/publications/i/item/9789241509565>
57. UNAIDS. The Urgency of Now: AIDS at a Crossroads. *Global AIDS Update 2024*. Geneva: UNAIDS; (2024).
58. Bekker, LG, Das, M, Abdool Karim, Q, et al. Twice-Yearly Lenacapavir or Daily F/TAF for HIV Prevention in Cisgender Women. *N Engl J Med.* (2024) 391:1179–1192. doi: 10.1056/NEJMoa2407001
59. Kelley, CF, Acevedo-Quinones, M, Agwu, AL, et al. Twice-Yearly Lenacapavir for HIV Prevention in Men and Gender-Diverse Persons. *N Engl J Med.* (2025) 392:1261–1276. doi: 10.1056/NEJMoa2411858
60. Mbouamba Yankam, B, Adeagbo, O, Amu, H, Dowou, RK, Mbouamba Nyamen, BG, Ubechu, SC, et al. Task shifting and task sharing in the health sector in sub-Saharan Africa: evidence, success indicators, challenges, and opportunities. *Pan Afr Med J.* (2023) 46:11. doi: 10.11604/pamj.2023.46.11.40984
61. Okoroafor, SC, and Christmals, CD. Optimizing the roles of health workers to improve access to health services in Africa: an implementation framework for task shifting and sharing for policy and practice. *BMC Health Serv Res.* (2023) 23:843. doi: 10.1186/s12913-023-09848-z
62. Maier, CB, Aiken, LH, and Busse, R. Nurses in advanced roles in primary care: Policy levers for implementation. *OECD Health Working Papers*, 98. Paris: OECD Publishing; (2017). doi: 10.1787/a8756593-en
63. UNAIDS. HIV Prevention 2030 Global Access Framework. Geneva: UNAIDS (2026). Available at: https://www.unaids.org/en/resources/documents/2026/20260331_HIV_Prevention_2030_Framework
64. UNICEF. *Children and Young People Living with HIV: Global Overview 2024*. New York: UNICEF (2024). Available at: <https://data.unicef.org/topic/hiv/aids/global-regional-trends>
65. Bekker, L-G, Alleyne, G, Baral, S, Cepeda, J, Daskalakis, D, Dowdy, D, et al. Advancing global health and strengthening the HIV response in the era of the Sustainable Development Goals: the International AIDS Society–Lancet Commission. *Lancet.* (2018) 392:312–358. doi: 10.1016/S0140-6736(18)31070-5
66. Coales, K, Jennings, H, Afaq, S, Arsh, A, Bhatti, M, Siddiqui, F, et al. Perspectives of health workers engaging in task shifting to deliver health care in low-and-middle-income countries: a qualitative evidence synthesis. *Glob Health Action.* (2023) 16:2228112. doi: 10.1080/16549716.2023.2228112

CHAPTER 5

THEORETICAL FRAMEWORK

5.1 Introduction

The previous chapter, a narrative literature review, identified key gaps in healthcare workers' awareness, knowledge, attitudes, and readiness regarding HIV injectable PrEP across various healthcare settings. While the reviewed studies were conducted primarily in public health clinics and among key populations, they highlighted limited research in specialized settings such as campus health clinics. To interpret these patterns within a coherent conceptual lens, this chapter introduced the Diffusion of Innovations DOI Theory developed by Rogers 2003 (Miller 2015; Hornor 2022), which explains how new ideas and practices are communicated, adopted, or resisted within social systems. This theory guided the overall design, analysis, and interpretation of this study. DOI has been widely applied in public health to examine the uptake of new interventions and technologies, making it particularly relevant for understanding healthcare worker adoption of novel HIV prevention strategies such as injectable PrEP (Wu, Yang and Meyers 2021; Spinnewijn *et al.* 2024)

The framework is especially relevant in South Africa, where PHC workers play a central role in the delivery of HIV prevention services. Their perceptions, readiness, and willingness to integrate innovations such as long-acting injectable PrEP are likely to influence the pace and extent of adoption. As highlighted in the previous chapter, gaps in healthcare workers' awareness and preparedness for injectable PrEP remain a barrier to effective implementation in KwaZulu-Natal, the province with the highest HIV burden nationally. By applying the DOI framework, this chapter situates the study within a theoretical perspective that provides a structured basis for exploring how PHC workers evaluate, accept, or resist injectable PrEP, and how these perceptions shape implementation outcomes.

This chapter is organized first to provide an overview of alternative theoretical frameworks that were considered but ultimately deemed less suitable for this study's aims. Following this comparative analysis, the Diffusion of Innovations Theory is

described in detail, including its main elements and attributes that shape innovation adoption. The chapter then examined the specific relevance of DOI to HIV prevention innovations, particularly injectable PrEP, before outlining the application of DOI to the study objectives. This structured approach demonstrated how the framework guides both the analysis of findings and the interpretation of results within a coherent theoretical perspective.

5.2 Overview of Theoretical Frameworks Considered

Several theoretical models, such as the Health Belief Model (HBM), Theory of Planned Behaviour (TPB), and Socio-Ecological Model (SEM), can help explain healthcare workers' perceptions, decision-making, and behaviours regarding new health interventions. Each provides unique insights, but also has limitations when applied to system-level adoption of innovations.

The HBM posits that health behaviours are shaped by individual perceptions of susceptibility to a condition, the perceived severity of that condition, perceived benefits of preventive action, and perceived barriers to action (Rosenstock 1974). While this model is valuable for understanding patient-level decisions to engage in protective behaviours, its focus on individual cognitions makes it less suited for examining provider-level adoption of system-wide innovations such as injectable PrEP.

On the other side, the TPB emphasises that behaviour is driven by behavioural intentions, which in turn are influenced by attitudes, subjective norms, and perceived behavioural control (Ajzen 2011). This framework helps explain individual decision-making processes but does not adequately capture how the characteristics of an innovation, organisational culture, or systemic factors influence adoption.

The SEM highlights the multi-level influences on health behaviours, encompassing individual, interpersonal, organisational, community, and policy factors (McLeroy *et al.* 1988). It provides a comprehensive, layered understanding of the environment in which healthcare workers operate. However, while SEM situates behaviours within their broader context, it does not directly address why certain innovations diffuse more effectively than others, or how specific innovation attributes influence adoption.

In contrast to these models, the DOI Theory directly addresses how new interventions spread, the attributes that influence adoption, and the role of communication and social systems in shaping uptake (Miller 2015; Hornor 2022). DOI therefore provides a more precise and robust framework for studying the adoption of injectable PrEP by healthcare workers, where both the perceived characteristics of the innovation and the broader organisational and social environment are central to the success of implementation.

5.3 Diffusion of Innovations Theory

Rogers (2003) defined diffusion as the process by which an innovation is communicated over time through specific channels among members of a social system. The theory identifies four main elements: the innovation itself, such as injectable PrEP in this study; communication channels, including training, peer-to-peer exchange, and policy directives; time, which reflects the adoption process often categorised into innovators, early adopters, early majority, late majority, and laggards; and the social system, encompassing the structure within which diffusion occurs, such as healthcare facilities, policy environments, and professional networks.

5.3.1 Core Elements

The Diffusion of Innovations (DOI) theory identifies four key elements that shape the spread of new practices (Rogers 2003; Hornor 2022). The first is the innovation itself (Rogers (2003), which in this study refers to injectable PrEP, a long-acting HIV prevention method designed to address adherence challenges linked to daily oral PrEP. The second element is communication channels, through which information about the innovation is disseminated (Rogers 2003). These may include interpersonal networks, professional meetings, training programs, policy directives, and peer-to-peer exchanges, with adoption heavily influenced by the credibility and reach of these channels. The third element is time, recognizing that adoption unfolds gradually across different categories of adopters, namely innovators, early adopters, the early majority, the late majority, and laggards, each with unique characteristics that shape the pace of diffusion (Rogers 2003). Lastly, the social system provides the broader context in which adoption occurs (Rogers 2003). This encompasses healthcare facilities,

professional networks, policy environments, and community settings, all of which are shaped by norms, values, and power dynamics that influence how and to what extent innovations like injectable PrEP are embraced.

5.3.2 Attributes of Innovations

The rate and extent of adoption are primarily influenced by five perceived attributes of an innovation (Hornor 2022): The adoption of injectable PrEP can be better understood through the key attributes of innovations described in the Diffusion of Innovations theory. Relative advantage refers to the degree to which healthcare workers perceive injectable PrEP as superior to existing prevention methods (Rogers, 2003). This advantage may include reduced adherence challenges compared to daily oral PrEP, greater convenience for clients, and enhanced confidentiality. Compatibility speaks to how well the intervention aligns with healthcare workers' values, needs, and current clinical practices (Rogers 2003). For instance, providers may question whether injectable PrEP can be integrated into already overburdened clinic routines. The attribute of complexity reflects the perceived difficulty of understanding and implementing the intervention (Rogers 2003). Without adequate training or with concerns about managing potential side effects, healthcare workers may regard injectable PrEP as complicated or resource-intensive. Trialability highlights the importance of opportunities to test injectable PrEP on a limited scale before broader implementation (Rogers 2003). Pilot programmes and small-scale rollouts can help build familiarity, reduce uncertainty, and boost provider confidence. Finally, observability concerns the extent to which the benefits of the innovation are visible (Rogers 2003). When healthcare workers witness tangible outcomes, such as improved adherence, higher patient satisfaction, or reduced HIV incidence, they are more likely to support and adopt injectable PrEP.

5.3.3 Adopter Categories

DOI further classifies individuals into five adopter categories: innovators, early adopters, early majority, late majority, and laggards (Rogers 2003). Innovators are risk-takers who first try new interventions, while early adopters often serve as opinion leaders, influencing peers (Miller 2015). The early majority adopts after evidence of success is demonstrated (Rogers 2003), while the late majority requires strong social proof before adoption (Rogers 2003). Laggards adopt last, often due to resistance or

adherence to traditional practices (Rogers 2003). Recognising these categories is critical for tailoring strategies to encourage the uptake of injectable PrEP across diverse groups of healthcare workers.

5.4 Relevance of DOI to HIV Prevention and Injectable PrEP

The DOI framework is particularly suitable for studying the adoption of injectable PrEP because it accounts for both individual perceptions and system-level influences. Healthcare providers serve as gatekeepers in HIV prevention, determining whether and how new interventions are offered to clients (Rogers 2003). Adoption, therefore, depends not only on clinical evidence but also on how providers perceive and interpret the innovation (Miller 2015).

Injectable PrEP presents relative advantages over oral PrEP, such as reducing adherence challenges and enhancing privacy for patients (Thomas 2021). However, compatibility issues may arise if clinics lack capacity, staff, or resources to integrate the intervention into existing workflows. Complexity may be perceived where providers feel undertrained or uncertain about side effects. Opportunities for trialability, such as pilot projects, can help build confidence. Finally, observability of positive patient outcomes reinforces acceptance and motivates providers to continue offering the intervention.

Within campus health clinics in KwaZulu-Natal, PHC workers' readiness to adopt injectable PrEP will be shaped not only by their knowledge and attitudes but also by organisational norms, policy directives, and peer influences (Violette *et al.* 2024). By applying DOI, this study can systematically examine the facilitators and barriers influencing adoption, highlighting how innovation attributes intersect with broader social and institutional contexts to determine implementation outcomes.

5.5 Application to This Study

The DOI Theory provided a structured lens to align this study's objectives with the adoption of long-acting injectable PrEP by PHC workers in campus health clinics. The first objective, which seeks to explore healthcare workers' knowledge, attitudes, and

beliefs, is closely linked to the knowledge and persuasion stages of the DOI innovation-decision process. During the knowledge stage, individuals become aware of the innovation and gain an understanding of how it works, while the persuasion stage involves forming favourable or unfavourable attitudes based on this understanding (Miller 2015; Hornor 2022). Investigating PHC workers' beliefs and perceptions, therefore, aligns with DOI's emphasis on the role of individual perceptions in shaping adoption, highlighting how awareness and attitudes can either facilitate or impede readiness to offer injectable PrEP (Spinnewijn *et al.* 2024).

The second objective, which focuses on identifying perceived benefits and concerns, is directly related to DOI's attributes of innovations, namely, relative advantage, compatibility, and complexity (Miller 2015; Hornor 2022). The perceived relative advantage of injectable PrEP, such as improved adherence, convenience, or potential to reduce HIV incidence, influences whether healthcare workers view the innovation as worthwhile. Compatibility refers to the extent to which the intervention aligns with existing clinical routines, values, and workflows within campus health clinics. Complexity, on the other hand, captures how challenging healthcare workers perceive the innovation to be, including the technical skills required and the effort needed to integrate it into daily practice. Understanding both benefits and concerns through these attributes helps explain the differential adoption of injectable PrEP across individuals and clinics (Wu, Yang and Meyers 2021; Spinnewijn *et al.* 2024).

The third objective, examining barriers and facilitators to adoption, draws upon DOI's emphasis on the social system and communication channels (Miller 2015; Hornor 2022). The social system, comprising campus health clinic staff, managers, and the broader healthcare infrastructure, shapes norms, expectations, and interpersonal influences that can either encourage or hinder adoption. Communication channels, including formal training sessions, peer discussions, and institutional directives, determine how effectively information about injectable PrEP is disseminated and internalised. Barriers such as stigma, high workload, and insufficient training may slow adoption, whereas facilitators such as supportive leadership, peer influence, and clear policies can accelerate it (Spinnewijn *et al.* 2024). This perspective underscores that adoption is not only a matter of individual choice but also of how information, support, and social influence flow through the system.

Finally, the fourth objective, generating recommendations to enhance uptake, is framed through DOI's concepts of trialability, observability, and support for early adopters (Hornor 2022). Recommendations may include strategies to pilot injectable PrEP on a small scale, allowing healthcare workers to experiment and build confidence before wider implementation. Observability emphasizes making the benefits of adoption visible, for instance, by highlighting improvements in adherence or reductions in HIV incidence among students, which can reinforce positive attitudes and encourage further adoption. Supporting early adopters, who are opinion leaders within the clinic, ensures that successful experiences are communicated and leveraged to influence peers, thereby promoting diffusion throughout the workforce. By linking each objective to these DOI concepts, the study demonstrates how a theoretical framework can guide both the analysis of findings and the formulation of actionable strategies for enhancing the adoption of injectable PrEP in campus health clinics (Wu, Yang and Meyers 2021; Spinnewijn *et al.* 2024).

5.6 Conceptual Framework Diagram

Figure 1 presents a conceptual framework that illustrates the application of the DOI theory to the study objectives, showing how each DOI construct aligns with key areas of inquiry. Knowledge and persuasion are linked to understanding healthcare workers' awareness, beliefs, and attitudes toward injectable PrEP, highlighting the stages through which they form perceptions about the innovation (Miller 2015; Hornor 2022). Relative advantage and compatibility demonstrate how perceived benefits and alignment with existing services influence adoption readiness. Complexity emphasizes potential barriers that may hinder uptake, while trialability and observability suggest the importance of opportunities for practical experience and visible outcomes in fostering acceptance (Spinnewijn *et al.* 2024). Together, these constructs provide a framework for interpreting not just whether injectable PrEP is acceptable, but how and why it can be successfully integrated into campus health clinics.

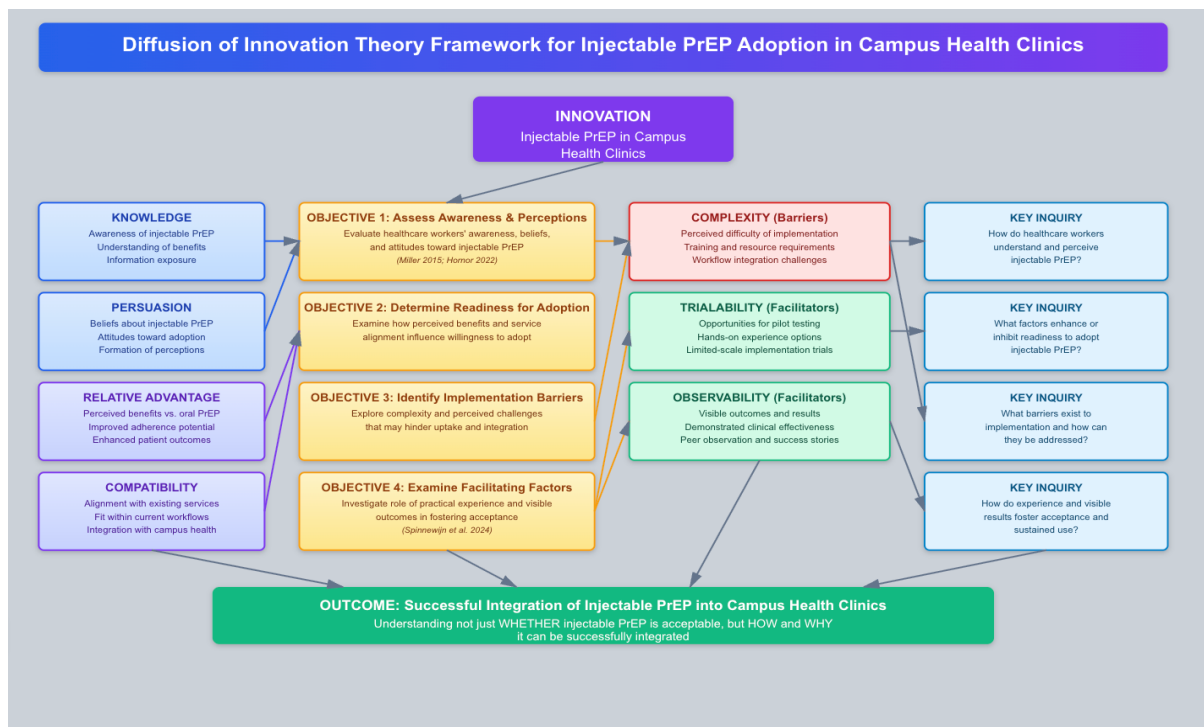


Figure 1: Conceptual Framework Diagram

5.7 Conclusion

This chapter has presented the theoretical foundation of the study, emphasising the importance of anchoring research within a robust framework. While several models, including the Health Belief Model, the Theory of Planned Behaviour, and the Socio-Ecological Model, offer valuable insights into health-related behaviours, they fall short in directly explaining how innovations spread within healthcare systems. The DOI Theory, by contrast, explicitly addresses how innovation attributes, communication processes, time, and social systems interact to shape adoption. A detailed discussion of DOI highlighted its relevance to HIV prevention and, more specifically, the adoption of injectable PrEP by PHC workers. The framework was shown to provide not only an explanatory model of adoption but also a practical guide for linking the study's objectives to measurable constructs such as relative advantage, compatibility, complexity, trialability, and observability. The narrative conceptual framework further demonstrated how these constructs apply to the specific context of KwaZulu-Natal, where PHC workers' perceptions, readiness, and social environment will critically influence the uptake of injectable PrEP.

CHAPTER 6

RESEARCH METHODOLOGY

6.1 Introduction

This chapter presents the methodological framework adopted for the study, which examined primary healthcare workers' perceptions of the implementation and use of HIV injectable PrEP within campus health clinics at a public university in KwaZulu-Natal, South Africa. The DOI Theory informed and guided the methodological approach, shaping the study design, data collection, and interpretation strategies.

The study aimed to identify factors influencing the potential adoption of injectable PrEP and to generate insights that could inform strategies for the effective integration of injectable PrEP into campus-based HIV prevention services. The chapter discusses the research paradigm, study design, setting, population, sampling strategy, data collection methods and procedures, ethical considerations, data analysis, and data management strategies. By presenting these elements, the chapter demonstrates the appropriateness, rigour, and ethical integrity of the chosen methods in addressing the study's objectives.

Guided by the interpretivist paradigm and a qualitative exploratory design, the study aimed to generate rich, context-specific insights into the participants' experiences and the contextual factors shaping their perspectives regarding the implementation of injectable PrEP. In addition to describing the specific techniques used for sampling, recruitment, and data collection, this chapter also discusses the procedures undertaken to ensure the trustworthiness of the findings, including credibility, dependability, transferability, and confirmability. Ethical considerations, such as informed consent, confidentiality, and adherence to institutional guidelines, are also addressed. All data collection activities were completed, and the methods described reflect the actual procedures followed. Table 1 provides a summary of the study's methodological approach.

Table 1: Summary of the Research Methodology

Design Criteria	Description
Title	Primary Healthcare Workers' Perceptions of HIV Injectable Pre-Exposure Prophylaxis (PrEP) in Selected Campus Health Clinics in KwaZulu-Natal, South Africa.
Study Aim	This study aims to explore the perceptions of PHC workers regarding the implementation and use of HIV injectable PrEP in campus health clinics of a public university in KwaZulu-Natal, to identify factors influencing its adoption and to inform strategies for effective integration into campus-based HIV prevention services.
Study Objectives	1. To explore primary healthcare workers' knowledge, attitudes, and beliefs about long-acting injectable HIV PrEP in a campus health clinic. 2. To explore PHC workers' perceptions of the clinical benefits and potential concerns regarding the use of CAB-LA injectable PrEP. 3. To identify systematic, institutional, and individual-level barriers and facilitators that may influence the implementation of CAB-LA injectable PrEP in campus health clinics. 4. To generate recommendations for improving the uptake and integration of injectable PrEP into existing HIV prevention services on campus.
Research Questions	1. How do PHC workers in campus health clinics describe their awareness, knowledge, and understanding of long-acting injectable HIV PrEP? 2. What are the perceived benefits and concerns related to the implementation of injectable HIV PrEP in a campus health clinic setting? 3. What barriers and facilitators do healthcare workers perceive as influencing the adoption and implementation of injectable HIV PrEP?

	4. What recommendations can be made to improve the uptake and integration of injectable PrEP into existing HIV prevention services on campus?
Theoretical Framework	Rogers' Diffusion of Innovations Theory, which explains how new ideas and practices are communicated, adopted, or resisted within social systems.
Research Paradigm	Interpretivist paradigm, emphasizes understanding healthcare workers' subjective meanings and experiences in context.
Research Design	Cross-sectional, qualitative, exploratory design, suited for exploring under-researched areas and gaining in-depth insights.
Study Setting	Conducted at a public university with six campus health clinics located in Durban (eThekweni Metro) and Pietermaritzburg (uMgungundlovu District), offering HIV prevention, testing, and treatment services.
Study Population	Primary healthcare workers (nurses, doctors, HIV counsellors) directly involved in PrEP delivery and HIV services.
Sampling Technique	Purposive sampling, selecting participants with relevant knowledge and experience.
Sample Size	18 participants, determined by data saturation.
Inclusion Criteria	• Employed at the campus health clinics of the selected university • Aged 18 years or older • Involved in HIV services, including oral PrEP • Willing to provide informed consent
Exclusion Criteria	• Healthcare providers not directly involved in the provision of HIV prevention or treatment services • Cognitive impairment that would preclude informed consent or meaningful participation • Unwilling to participate
Data Collection Methods	Semi-structured, face-to-face interviews (45–60 min) in English or isiZulu; audio-recorded with field notes. Conducted in private clinic spaces.

Data Collection Instrument	Semi-structured interview guide, informed by Rogers' Diffusion of Innovations Theory.
Data Analysis	Thematic analysis using Babchuk's 10-step process: transcription, coding, categorization, theme development, validation, and interpretation.
Trustworthiness	Ensured through credibility, dependability, confirmability, authenticity, and transferability.
Ethical Considerations	Ethical approval and gatekeeper permission obtained. Informed consent secured. Confidentiality maintained using pseudonyms. Data stored securely. The study adhered to principles of respect, beneficence, and justice.

6.2 Research Paradigm

This study was guided by the interpretivist paradigm, which emphasizes understanding individuals' subjective meanings and experiences within their social context (Cronn-Mills 2018). Interpretivism posits that reality is socially constructed and best understood through the interpretations of those who experience it (Cronn-Mills 2018). Unlike positivist paradigms that prioritize objectivity and measurement, interpretivism embraces complexity, context, and meaning-making processes (Shah 2021).

Interpretivism was chosen for this study for several key reasons. Firstly, it allows researchers to explore deeply personal and context-specific experiences (Asabor *et al.* 2021), which is essential for gaining a meaningful understanding of primary healthcare workers' perceptions regarding the implementation and use of injectable PrEP. This philosophical approach supports the use of open-ended, qualitative methods such as interviews and observations (Lincoln and Guba 1985; Creswell and Poth 2016; Tisdell, Merriam and Stuckey-Peyrot 2025), which are well-suited to capturing participants' nuanced views and lived realities. Additionally, interpretivism emphasizes the relationship between the researcher and the participant, promoting a more authentic and reflective exchange of insights (Crowley, Merwe and Skinner 2020). This alignment with the study's aims made interpretivism an appropriate and valuable choice.

In the context of South Africa's healthcare system and HIV prevention efforts, an interpretivist approach was crucial for uncovering the nuanced beliefs, values, and concerns held by healthcare workers. This paradigm allowed the researcher to capture both individual and collective interpretations that influence the acceptability and adoption of new health interventions.

6.3 Study Design

The study employed a cross-sectional, qualitative, exploratory research design (Creswell 2014). This design is appropriate when the research area is relatively unexplored, and when the aim is to gain an in-depth understanding of human experiences and meanings (Doyle *et al.* 2019). As (Creswell 2014) and (Creswell and Poth 2016) note, exploratory qualitative approaches enable researchers to investigate emerging phenomena in their natural settings, allowing for a rich and detailed exploration of meanings, experiences, and interpretations. Given that long-acting injectable PrEP is a relatively novel innovation in HIV prevention, little is known about how PHC workers in campus health clinics perceive its adoption and integration into existing services.

The qualitative design was therefore essential for generating rich, descriptive data through direct engagement with participants and contextualized insights that could inform future implementation strategies. It also allowed flexibility to explore emerging themes and adjust lines of inquiry as new insights emerged. Qualitative exploratory designs prioritize flexibility and openness (Creswell and Poth 2016), allowing researchers to probe participants' experiences, attitudes, and beliefs without being constrained by predetermined hypotheses. This approach aligns with the study's objectives, which include examining PHC workers' knowledge, perceived benefits and concerns, and identifying barriers and facilitators to the adoption of injectable PrEP. Through this design, the study captured the nuanced, often complex factors that influence healthcare workers' readiness to deliver injectable PrEP.

6.4 Setting of the Study

The study was conducted at a public university with seven campuses located in two urban centres of KwaZulu-Natal province: Durban, which falls under the eThekweni Metropolitan Municipality, and Pietermaritzburg, which forms part of the uMgungundlovu District Municipality. The university operates six campus health clinics across these seven campuses, offering comprehensive primary healthcare services, including HIV prevention, testing, and treatment. These clinics are staffed by multidisciplinary teams comprising nurses, doctors, HIV counsellors, and health promoters.

Campus health clinics were selected as study sites for several compelling reasons. These clinics primarily serve a young population (18–24 years), particularly students, who are considered a high-risk group for HIV acquisition due to a range of behavioural, biological, and structural factors (Dellar, Dlamini and Karim 2015). Situated within a university setting, these clinics function in an environment where health education, professional training, and research are ongoing, making them ideal for exploring innovative HIV prevention strategies such as injectable PrEP. Furthermore, campus clinics provide a focused and accessible setting where HIV prevention services are routinely delivered. This allows the study to engage directly with healthcare workers who have firsthand experience in PrEP-related service provision and are likely to be exposed to emerging public health interventions (Musakwa *et al.* 2021). These clinics were also chosen because they represent a microcosm of the broader healthcare system, offering insights into how PrEP implementation could be scaled within similar primary care settings in South Africa.

The intersection of service provision and health professional training made campus clinics particularly relevant for examining the feasibility of scaling up new interventions such as injectable PrEP.

6.5 Study Population

The study population comprised PHC workers employed at campus health clinics, encompassing a diverse range of professional roles essential to HIV prevention service delivery. This included primary care nurses who provided direct clinical care,

including the administration and management of PrEP services (Pleaner *et al.* 2023). HIV counselling and testing staff were also included, as they conducted comprehensive risk assessments, offered pre- and post-test counselling, and provided ongoing psychosocial support to patients. Part-time doctors formed another key group within the study population; they managed complex clinical cases, provided mentorship to other healthcare staff, and contributed to clinical decision-making processes.

The rationale for selecting this specific population was grounded in their direct involvement with HIV prevention and care services, particularly concerning injectable PrEP implementation. By including a range of healthcare professionals involved in different aspects of service delivery, the study aimed to capture a comprehensive, multifaceted understanding of perceptions, readiness, and potential challenges within campus health clinics. This purposive selection ensured that the perspectives gathered would reflect both clinical and community-oriented dimensions of HIV prevention efforts, thereby enhancing the depth and applicability of the findings.

6.6 Sampling Size and Sample Strategy

The sample size, a target range of 15 to 30 participants was established based on recommendations from the qualitative research literature, indicating that this range is often sufficient to reach data saturation, the point at which no new themes or insights emerge from additional data collection (Guest, Bunce and Johnson 2006). Guest, Bunce and Johnson (2006); (Sim *et al.* 2018) demonstrated that thematic saturation can be achieved within the first 12 interviews in homogeneous populations, while Sim *et al.* (2018) emphasized that purposive sampling within relatively defined participant groups commonly requires between 15 and 30 interviews to explore key themes comprehensively. This sample size balances the need for depth and diversity of data with practical considerations such as time and resource constraints. Employing purposive sampling within this sample size allowed the study to focus on information-rich cases, thereby enhancing the credibility and relevance of the findings without unnecessary redundancy.

Saturation was monitored continuously and determined to have been reached after 18 interviews, at which point no new themes or patterns were emerging (Naeem *et al.* 2024). This sample size aligns with the best practices of qualitative research and ensures both breadth and depth of insight. (Mason 2010).

A purposive sampling strategy was employed to select participants who possessed relevant knowledge, experience, and insight related to the research question, consistent with qualitative research methodologies (Palinkas *et al.* 2015). This non-probability sampling approach enabled the deliberate inclusion of individuals most capable of providing rich, detailed data pertinent to the study objectives. By targeting participants across diverse professional roles within campus health clinics, the study aimed to capture a broad range of perspectives on the implementation and perceptions of injectable PrEP.

6.7 Inclusion and Exclusion Criteria

Inclusion Criteria:

- Employed at the campus health clinics of the selected university
- Aged 18 years or older
- Involved in HIV services, including oral PrEP
- Willing to provide informed consent (McElroy and Ladner 2020)

Exclusion Criteria:

- Healthcare providers not directly involved in the provision of HIV prevention or treatment services
- Cognitive impairment that would preclude informed consent or meaningful participation
- Unwilling to participate

6.8 Piloting

A pilot study with three PHC workers from non-study clinics was conducted to test the interview guide. Feedback from pilot participants was used to refine the structure, flow, and clarity of the questions. The pilot data were not included in the study's primary dataset.

6.9 Participant Recruitment

Following ethical approval from the Institutional Research Ethics Committee, the researcher met with the Heads of Clinics to introduce the study and agree on a recruitment strategy. To support recruitment, an informative flyer (Appendix G) was designed and distributed in staff rooms and notice boards across six PHC clinics and the university. The flyer outlined the study's purpose, eligibility criteria, potential benefits of participation, and emphasized confidentiality and voluntary involvement, including the researcher's contact details for further inquiries.

Participants were identified through recommendations from the Heads of Clinics, who served as intermediaries to facilitate contact with eligible individuals. The researcher did not obtain personal contact information directly; instead, introductions were arranged through secure and appropriate channels, such as phone calls or in-person visits coordinated with clinic leadership. Once potential participants were identified or expressed interest, they were provided with additional study information, including the Letter of Information (Appendix A) and the Informed Consent Form (Appendix B).

A purposive sampling strategy was used to ensure a diverse and representative range of perspectives across various healthcare roles relevant to the research objectives. The consent process was thoroughly explained, and participants were encouraged to ask questions. It was made clear that participation was entirely voluntary and that individuals could withdraw from the study at any stage without penalty. Written informed consent was obtained before data collection commenced, and interviews were scheduled at times convenient for participants in private, comfortable settings. Core ethical principles, including respect for autonomy, privacy, and confidentiality, guided all recruitment procedures.

6.10 Data Collection Method and Tool

The study used semi-structured interviews to collect qualitative data. This method combines prepared open-ended questions with the flexibility to probe further based on participants' responses (Mashuri *et al.* 2022). It allows for a conversational style while ensuring consistency across interviews.

The interview guide (Appendix C) was developed using Rogers (2003) diffusion of innovations theory as a guiding framework (Rogers 2003; Gerson 2020). This theory provides a useful lens for understanding how new ideas and practices are adopted within a system, and it informed the structure and content of the interview questions. Five key constructs from the DOI theory were integrated into the guide: relative advantage, compatibility, complexity, trialability, and observability (Rogers 2003; Bertrand 2004; Hornor 2022).

Relative advantage refers to the perceived benefits of the innovation compared to existing practices (Rogers 2003). Questions were designed to explore whether healthcare workers viewed injectable PrEP as more effective, efficient, or acceptable than oral PrEP or other HIV prevention strategies (Rogers 2003; Bertrand 2004). Compatibility addresses how well the innovation aligns with existing values, experiences, and needs (Rogers 2003). The guide included questions to assess whether injectable PrEP fits into the current practices and beliefs of healthcare workers in campus clinics (Rogers 2003; Shamu, Mullick and Christofides 2024). Complexity relates to how difficult the innovation is perceived to be in terms of understanding or implementation (Rogers 2003). The guide probed participants' views on the training, procedures, or systems required to deliver injectable PrEP and whether they anticipated any barriers (Hornor 2022). Trialability is the extent to which an innovation can be tested or experimented with on a limited basis (Rogers 2003). Accordingly, questions sought to explore whether healthcare workers would be willing to pilot the use of injectable PrEP within their settings before full implementation (Rogers 2003). Finally, observability refers to the visibility of the outcomes and benefits of the innovation (Rogers 2003). The interview guide included prompts to determine whether participants believed the effects of injectable PrEP could be easily observed in their clinical environment, such as reduced HIV infections or improved adherence (Bertrand 2004; Celum *et al.* 2015). These constructs helped ensure that the interview guide captured a comprehensive range of factors influencing the potential adoption and implementation of injectable PrEP in campus health clinics.

Sample interview questions were both closed-ended (for initial screening) and open-ended (for in-depth exploration). For example, participants were initially asked: "*Have you heard about HIV injectable pre-exposure prophylaxis (PrEP)?*" with follow-up

questions exploring sources of information and depth of knowledge. Participants were asked open-ended questions such as: *"What do you think are the benefits of using HIV injectable PrEP?"* and *"What concerns do you have about HIV injectable PrEP?"* Additionally, the interviews explored perceived barriers by asking: *"What barriers do you think might prevent healthcare workers from recommending it?"* and implementation needs through questions like: *"What kind of support or resources would you need to feel confident in recommending it?"* (see Appendix C for the complete interview guide).

These open-ended questions were deliberately chosen to allow participants to articulate their knowledge, perceptions, and concerns in their own words, thereby capturing both expected and unexpected dimensions of readiness. The study's theoretical framework guided the design of the interview questions. Similarly, exploring challenges and readiness aligns with the DOI theory, particularly its attributes of complexity, compatibility, and trialability. By linking the interview questions to theoretical constructs, the study ensured that the collected data could be systematically analysed to address both individual- and system-level factors influencing the likelihood of adopting injectable PrEP in campus health clinics.

6.11 Data Collection Procedures

At the start of each interview, participants were welcomed, briefed, and asked to provide written consent as a confirmation of their willingness to participate in the study. Interviews were conducted face-to-face in a quiet, private room within the health facility on campus to ensure confidentiality. Interviews lasted 45-60 minutes and were conducted in English or isiZulu, depending on the participant's preference. All interviews were audio-recorded with the participant's consent and accompanied by field notes that captured non-verbal cues and context.

The researcher conducted all interviews personally, ensuring consistent data collection and fostering rapport with each participant. After each interview, audio recordings were securely stored on a password-protected device, and detailed field notes were typed and linked to the corresponding participant's unique code. In addition, briefing sessions were held with the research supervisors after completing

interviews at each facility. These sessions served to reflect on the interview process, assess the quality and depth of the data collected, and identify any areas requiring refinement in the interview approach. Feedback from the research supervisors helped enhance the interview technique, maintain ethical standards, and ensure alignment with the study objectives. The debriefing process also helped the researcher to manage potential biases and emotional responses, thereby improving the rigour and reflexivity of the research.

6.12 Data Management

Data management procedures in this study were guided by recognized best practices, institutional policy, and relevant legal and ethical standards to ensure data integrity, security, and participant confidentiality. Each data file was systematically named using a combination of anonymized participant codes and interview dates, facilitating accurate organization while safeguarding identity. All digital data was stored on encrypted, password-protected devices and routinely backed up to secure, institutionally approved cloud storage systems to prevent data loss and ensure long-term preservation.

To maintain strict confidentiality, access to research data was limited exclusively to the primary investigator and supervisory team. Identifiable information, such as names and clinic locations, was stored separately from the interview transcripts to prevent any direct association with participant responses. Throughout the study, confidentiality and privacy were treated as ethical priorities, and data handling procedures were continuously monitored for compliance.

The study also aligned with the FAIR data principles, ensuring that data were Findable, Accessible, Interoperable, and Reusable, within the constraints of ethical research involving human subjects. Accordingly, data will be securely archived for a minimum period of five years, as per institutional requirements. Any future use or sharing of the data will be permitted only under conditions that protect participant anonymity and comply with all ethical and legal obligations governing research data management.

All audio recordings were transcribed verbatim by the researcher within 72 hours of each interview to ensure accuracy and capture nuances while the interaction remained fresh in memory. All interviews were conducted primarily in English. However, when participants required clarification or appeared uncertain about specific questions, the researcher repeated or rephrased the questions in isiZulu to facilitate understanding and ensure accurate responses. These isiZulu clarifications were translated into English during the transcription process by the researcher, who is fluent in both languages, to maintain consistency and preserve the contextual meaning of participants' responses. Transcription accuracy was verified by listening to the audio recordings while reading the transcripts, with any errors or omissions corrected immediately. This rigorous transcription process ensured that participants' voices were authentically represented in the analysis, thereby strengthening the credibility of the findings. NVivo qualitative data analysis software (Version 15) was subsequently utilized to manage and analyse the interview transcripts systematically and transparently. The software facilitated the efficient coding of large volumes of textual data, allowing for the retrieval of relevant participant quotes and the identification of patterns across interviews. NVivo's capabilities enabled the researcher to organize data thematically, monitor emerging categories, and maintain an audit trail of analytic decisions throughout the process. The researcher conducted all initial coding independently to ensure immersion in the data and maintain analytical consistency. A comprehensive codebook (Appendix J) was developed to guide the coding process. Initially, codes were generated inductively, grounded in the raw data to ensure that the analysis remained closely aligned with participants' perspectives and language. As coding progressed, the codebook was continuously refined through iterative cycles of reading, coding, and reflection. Codes were grouped into broader categories and subcategories, with clear definitions established for each to ensure consistency and reliability. To enhance the trustworthiness of the analysis, the research supervisors conducted independent coding checks on a subset of transcripts (approximately 15–20%) at multiple stages throughout the coding process. Regular briefing meetings were held to discuss coding decisions, resolve interpretive differences, and refine the codebook. Any discrepancies were resolved through consensus discussions, with adjustments documented in the audit trail. This collaborative approach to coding verification strengthened the dependability and confirmability of the findings. The use of NVivo, combined with a well-structured codebook and systematic coding checks,

contributed to the credibility and transparency of the analytical process, thereby enhancing the overall trustworthiness of the study's findings.

6.13 Trustworthiness

To ensure the rigour of this qualitative study, the criteria of credibility, dependability, confirmability, authenticity, and transferability as proposed by Lincoln and Guba (1985) were applied. These criteria are widely regarded as the gold standard for establishing trustworthiness in qualitative research (Shenton 2004; Korstjens and Moser 2018). The following strategies were employed for each criterion.

6.13.1 Credibility

Credibility refers to confidence in the truth of the findings (Lincoln & Guba, 1985). In this study, credibility was enhanced through prolonged engagement with the data during multiple cycles of transcription, coding, and theme refinement. Briefing sessions with research supervisors provided opportunities to discuss interpretations, identify alternative explanations, and reduce potential bias. For example, several participants expressed concern that students might stop using condoms once injectable PrEP was introduced. The researcher initially coded these statements narrowly as *risk compensation*, but during supervisory discussions, it became clear that these concerns also reflected the sub-theme identified in findings: Concerns about impact on condom adherence among students, prompting refinement of the theme. Some participants expressed concerns that students might perceive injectable PrEP as a replacement for condoms, which could increase the risk of other sexually transmitted infections. Credibility was further strengthened through the inclusion of direct participant quotations, which serve as evidence for the claims made and allow the voices of PHC workers to remain central.

6.13.2 Dependability

Dependability concerns the stability and consistency of findings over time (Lincoln and Guba 1985). To achieve this, a comprehensive audit trail was maintained throughout the study. This included storing raw interview transcripts from all 18 participants, detailed coding frameworks, field notes taken at the two campus health clinics, and successive versions of thematic maps. For example, several participants expressed concerns about insufficient training to provide injectable PrEP confidently. Several

participants noted that their training had focused exclusively on oral PrEP, leaving them feeling unprepared to implement injectable PrEP immediately. Initially, these comments were coded under *knowledge gaps*, but during later analysis, they were placed within the theme of *Complexity*, reflecting how the perceived difficulty of adopting a new biomedical intervention was closely tied to healthcare workers' limited training and preparedness. The rationale for this coding shift was documented in the audit trail, illustrating how analytic decisions were tracked over time. Supervisor reviews of coding decisions and peer debriefing sessions further strengthened dependability, ensuring that the analytic process remained transparent, consistent, and could be traced and assessed by others.

6.13.3 Confirmability

Confirmability ensures that the findings reflect participants' experiences rather than the researcher's bias (Schwandt, Lincoln and Guba 2007). To support confirmability, reflexive journaling was used throughout the research. I critically reflected on my positionality as a younger researcher interviewing mostly older healthcare workers. At times, participants positioned themselves as mentors, offering explanations in simplified terms or referencing "what young people need to understand." Recording these reflections helped me remain aware of power dynamics and how they may have shaped responses. Additionally, debriefing with supervisors ensured that coding and theme development were consistently grounded in participant data rather than personal assumptions.

6.13.3.1 Reflexivity

Reflexivity refers to the researcher's deliberate and ongoing examination of how their own positionality, experiences, and assumptions may influence the research process and findings (Finlay 2002). In this study, reflexive practices were employed throughout data collection and analysis to enhance methodological rigour. These reflections were recorded in a reflexive journal, which enabled me to critically consider how power dynamics and my background may have influenced my responses. Reflexivity also guided analytic decisions: for example, when participants expressed concerns that students might stop using condoms with the introduction of injectable PrEP, I carefully considered my interpretations in light of these reflections to ensure that themes accurately represented participants' perspectives. Discussions with supervisors

further supported reflexivity by verifying that coding and theme development remained grounded in the data rather than shaped by personal assumptions.

6.13.4 Transferability

Transferability refers to the extent to which findings can be applied in other contexts (Schwandt, Lincoln and Guba 2007). This was achieved by providing rich, thick descriptions of the research context, including detailed information about the university setting, the structure of campus health clinics, and the professional backgrounds of participants. For example, I described how clinics were staffed mainly by nurses, with limited space and heavy student demand, to allow readers to judge whether similar institutions in South Africa or elsewhere in Sub-Saharan Africa might face comparable challenges, including diverse PHC worker roles (nurses, counsellors, and doctors), further enhancing transferability by capturing varied perspectives.

6.13.5 Authenticity

Authenticity refers to the researcher's effort to fairly and accurately represent the diversity of participants' perspectives, ensuring that all voices, including minority or marginalized views, are acknowledged and presented faithfully (Lincoln and Guba 1985). The researcher aimed to fairly and faithfully represent the range of realities and voices of participants. This involved ensuring that the findings reflected the diversity of views and experiences, with participants' voices presented in a balanced and respectful manner. Attention was also given to power dynamics, ensuring that marginalized perspectives were recognized and not overlooked. To achieve this, all 30 interviews were transcribed verbatim, and participants' quotes were used to illustrate key findings. During coding and theme development, care was taken to preserve diverse opinions, including minority or divergent perspectives, so that the analysis captured the full spectrum of healthcare workers' experiences regarding the introduction of injectable PrEP at the campus health clinics. Participants highlighted that prior training focused only on oral PrEP, which limited their confidence in delivering injectable PrEP. Briefing sessions with research supervisors provided opportunities to discuss interpretations, consider alternative perspectives, and ensure that participants' voices were accurately and authentically represented.

6.14 Ethical Considerations

Ethical considerations refer to the principles and guidelines that ensure research is conducted in a manner that respects participants' rights, dignity, and well-being (Flanagan and Beck 2024). In qualitative research, this includes obtaining informed consent, ensuring confidentiality and anonymity, protecting participants from harm, and addressing potential power imbalances between the researcher and participants. Ethical considerations also involve obtaining appropriate approvals from institutional review boards or ethics committees and managing any conflicts of interest that may arise during the study.

6.14.1 Ethics Approval

The study received ethical clearance from the Institutional Research Ethics Committee (IREC) of the university (IREC 113/25), confirming compliance with established standards for research involving human participants (World Medical Association, 2013). The researcher also completed formal training in research ethics (Appendix D).

6.14.2 Gatekeeper Permission

Permission to conduct the study within the university context was obtained from the University Gatekeeper Permission Committee and the heads of the campus health clinics (Appendices E and F). These approvals ensured institutional support and formal access to the research setting (Department of Higher Education and Training, 2015).

6.14.3 Participant Information and Informed Consent

Before participation, all individuals received a Participant Information Sheet (Appendix A), which outlined the purpose of the research, its objectives, and its relevance to HIV prevention. The document described the study procedures, including the nature of the interviews, expected duration of involvement, and possible risks and benefits.

The information sheet emphasized that participation was voluntary and that individuals had the right to decline or withdraw at any stage without providing a reason and without any consequences. These safeguards are consistent with internationally recognized principles of respect for persons and autonomy (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979).

Written informed consent (Appendix B) was obtained from all participants before data collection. Participants were assured of their rights, including the freedom to withdraw at any time.

6.14.4 Confidentiality and Anonymity

Confidentiality was strongly emphasized throughout the study. Each participant was assigned a unique participant code, and all identifying details, including names, specific job titles, and clinic locations, were removed during transcription. This ensured that participant identities were not linked to the data, thereby protecting their privacy (World Medical Association, 2013).

6.14.5 Principles of Research Ethics

Several core principles guide ethical conduct in research. Respect for persons requires that participation is voluntary and that participants provide informed consent, ensuring they understand the nature and purpose of the study (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979). The principle of beneficence and non-maleficence emphasizes the importance of maximising potential benefits while minimising harm or risk to participants (World Medical Association, 2013). Finally, justice entails the fair and equitable treatment of participants, ensuring that no group is unduly burdened or excluded from the potential benefits of the research (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979).

6.14.6 Beneficence

This study adhered to the ethical principle of beneficence by ensuring that the research produced potential benefits for both participants and the broader public health community. The findings aim to provide valuable insights into healthcare workers' perceptions and readiness to deliver injectable PrEP within campus health clinics. By identifying facilitators and barriers to implementation, the study seeks to inform strategies that enhance HIV prevention services, improve staff preparedness, and support policy development related to PrEP delivery in university healthcare settings. Although participants did not receive direct personal benefits, their involvement

contributes to improving healthcare service delivery and strengthening HIV prevention efforts in South Africa (Miller 2015; Hornor 2022).

6.14.7 Non-maleficence

The principle of non-maleficence was upheld by ensuring that no harm, physical, psychological, or social, befell participants. Participation in the study was entirely voluntary, and individuals were informed of their right to withdraw at any stage without penalty. To minimise any potential discomfort, interviews were conducted in a private, safe, and confidential setting within the campus clinics. No identifying information was collected, and all data were anonymised during transcription and analysis to protect participants' identities. Additionally, sensitive topics related to workplace perceptions were approached with care and respect to avoid any risk of professional or emotional distress (Spinnewijn *et al.* 2024).

6.14.8 Data Security and Management

All data, including audio recordings, transcripts, and field notes, were securely stored on password-protected devices. Access was strictly limited to the principal investigator and supervisors. No raw data were shared outside the research team. This approach ensured compliance with ethical requirements for secure handling of sensitive data (DHET, 2015).

Conclusion

This chapter presented the methodological approach used in the study. An interpretivist paradigm and qualitative exploratory design enabled a deep understanding of PHC workers' perceptions of injectable PrEP. Purposive sampling ensured a diverse range of perspectives, and semi-structured interviews yielded rich data. Data were rigorously analysed using NVivo and grounded in the DOI theoretical framework. Ethical standards and data management protocols were strictly followed, laying a solid foundation for the findings presented in Chapter 7.

CHAPTER 7

FINDINGS

Introduction

This chapter presents the findings of the qualitative study exploring PHC workers' perceptions of implementing HIV injectable PrEP in campus health clinics at a public university in KwaZulu-Natal, South Africa. The findings respond to the four research objectives introduced earlier in the study, which are:

1. To assess the awareness and knowledge of healthcare workers regarding HIV injectable PrEP;
2. To explore PHC workers' perceptions of the clinical benefits and potential concerns regarding the use of CAB-LA injectable PrEP.
3. To identify systematic, institutional, and individual-level barriers and facilitators that may influence the implementation of CAB-LA injectable PrEP in campus health clinics, and
4. To generate recommendations for improving the uptake and integration of HIV injectable PrEP into existing HIV prevention programs.

The chapter is organized according to these objectives, beginning with participants' awareness and knowledge of injectable PrEP. It then outlines the perceived benefits and concerns regarding its potential implementation in a campus health clinic setting. The subsequent section examines the barriers and facilitators that may influence healthcare workers' adoption and delivery of injectable PrEP. Finally, the chapter concludes with findings related to participants' recommendations for improving uptake and integration of injectable PrEP into existing HIV prevention programmes. Quotations from participant interviews are included throughout to illustrate key themes and support the interpretation of findings.

7.1 Demographic Characteristics of Participants

Eighteen primary healthcare (PHC) workers participated in this study. The sample comprised 10 PHC nurses (55.6%), three medical doctors (16.7%), and five HIV counsellors (27.8%). Participant ages ranged from 27 to 70 years, with a mean age of

52.4 years. Professional experience in participants' current roles ranged from 1 to 35 years, with a mean of 16.6 years. Notably, the shorter experience durations observed among some HIV counsellors reflected relatively recent entry into this specific professional role, rather than limited healthcare exposure overall. The sample consisted predominantly of females (n=16, 88.9%), with only two male participants, reflecting the gender composition of the PHC workforce in the study setting.

All participants worked in campus health clinics at the selected public university, serving the public, staff, and predominantly 18- to 30-year-old students. The clinics where participants were employed provide HIV testing, counselling, sexual and reproductive health services, including oral PrEP, mental health services, and primary healthcare services. Table 2 presents the demographic profile of individual participants.

Table 2: Profile of study participants

Participant Code	Age (years)	Sex	Occupation	Years of Experience
P1	70	Female	PHC Nurse	30
P2	68	Female	PHC Nurse	27
P3	39	Female	PHC Nurse	12
P4	35	Female	PHC Nurse	03
P5	27	Female	PHC Nurse	05
P6	62	Female	PHC Nurse	30
P7	46	Female	PHC Nurse	08
P8	67	Female	PHC Nurse	28
P9	57	Female	PHC Nurse	11
P10	66	Female	PHC Nurse	35
P11	50	Female	Medical Doctor	30
P12	50	Male	Medical Doctor	23
P13	38	Female	Medical Doctor	15
P14	55	Female	HIV Counsellor	01
P15	55	Female	HIV Counsellor	15

P16	32	Male	HIV Counsellor	06
P17	64	Female	HIV Counsellor	02
P18	42	Female	HIV Counsellor	19

Overall, the participants represented a mix of healthcare professionals, with the majority being PHC nurses. The variation in professional roles, years of experience, and gender ensured a broad representation of perspectives on perceptions of injectable PrEP in campus-based PHC clinics.

Presentation of Findings

The findings are presented according to the study's four objectives, with themes and sub-themes supported by illustrative quotations from participants. Throughout the presentation, connections are made to Rogers' Diffusion of Innovations theoretical constructs where applicable, situating the empirical findings within established theories of innovation adoption.

Table 3 presents a summary of the themes and sub-themes that emerged from the data analysis, organized according to the study's four objectives.

Table 3: Summary of themes and subthemes

Objective	Theme	Sub-themes
Objective 1: PHC workers' knowledge, attitudes, and beliefs	Theme 1: Awareness and Knowledge of Injectable PrEP	1. Variations in knowledge across healthcare worker categories 2. Knowledge gaps about clinical and operational aspects
	Theme 2: Perceptions and Attitudes toward Injectable PrEP	1. Optimism about the potential to enhance HIV prevention 2. Optimism contingent on demonstrated success
Objective 2: Benefits and concerns of implementation	Theme 1: Potential Benefits of HIV Injectable PrEP	1. Anticipated adherence associated with reduced daily pill burden 2. Convenience for students with busy, unpredictable lifestyles 3. Reduced stigma and increased privacy compared to daily oral PrEP

		4. Extended dosing interval as a practical advantage
	Theme 2: Perceived Concerns and Challenges of HIV Injectable PrEP	1. Uncertainty about injectable PrEP efficacy compared to oral PrEP 2. Concerns about patient acceptability 3. Anticipated side effects and safety monitoring requirements 4. Concerns about impact on condom adherence among students
Objective 3: Barriers and facilitators	Theme 1: Perceived Barriers to Adoption and Implementation	1. Lack of adequate training and preparedness 2. Staff shortages and workload pressures 3. Stigma and misconceptions surrounding HIV prevention services 4. Logistical and infrastructural challenges
	Theme 2: Perceived Facilitators of Adoption and Implementation	1. Structured training and continuous professional development 2. Leadership and management support 3. Clear operational protocols and standardized guidelines 4. Community engagement and peer advocacy 5. Compatibility with existing services 6. Dissemination of success stories
Objective 4: Recommendations for integration	Theme 1: PHC workers' Recommendations for Injectable PrEP Implementation	1. Structured training and continuous professional development 2. Pilot phase before full-scale implementation 3. Targeted awareness campaigns 4. Clear communication strategies 5. Robust monitoring and evaluation systems 6. Phased roll-out approach

Objective 1: To explore PHC workers' knowledge, attitudes, and beliefs about long-acting injectable HIV PrEP in campus health clinics

Theme 1: Awareness and Knowledge of Injectable PrEP

This section presents findings related to PHC workers' awareness and knowledge of injectable HIV PrEP within the campus health clinic context. It explores how familiar different categories of staff are with this emerging prevention method and examines the nature and depth of their understanding. The findings highlight variations in knowledge across professional groups as well as areas where clinical and operational understanding remains limited. These insights help to clarify the current state of readiness among campus health clinic staff to engage with injectable PrEP as part of HIV prevention services.

Sub-theme 1: Variations in knowledge across healthcare worker categories

The findings indicate notable differences in awareness and understanding of injectable PrEP among various healthcare worker categories within campus health clinics (Table 4). Among the ten nurses interviewed, seven reported having some knowledge of injectable PrEP, whereas three indicated limited or no awareness of it. The three doctors demonstrated a moderate level of awareness overall, with one displaying a clear understanding of the intervention and two acknowledging only limited familiarity. Among the five HIV counsellors, four reported that they had heard about injectable PrEP, though their knowledge was largely surface-level, and one counsellor indicated minimal awareness.

Table 4: Healthcare Workers' Awareness and Understanding of Injectable PrEP by Cadre (N=18)

Healthcare Worker Cadre	n	Level of Awareness and Understanding	n (%)
Nurses	10	Some knowledge	7 (70.0)
		Limited or no awareness	3 (30.0)
Doctors	03	Clear understanding	1 (33.3)
		Limited familiarity	2 (66.7)

HIV Counsellors	05	Heard about it (surface-level knowledge)	4 (80.0)
		Minimal awareness	1 (20.0)
Total	18		

Some of the healthcare workers who demonstrated greater knowledge of injectable PrEP highlighted its advantages over oral PrEP, as described in the excerpts below:

“Injectable PrEP is cabotegravir administered intramuscularly every two months. It provides sustained protection against HIV acquisition and has shown high efficacy in clinical trials. The main advantage over oral PrEP is that it eliminates the daily pill burden, which should theoretically improve adherence. However, I think we need more local data on its effectiveness in our population and how patients respond to it in our local setting.” [P12, Medical Doctor]

In contrast, other participants reported only a basic awareness of injectable PrEP and lacked understanding of its recommended dosing intervals and associated side effects, highlighting uncertainty in their confidence in future service delivery.

“I’ve heard about injectable PrEP, but most of what I know comes from online articles. We haven’t really had formal training yet. I know it’s supposed to prevent HIV, but I’m not clear on how often patients need to come back or what the side effects might be. It would help if we had proper sessions where someone explains everything in detail.” [P05, PHC Nurse]

Similarly, an HIV counsellor explained that they currently lack the information needed to guide clients in choosing between different PrEP modalities:

“I’ve heard colleagues talking about it, and I saw something about it on the news last year [2024]. From what I understand, it’s an injection that protects against HIV for a few months. But honestly, I don’t know

much about who should get it, whether it has serious side effects, or how we would counsel students about choosing between pills and injections. I'd need proper training before I could confidently discuss it with clients.” [P16, HIV Counsellor]

Taken together, although participants’ depth of knowledge varied, there was a shared understanding that injectable PrEP represents a new development in HIV prevention, with information most often obtained through online news and peer networks. Most participants also emphasized the need for formal training and structured information on injectable PrEP to strengthen their confidence in supporting its implementation.

Sub-theme 2: Knowledge gaps about clinical and operational aspects

Although most participants recognized injectable PrEP as a new HIV prevention method, they expressed uncertainty about its clinical requirements and operational implementation within campus health clinics. Knowledge gaps included its effectiveness, the duration of protection, dosage schedules, and the specific eligibility criteria for potential users.

Some participants expressed uncertainty about the effectiveness and dosing requirements of injectable PrEP. Although aware that the intervention is intended to prevent HIV, they were unsure how well it works in comparison to existing oral PrEP and did not feel confident explaining its protective level to clients. Participants were also unclear about how frequently injections would be required and whether adherence demands would differ from daily oral PrEP. One participant said:

“I’m not sure if it’s already in South Africa or just something still being tested. And even if it is available, I don’t know how long one injection lasts. Is it monthly? Every three months? And does it work as well as the tablets? These are the kinds of questions students will ask us, and right now, I wouldn’t have good answers for them.” [P07, PHC Nurse]

Other participants also voiced uncertainty about the eligibility criteria for accessing injectable PrEP. While they understood that the intervention is intended for HIV

prevention, many were unsure about the specific clinical guidelines that determine who can receive it.

“Some patients ask about new prevention methods, but we don't have enough information to guide them properly. For example, I don't know if injectable PrEP is only for people at very high risk or if any student can request it. Can someone on chronic medication also take it? What about someone who's already on oral PrEP, can they switch? Without clear guidelines, it's hard to counsel effectively.” [P18, HIV Counsellor]

As a result, participants' limited understanding of eligibility guidelines created uncertainty and hesitation around how to effectively identify and support clients who could be suitable candidates for injectable PrEP.

Theme 2: Perceptions and Attitudes toward Injectable PrEP

This theme explores healthcare workers' perceptions and attitudes toward the introduction of injectable PrEP in campus health clinics. Two sub-themes emerged: (1) optimism about the potential to enhance HIV prevention and (2) optimism contingent on demonstrated success. Together, these sub-themes illustrate a general receptiveness toward injectable PrEP, balanced with a need for reassurance through practical evidence.

Sub-theme 1: Optimism about the potential to enhance HIV prevention

Participants highlighted the convenience and long-acting nature of injectable PrEP as key advantages that could improve PrEP client uptake and adherence.. They perceived it as an innovation that might particularly benefit individuals who are concerned about maintaining daily pill-taking routines, stigma related to oral PrEP use, or privacy issues. As one participant said:

“We feel hopeful about injectable PrEP because it could really change the game for prevention. Students often forget to take their pills daily, or they stop because they don't want others to see them taking medication. With an injection every two months, they don't have to worry about pills at all. It's more discreet, and I think it would

encourage more students to protect themselves.” [P15, HIV Counsellor]

This optimism was grounded in the perception that injectable PrEP offers individuals greater autonomy to choose between a pill or an injection, similar to the range of options available for contraceptive methods. Participants felt that such a choice could empower users, allowing them to select a prevention method that best fits their personal preferences and lifestyles. In the words of another participant:

“This is a welcome addition to the HIV prevention methods. Anything that improves adherence is beneficial, and I believe injectable PrEP has that potential. We've seen with family planning injections that students prefer them over daily pills. I think the same could be true for HIV prevention methods. If we can offer both options, pills and injections, then clients can choose what works best for their lifestyle.”

[P02, PHC Nurse]

In summary, participants perceived injectable PrEP as an innovation that could enhance overall prevention outcomes by supporting better adherence and enabling individuals to choose their preferred prevention modality.

Sub-theme 2: Optimism Contingent on Demonstrated Success

While participants recognised the potential benefits of introducing injectable PrEP, some expressed a reserved stance, noting that their confidence would depend on seeing how well the method performs in reality. These participants recognized the promise of injectable PrEP in strengthening HIV prevention efforts, while also acknowledging their doubts associated with the nature of the target population for injectable PrEP. One doctor captured this sentiment:

“Some of us are excited about injectable PrEP, but others are still hesitant until they see actual results. It sounds good in theory, convenient, long-acting, and better adherence. But we need to see how it works in practice. Will there be side effects we haven't anticipated? I'm cautiously optimistic, but I think we need to approach

this thoughtfully and monitor outcomes closely.” [P12, Medical Doctor]

Another participant shared similar views, emphasizing the need for demonstrated effectiveness before full commitment:

“I think it’s a good idea, but we have to see if it really works as promised. We’ve had new interventions before that looked great on paper but didn’t perform well in our setting. So while I’m hopeful about injectable PrEP, I want to see evidence from our own clinics, from our own students, before I’m fully convinced. Show me the results, and then I’ll be a strong advocate for it.” [P11, Medical Doctor]

Participants acknowledged the value of expanding HIV prevention options but highlighted that practical evidence from campus health contexts would be necessary before they could fully advocate for its use.

Overall, while participants were receptive to the innovation, full endorsement of injectable PrEP remained contingent on demonstrated success in practice, particularly within campus health settings where patterns of service utilization may differ from those observed in clinical trials.

Objective 2: To explore the potential benefits and concerns regarding the implementation of HIV injectable PrEP within campus health clinic settings

Theme 1: Potential Benefits of HIV Injectable PrEP

Participants mentioned four potential benefits of introducing injectable PrEP within campus health clinic settings. These are: (1) anticipated adherence associated with reduced daily pill burden, (2) convenience for students with busy, unpredictable lifestyles, (3) reduced stigma and increased privacy compared to daily oral PrEP, and (4) extended dosing interval as a practical advantage. All participants acknowledged that injectable PrEP could offer significant benefits over daily oral PrEP, particularly in overcoming existing barriers to daily medication adherence.

Sub-theme 1: Anticipated adherence associated with reduced daily pill burden

Participants highlighted that one of the most appealing features of injectable PrEP is its potential to improve adherence among students by removing the need for daily medication. They noted that daily oral PrEP demands daily consistency and personal commitment, yet these are areas where students commonly struggle, potentially compromising effective adherence. One nurse explained:

“With injections, patients don't have to remember pills every day, which is much easier for students who are always busy. Daily oral PrEP requires discipline and routine, but students' lives are unpredictable; they have classes, social activities, exams, and travel home during holidays. It's easy to forget a pill or run out of tablets. With injectable PrEP, once they get the injection, they're sorted out for two months without having to think about it daily.” [P08, PHC Nurse]

Another participant reinforced this view by highlighting that adherence to preventive medicine, such as oral PrEP, can be difficult because individuals do not feel unwell and may not view daily medication as essential. In their view, the long-acting injectable option has the potential to address this challenge by reducing the ongoing effort required to maintain protection.

“Not having to take a pill daily could really help with adherence. Young people often forget or skip doses, especially when they don't feel sick. We see this challenge with oral PrEP all the time. Patients start with good intentions but gradually become inconsistent. An injection every two months is more manageable for students than taking pills every day. It removes the burden of daily decision-making and memory.” [P11, Medical Doctor]

Overall, participants believed that injectable PrEP could support better adherence outcomes among students, ultimately strengthening HIV prevention efforts in campus settings.

Sub-theme 2: Convenience for students with busy, unpredictable lifestyles

Participants also emphasized that injectable PrEP could be especially beneficial for young populations with unpredictable, busy lifestyles, such as students, for whom maintaining a daily oral regimen can be challenging. They noted that students juggle social and academic life, which can make it difficult for them to remember to take their daily medication. One counsellor noted:

“An injection once every two months is more manageable for students than taking pills every day. Students are constantly moving between lectures, libraries, residences, and social events. Some live off-campus and might forget their pills at home. Others travel frequently. Injectable PrEP fits better into their busy schedules because they would only need to plan for a clinic visit every two months rather than worrying about taking a pill at the same time every single day.” [P17, HIV Counsellor]

Moreover, some participants felt that the campus environment would facilitate students' ability to receive injectable PrEP:

“Students have busy lives. They might be fine taking pills during term time, but then they go home for holidays or travel, and they forget their pills. Injectable PrEP would therefore eliminate these problems.” [P06, PHC Nurse]

The convenience of an injection was also linked to reduced anxiety, as students would not be required to worry about their daily medication.

Overall, participants felt that injectable PrEP may offer a more practical HIV prevention option for students, aligning more closely with their lifestyles and campus environment, and ultimately improving the likelihood of adherence.

Sub-theme 3: Reduced stigma and increased privacy compared to daily oral PrEP

Participants also highlighted the potential of injectable PrEP to reduce HIV-related stigma and increase privacy for students seeking HIV prevention services. They explained that carrying or taking a daily pill can draw unwanted attention from roommates, leading to assumptions about HIV status or sexual behaviour. In contrast, receiving an injection periodically at the clinic was seen as a more discreet option, which could increase their privacy instead of exposing their PrEP use to others.

Healthcare workers further suggested that the stigma surrounding daily HIV-related medication may discourage students from adhering consistently. Injectable PrEP was therefore viewed as a means of enabling prevention without attracting suspicion or judgement from others within their social circles. One nurse explained:

“People hide their PrEP pills because others think they are HIV positive. If it's just an injection, no one outside has to know. Students living in residences share rooms and common spaces. If they keep PrEP pills in their room, roommates might see them and make assumptions. There's still a lot of stigma around HIV. Some students fear being judged or labelled as promiscuous. With injectable PrEP, there's no visible evidence of prevention use, which protects their privacy .” [P10, PHC Nurse]

Furthermore, participants emphasised that, because injectable PrEP is less visible than a daily pill, it could protect students from involuntary disclosure and the stigma that may accompany it.

“Injectable PrEP offers more discretion. Students won't have to worry about someone finding their tablets or asking questions. The injection will happen at the clinic, and then they will go about their lives without any daily reminder or visible sign of prevention. This could be especially helpful for students who feel vulnerable to stigma or who don't want to disclose their prevention choices to partners, friends, or family.” [P09, PHC Nurse]

Another participant linked privacy protection to travel periods:

“They can get their injection before leaving for the holidays and be protected throughout that period without anyone at home knowing.”

[P06, PHC Nurse]

The convenience of an injection was also linked to reduced anxiety, as students would not be required to worry about involuntary disclosure or feel uncomfortable taking them around family.

In summary, participants viewed the discreet delivery of injectable PrEP as a key factor that could promote both initiation and continued use, by minimising stigma and protecting student privacy.

Sub-theme 4: Extended dosing interval as a practical advantage

The bi-monthly administration schedule of injectable PrEP was repeatedly mentioned as a possible significant practical advantage for students. Participants felt that fewer clinic visits every two months would reduce the logistical burden on both students and campus health facilities. A doctor commented:

“The main advantage is the frequency of injection. Instead of monthly or more frequent visits to collect pills, students only need to come every two months. This will reduce congestion at our clinics, decrease waiting times, and make prevention more accessible for students who might otherwise struggle to attend frequent appointments due to their academic schedules.” [P13, Medical Doctor]

The reduced frequency of follow-up was seen as helping to alleviate common logistical barriers associated with daily oral PrEP. Overall, participants viewed injectable PrEP as a promising, more user-friendly innovation that could enhance adherence and convenience, which they regarded as key factors contributing to its perceived relative advantage over oral PrEP.

Theme 2: Perceived Concerns and Challenges of HIV Injectable PrEP

While participants acknowledged the benefits, they also identified four concerns and challenges that could affect the successful implementation of injectable PrEP in campus health settings. These concerns and challenges include: (1) uncertainty about injectable PrEP efficacy compared to oral PrEP, (2) concerns about patient acceptability, (3) anticipated side effects and safety monitoring requirements, and (4) concerns about impact on condom adherence among students.

Sub-theme 1: Uncertainty about injectable PrEP efficacy compared to oral PrEP

Despite acknowledging the benefits, most participants expressed uncertainty about the efficacy of injectable PrEP compared with oral PrEP. This concern was shared among doctors, nurses, and counsellors, who noted that their confidence in recommending injectable PrEP depended on accessible, trustworthy local research.

Participants linked their uncertainty about injectable PrEP's efficacy to the limited availability of locally generated scientific evidence from South African clinical trials. One participant stated:

"I've read about it online, but I don't know if it's as effective as the pills. Most of the studies I've seen are from other countries, and I'm not sure how applicable those findings are to our context. Our students might have different risk profiles, health backgrounds, or genetic factors that could influence how well injectable PrEP works. Before I can confidently recommend it, I'd like to see evidence from South African trials or implementation data from similar African settings." [P12, Medical Doctor]

Participants emphasized that locally generated efficacy data would be crucial in enhancing their confidence and ability to implement injectable PrEP effectively. One participant strongly asserted that :

"Until there's clear evidence, especially local research, I can't confidently recommend it to students. When students ask me questions, I need to give them accurate information. If I tell them injectable PrEP is just as good as oral PrEP, but I'm not actually sure,

I'm doing them a disservice. We need data on effectiveness, safety profiles, and long-term outcomes specific to our population before we can promote it widely.” [P14, HIV Counsellor]

Another participant echoed this view, agreeing that locally generated evidence on the efficacy of injectable PrEP would be crucial for addressing the unanswered questions that healthcare workers currently face.

“With oral PrEP, we were told it works if you take it daily... but with the injection, we don't know the numbers. How many students have used injectable PrEP? How many stayed HIV-negative? What were the failure rates? These are questions we can't answer yet because the data isn't available or hasn't been shared with us. Without this information, it's hard to counsel students effectively or to know if we're truly offering them the best protection.” [P05, PHC Nurse]

However, one participant noted that some healthcare workers expressed resistance toward the introduction of injectable PrEP, as they questioned the necessity of offering an additional prevention modality.

“It's effective, but some colleagues remain sceptical, thinking oral PrEP is enough. There's some resistance to change. Some staff members feel that since oral PrEP is already available and proven to work, why complicate things by introducing another option? But I think having choices is important. Different students will prefer different methods. We just need to make sure both options are equally well-supported with evidence and resources.” [P11, Medical Doctor]

Participants emphasized that seeing positive results and real-world outcomes would be essential for building confidence in injectable PrEP. Several highlighted the role of peer influence and patient feedback in shaping perceptions, emphasizing the importance of social proof in adoption. One nurse explained:

“If students see others benefiting, more will join. Young people are influenced by their peers. If they see friends or classmates using injectable PrEP successfully, staying HIV-negative, experiencing minimal side effects, and appreciating the convenience, they'll be more likely to try it themselves. We need to create opportunities for satisfied users to share their experiences, maybe through testimonials, peer education programs, or social media campaigns.”
[P09, PHC Nurse]

Another nurse linked this to clinical outcomes:

“We'll believe in it more if we see reduced infections in our clinic. If we notice a decline in new HIV diagnoses among students using injectable PrEP compared to those on oral PrEP or no prevention, that would be powerful evidence. It would validate our efforts and motivate us to continue promoting injectable PrEP. Data speaks louder than theory. Show us the numbers, and we'll be convinced.” [P10, PHC Nurse]

Limited knowledge and the lack of locally generated efficacy data contributed to hesitation among participants, highlighting the need for context-specific evidence to build confidence in the implementation of injectable PrEP.

Sub-theme 2: Concerns about patient acceptability

While some participants thought injectable PrEP would be convenient for students with busy, unpredictable lifestyles, others raised concerns about patient acceptability, especially among students who may be resistant to injections. One nurse cautioned:

“The student population might resist injections, especially males, due to fear of needles, which conflicts with social expectations that men should appear fearless and strong.” [P04, PHC Nurse]

Another nurse expressed similar concerns:

“Some students might fear injections or side effects. Not everyone is comfortable with needles. Some students have had bad experiences with injections in the past, painful shots, bruising, or anxiety about medical procedures.” [P07, PHC Nurse]

Some participants also expressed concerns about whether students would adhere to the two-month injection schedule. One participant noted:

“Will students actually come back every two months? That's something we need to monitor carefully. If they miss their appointments, their protection lapses, and they're at risk.” [P12, Medical Doctor]

In summary, participants indicated that the acceptability of injectable PrEP among students would be shaped by fear of needles, gendered expectations, and concerns about adherence to the follow-up schedule.

Sub-theme 3: Anticipated side effects and safety monitoring requirements

Concerns about side effects and safety were mentioned. Some healthcare workers expressed concern that potential adverse reactions might deter clients from adopting it.

“Some students won't trust it; they worry about side effects. We've heard reports of injection reactions, weight gain, mood changes, and other issues associated with injectable PrEP. If students experience these side effects, word will spread quickly on campus, and uptake could drop dramatically.” [P15, HIV Counsellor]

Participants expressed concern that potential side effects of injectable PrEP would require regular safety monitoring, potentially increasing healthcare providers' workload.:

“It's convenient, but we need to monitor for side effects carefully. Injectable PrEP requires regular follow-up to check for adverse

reactions, ensure patients are still HIV-negative, and address any concerns. This means additional consultations, blood tests, and documentation. With our current staff shortages, adding these monitoring responsibilities could strain our system.” [P13, Medical Doctor]

In summary, participants noted that concerns about side effects could hinder the uptake of injectable PrEP and necessitate regular safety monitoring, which, in turn, could increase healthcare providers' workload.

Sub-theme 4: Concerns about impact on condom use among students

Some PHC workers expressed doubt about whether injectable PrEP would result in inconsistent condom use among the student population. One participant explained:

“My concern is that knowing students, they might stop using condoms altogether once they're on injectable PrEP. They'll think they're fully protected and forget that PrEP only prevents HIV, not other sexually transmitted infections or pregnancy. We already struggle to convince some students about the importance of condoms. If we introduce injectable PrEP without strong education campaigns, we might see an increase in other STIs on campus.” [P04, PHC Nurse]

Another nurse expressed similar concerns:

“Knowing students, they might stop using condoms, which is a concern for us because that means unplanned pregnancy and a high number of cases of STIs.” [P09, PHC Nurse]

In summary, participants raised concerns that the introduction of injectable PrEP might inadvertently reduce condom use among students, potentially leading to increased rates of other sexually transmitted infections and unplanned pregnancies if not accompanied by comprehensive education on dual protection.

Objective 3: To explore the perceived barriers and facilitators influencing healthcare workers' adoption and implementation of HIV injectable PrEP

Theme 1: Perceived Barriers to Adoption and Implementation

While participants generally welcomed the expected introduction of injectable PrEP, they also identified potential barriers that could hinder its successful adoption and implementation within primary healthcare settings. These barriers include (1) lack of adequate training and preparedness, (2) staff shortages and workload pressures, (3) stigma and misconceptions surrounding HIV prevention services, and (4) logistical and infrastructural challenges.

Sub-theme 1: Lack of adequate training and preparedness

A commonly cited concern was the lack of adequate training and preparedness among healthcare workers. Many participants reported not yet having received formal guidance or training on administering or managing injectable PrEP, which contributed to uncertainty and hesitation about its implementation. Participants admitted lacking the necessary competencies to administer injectable PrEP, highlighting the importance of training before implementation. One nurse explained:

“Lack of formal training would be a major barrier for staff. We can't be expected to offer a new service without proper preparation. I don't know how to administer injectable PrEP. What's the right injection technique? Which muscle should be used? How deep should the needle go? I don't know how to counsel patients about what to expect, how to manage side effects, or when to refer for specialist care. Without comprehensive training, we'll make mistakes, and patients will suffer.” [P03, PHC Nurse]

Another participant reinforced this concern, noting that inadequate training remains a significant barrier to the successful implementation of injectable PrEP:

“Training on side effects and adherence monitoring is essential to prevent mistakes. We need to understand the full range of possible side effects, from minor injection site reactions to more serious

complications. We need to know how to support patients in returning for their next injection on time, how to handle missed appointments, and how to counsel patients who want to switch back to oral PrEP or discontinue prevention altogether. All of this requires specialized knowledge that we don't currently have.” [P16, HIV Counsellor]

A third participant further highlighted the lack of clinical training, stressing the importance of practical, hands-on preparation for healthcare workers before rollout:

“We need proper training before we can offer this safely. It's not just about the technical skills required to give an injection. We need to understand the evidence base, eligibility criteria, contraindications, drug interactions, and follow-up protocols. We need training on counselling techniques specific to injectable PrEP. And we need ongoing support, not just a one-time workshop. Continuous professional development will be essential as we learn from experience and as new research emerges.” [P08, PHC Nurse]

Overall, participants identified inadequate training as a key perceived barrier that could hinder both the adoption and successful implementation of injectable PrEP within campus health services.

Sub-theme 2: Staff shortages and workload pressures

In addition to training gaps, participants mentioned staff shortages and workload pressures as key factors that could hinder the successful implementation of injectable PrEP within campus health clinics. Participants emphasized that existing human resource limitations could make it challenging to accommodate the additional responsibilities associated with injectable PrEP delivery. One nurse strongly asserted that:

“Our workload is already too much; adding injections without extra staff will be hard. We're already overwhelmed with our current patient load. We handle HIV testing, counselling, family planning, STI screening and treatment, general primary care, and health education.

If we add injectable PrEP to this list without hiring additional nurses or extending clinic hours, something will have to give. Either we'll rush through consultations, reducing quality, or we'll see fewer patients, reducing access.” [P06, PHC Nurse]

Introducing a new service such as injectable PrEP was therefore viewed as potentially adding to an already strained workload. This sentiment was shared by others, with one nurse explaining:

“We don't have enough nurses; adding injections means longer queues. Students already complain about long waiting times. If each injectable PrEP appointment takes 30-45 minutes, including counselling, preparation, administration, observation, documentation, and scheduling the next visit, we won't be able to maintain our current patient flow. The queues will get even longer, students will get frustrated, and some might leave without receiving care. We need more staff if we're going to do this properly.” [P10, PHC Nurse]

Similarly, a counsellor also expressed concerns about time constraints:

“Counselling time per student could be insufficient during busy clinic hours. Injectable PrEP requires thorough counselling, including discussion of benefits, risks, alternatives, expectations, adherence to follow-up visits, and concerns. This can't be rushed. But during peak hours, when the clinic is packed with students, we might not have the luxury of spending adequate time with each person. This compromises the quality of care and could lead to misunderstandings or poor outcomes.” [P18, HIV Counsellor]

Overall, participants identified staff shortages and workload pressures as major barriers to the successful adoption and implementation of injectable PrEP, emphasising the need for adequate staffing and support to ensure sustainable delivery.

Sub-theme 4: Stigma and misconceptions surrounding HIV prevention services

In addition to workload and staffing challenges, participants highlighted that stigma and misconceptions surrounding HIV prevention services could further limit the acceptability and uptake of injectable PrEP among students. They explained that negative attitudes toward HIV and persistent misconceptions about individuals who seek prevention services continue to influence how such interventions are perceived within the university community.

Some participants noted that students may associate PrEP use with promiscuity or HIV infection, leading to fear of judgement and reluctance to access services. This concern was illustrated by one nurse who explained:

"There's still a lot of stigma around HIV prevention services in the country. Some people avoid coming to our clinic altogether because they don't want to be seen entering a place(room) associated with HIV. Others worry that their peers or partners will question why they're taking prevention seriously, 'Why do you need PrEP? Who are you sleeping with?' This stigma affects oral PrEP uptake. We need broader efforts to normalize HIV prevention, to frame it as responsible health behaviour rather than something shameful or suspicious."

[P04, PHC Nurse]

Others highlighted that a general lack of awareness and misinformation about PrEP could contribute to low uptake of injectable PrEP. A counsellor reinforced this point, noting that :

"Community perceptions and stigma can really affect whether students access injectable PrEP. Even if we offer the service, if students feel judged or stigmatized for using it, they won't come. We need to work with student organizations, campus leaders, and influencers to create a supportive environment where seeking HIV prevention is seen as smart and responsible, not as an admission of risky behaviour." [P17, HIV Counsellor]

Collectively, the participants viewed social perceptions and stigma as critical challenges that could hinder the acceptability and accessibility of injectable PrEP in campus health settings.

Sub-theme 5: Logistical and infrastructural challenges

In addition to stigma and misconceptions, participants highlighted logistical and infrastructural challenges as further obstacles that could hinder the effective implementation of injectable PrEP within campus health settings. They raised logistical and infrastructural challenges, including storage requirements for the medication, supply chain reliability, and systems for client follow-up and monitoring. These operational concerns were considered critical factors that could affect the program's overall feasibility and sustainability.

Some participants also raised concerns about storage space constraints and challenges with electricity. For example, one nurse remarked that:

“If the injection needs to be kept cold, it could be a real challenge. We already struggle with storage space. If Injectable PrEP adds another product that requires careful storage management. We need dedicated fridge space, backup power systems, temperature monitoring devices, and clear protocols for handling storage failures. Without proper infrastructure, we risk wasting expensive medication or, worse, administering ineffective doses.” [P10, PHC Nurse]

Other participants raised concerns about the reliability of supply chains, cautioning that interruptions or stock shortages could disrupt consistent access to injectable PrEP and compromise the effectiveness of implementation efforts. This was articulated by a participant who noted:

“We would need proper fridges and safe storage, just like vaccines. But it's not just about having the equipment; it's about ensuring a consistent supply. What happens if we initiate students on injectable PrEP and then run out of stock? They miss their scheduled injections, their protection lapses, and they're at risk of HIV infection. We need

guarantees from the Department of Health that injectable PrEP will be reliably available, that supply chains won't be disrupted, and that there's a plan for emergency stock if problems arise.” [P06, PHC Nurse]

Participants also raised concerns about follow-up processes and the possibility of missed appointments, noting that irregular attendance for scheduled injections could affect continuity of protection and place additional strain on clinic operations. This point was captured in the words of a counsellor who said:

“Managing appointments every two months could be tricky. We need robust reminder systems, SMS messages, phone calls, maybe. We need to track who's due for their next injection, who's missed appointments, and who needs follow-up testing. This requires reliable information systems, administrative support, and coordination between different staff members. If our systems aren't up to the task, students will fall through the cracks, and the program will fail.” [P14, HIV Counsellor]

Overall, participants highlighted that logistical and infrastructural barriers, including storage limitations, unreliable supply chains, and difficulties in managing follow-up appointments, could impede the consistent and effective implementation of injectable PrEP, underscoring the need for strengthened systems and resources within campus health services.

Theme 2: Perceived Facilitators of Adoption and Implementation

Despite the numerous barriers identified, participants also discussed several factors that could facilitate the successful implementation of injectable PrEP within campus health settings. These facilitators included: (1) structured training and continuous professional development, (2) leadership and management support, (3) operational protocols and guidelines, (4) community engagement, (5) compatibility with existing services, and (6) dissemination of success stories, reflecting a shared understanding that successful adoption would require both internal and external readiness.

Sub-theme 1: Structured training and continuous professional development

A recurring sub-theme across interviews was the importance of structured training and continuous professional development. Participants emphasized that targeted capacity-building initiatives would equip healthcare workers with the necessary knowledge, confidence, and practical skills to deliver injectable PrEP safely and effectively. One nurse explained:

“We need proper training before we start giving the injections. This should include theoretical knowledge, understanding how injectable PrEP works, its efficacy, contraindications, and side effects, as well as practical skills like injection technique, patient positioning, and post-injection observation. We also need training on counselling approaches, documentation procedures, and integration with other services. Ideally, the training should be hands-on, with opportunities to practice under supervision before we start administering injectable PrEP to real patients.” [P02, PHC Nurse]

A counsellor reinforced this need:

“Training sessions would make us more confident to recommend it. Right now, I don't feel comfortable promoting injectable PrEP because I don't know enough about it. But if I received comprehensive training, understood the evidence, and could answer students' questions accurately, I'd be much more enthusiastic about offering it. Training builds confidence, and confidence translates into better counselling and higher uptake.” [P16, HIV Counsellor]

Another nurse emphasized the need for ongoing support:

“It can't be just a one-time training. We need continuous professional development as we implement injectable PrEP, encounter challenges, and new research becomes available. Regular refresher courses, case discussions, mentorship from experienced providers, and access to technical support would all be valuable. We should also

have opportunities to share our experiences with colleagues from other clinics, to learn from each other's successes and mistakes.”

[P08, PHC Nurse]

Collectively, participants recognised targeted capacity-building initiatives could ensure the smooth rollout of injectable PrEP.

Sub-theme 2: Leadership and management support

In addition to training, strong leadership and management support were identified as crucial enablers. Participants believed that active involvement from healthcare facilities to government leaders would help create an enabling environment, ensuring adequate resource allocation and alignment with broader HIV prevention priorities. One doctor explained:

“If management supports us with guidelines and supplies, we can do it. Leadership needs to demonstrate commitment to injectable PrEP implementation by providing the necessary resources, funding for training, and medication and supply procurement; upgrading infrastructure; hiring additional staff if needed; and creating clear policies and guidelines. When frontline workers see that leadership is serious about making injectable PrEP work, they're more motivated to put in the effort required.” [P11, Medical Doctor]

A nurse added:

“Strong leadership backing makes implementation smoother. When leaders at the facility, district, provincial, and national levels are aligned and supportive, barriers get removed more quickly. Issues like supply chain challenges or unclear policies get resolved faster when there's strong leadership advocacy. We need leaders who will champion injectable PrEP, who will communicate its importance, and who will hold everyone accountable for achieving implementation goals.” [P06, PHC Nurse]

In summary, participants highlighted that committed leadership and supportive management structures would be vital to drive the integration of injectable PrEP, mobilise resources, and maintain momentum toward sustainable HIV prevention within campus health services.

Sub-theme 3: Clear operational protocols and standardized guidelines

Moreover, the development of clear operational protocols and guidelines was considered essential. Participants indicated that standardized procedures would enhance consistency, accountability, and confidence in service delivery. For example, one participant remarked that:

“Having clear protocols and SOPs facilitates administration. We need step-by-step guidelines that cover every aspect of injectable PrEP delivery, eligibility assessment, pre-injection counselling, informed consent procedures, injection administration techniques, post-injection monitoring, scheduling follow-up appointments, managing side effects, documenting services, and handling special situations like missed appointments or patient requests to discontinue. When everyone follows the same protocols, we ensure consistent quality of care across all clinics and all shifts.” [P17, HIV Counsellor]

This view was echoed by another participant who said:

“Standardized guidelines would take away a lot of uncertainty and stress. Right now, we’re not sure how to fit injectable PrEP into our workflow. Should we have dedicated days for it? Should all nurses be trained, or only specific staff? How do we prioritize appointments when the clinic is busy? Clear protocols would answer these questions and make implementation much smoother. They would also protect us legally and professionally by making sure we follow approved procedures.” [P09, PHC Nurse]

Overall, participants emphasized that clear operational protocols and standardised guidelines would play a crucial role in facilitating the effective and consistent implementation of injectable PrEP within campus health services.

Sub-theme 4: Community engagement and peer advocacy

Beyond institutional factors, participants emphasized the role of community engagement and awareness-raising efforts in fostering acceptance of injectable PrEP. They noted that involving community leaders, peer educators, and advocacy groups could help dispel misconceptions, reduce stigma, and encourage uptake of injectable PrEP. The role of community education in facilitating the implementation of injectable PrEP was articulated by a participant who noted:

“Community education campaigns would help people trust it more. We need to go beyond the clinic walls and engage students in their residences, lecture halls, social events, and through campus media. We should use peer educators, students who are trained to talk to their peers about HIV prevention in relatable, non-judgmental ways. We could organize awareness campaigns during orientation week, health fairs, and HIV Testing Services events. The more visible and normalized injectable PrEP becomes, the more students will feel comfortable accessing it.” [P18, HIV Counsellor]

This sentiment was shared by others, with one explaining:

“Educating communities about injectable PrEP will make people more comfortable. Many students don't even know injectable PrEP exists. Others have heard about it but have misconceptions; they think it's experimental, dangerous, or only for certain types of people. Community education can correct these misconceptions, provide accurate information, and frame injectable PrEP as a legitimate, effective, and safe prevention option. When students see that their peers, their campus health service, and public health authorities all endorse injectable PrEP, they're more likely to consider it for themselves.” [P05, PHC Nurse]

In addition to community education, participants identified peer advocacy as an important facilitator that could enhance the acceptance and successful implementation of injectable PrEP among students. They explained that students often respond positively to information and encouragement from peers whom they perceive as relatable and trustworthy. Participants believed that trained peer advocates could play a crucial role in promoting awareness, addressing misconceptions, and creating an environment in which discussions about HIV prevention are normalized. One participant said:

“Peer influence is strong; students seeing friends use it successfully matters. Young people trust their friends more than they trust healthcare providers or official health messages. If a student's friend shares a positive experience with injectable PrEP, 'I got the injection, it wasn't painful, I haven't had side effects, I feel protected, and I don't have to remember pills anymore', that's incredibly powerful. We should create opportunities for peer testimonials, peer-led support groups, and peer advocacy to harness this influence and encourage broader uptake.” [P15, HIV Counsellor]

Overall, participants viewed peer advocacy as a key strategy for improving outreach, fostering trust, and increasing the uptake of injectable PrEP within university settings.

Sub-theme 5: Compatibility with existing services

In addition to community engagement and peer advocacy, participants underscored that the successful introduction of injectable PrEP would be facilitated by its compatibility with existing campus health services and HIV prevention programmes. They explained that integrating injectable PrEP into the current healthcare services, such as HIV testing, counselling, and sexual and reproductive health services, would promote efficiency and continuity of care. By building on existing healthcare services, healthcare workers believed that injectable PrEP could be introduced with minimal disruption to existing workflows. One participant explained the alignment of existing healthcare services with injectable PrEP:

“We already provide HIV prevention services; this would align well if added to our package. Injectable PrEP fits naturally into what we’re already doing. We offer HIV testing and counselling, oral PrEP, condom distribution, STI screening and treatment, and family planning services. Injectable PrEP is just another tool in our prevention toolkit. It doesn’t require us to develop entirely new systems or learn completely unfamiliar skills. It builds on our existing competencies and service infrastructure.” [P03, PHC Nurse]

This view reflected the perception that injectable PrEP could complement rather than compete with current HIV prevention efforts. Another participant shared a similar perspective, explaining that:

“It can fit into our services easily, just like family-planning injections. We’ve been giving contraceptive injections for years. The process is similar: counselling, consent, injection administration, observation, and scheduling the next visit. We already have the injection equipment, waste disposal systems, and patient flow processes in place. Adapting these for injectable PrEP should be straightforward. The main difference is the specific medication and the counselling content, but the operational framework is already there.” [P10, PHC Nurse]

Some participants further mentioned that students are already familiar with receiving injections through routine health services, such as contraceptives or vaccinations, and therefore may be more open to accepting injectable PrEP. For example, one participant said:

“Students are already used to coming for other injections, so this could be accepted easily. Many female students receive family planning injections every three months. Male and female students receive vaccinations. If we explain that injectable PrEP offers better protection through more consistent delivery, many students will accept it readily.” [P14, HIV Counsellor]

However, a few participants cautioned that while injectable PrEP may be compatible with existing services, resistance to change among healthcare workers, who are key role players in its implementation, could hinder its successful rollout. One nurse highlighted potential resistance:

“Injectable PrEP is compatible with our work, but some staff might resist learning a new protocol. Change is always difficult. Some colleagues prefer sticking to what they know and may see injectable PrEP as an unnecessary complication: ‘We already have oral PrEP; why do we need another option?’ We’ll need to address this through education, highlighting the benefits, sharing success stories, and providing support as staff adapt. Leadership will also need to manage the change carefully while making it clear that injectable PrEP is a priority.” [P07, PHC Nurse]

Some participants also noted that access to private consultation rooms within campus health clinics would enhance privacy and confidentiality, encouraging students to seek injectable PrEP without fear of judgement or exposure. As one participant described:

“We have to make sure students’ privacy and confidentiality are protected. Campus clinics are small, and students worry about being seen by their peers or having their information shared. When we roll out injectable PrEP, we need private consultation rooms, discreet scheduling, strict confidentiality policies, and staff trained on privacy ethics. If students don’t trust that their use of injectable PrEP will stay private, they won’t use the service, no matter how convenient or effective it is.” [P02, PHC Nurse]

Overall, participants highlighted that compatibility with existing campus health services could facilitate the implementation of injectable PrEP by building on established HIV prevention structures. However, they emphasised that effective integration would require supportive staff attitudes, strong leadership, and private consultation rooms to encourage student confidence and uptake.

Sub-theme 6: Dissemination of success stories

In addition to the importance of service compatibility and privacy, participants also highlighted the dissemination of success stories as a potential facilitator that could promote awareness, build trust, and encourage adoption of injectable PrEP among students and healthcare workers. They explained that sharing authentic experiences and positive outcomes from early implementation in campus healthcare facilities could help normalize the use of injectable PrEP and address lingering doubts about its efficacy and feasibility. One participant emphasized the motivational power of success stories, stating:

“If students see others benefiting, more will want to join. Young people are influenced by what’s happening around them. If the first group using injectable PrEP has positive experiences, they stay HIV-negative, find it convenient, and are happy with the service, word will spread naturally. Friends, roommates, and classmates will hear about it. They’ll see that injectable PrEP works and isn’t something to be afraid of. That kind of social proof is often more effective than any health campaign.” [P08, PHC Nurse]

Another participant echoed this view, suggesting that:

“We’ll believe in injectable PrEP more if we see fewer infections in our clinic. As healthcare workers, we respond to tangible results. If the data shows positive results, that will validate the intervention. It will justify the extra effort, resources, and training we would have put in. Seeing success at the clinic level will motivate the team and help us stay committed to the program.” [P06, PHC Nurse]

Some participants noted that success stories could also play a key role in reporting minimal side effects. For example, one participant remarked:

“Seeing that students have minimal side effects really reassures both staff and students who might be hesitant. Side effects are one of the

biggest concerns. We need to track and share this information, for example, saying something like, 'In our clinic, 95% of students on injectable PrEP had no significant side effects.' Local data like that is very reassuring and helps reduce hesitancy." [P16, HIV Counsellor]

While some participants emphasized the value of sharing success stories that highlight minimal side effects, others suggested that disseminating evidence of reduced HIV infections linked to injectable PrEP could serve as a powerful motivator for its adoption within campus health services. As one healthcare worker explained:

"If we see a drop in HIV cases, then we'll know it's worth it. The real measure of success for injectable PrEP is whether it actually reduces HIV among students. If we can show that new HIV diagnoses go down after we start the program, that's the clearest proof it works, in our context, with our population, in real-world conditions. That kind of visible success also justifies continuing investment and expanding the program." [P10, PHC Nurse]

Another participant echoed this view, however, emphasizing the importance of sharing both successes and challenges, suggesting that presenting a balanced perspective would enhance credibility and preparedness among healthcare workers:

"Clinic data on adherence and outcomes really helps build confidence in the program. We need systems to track follow-up visits, continuation rates, side effects, and even new HIV cases. That information should be reviewed regularly and shared with staff, management, and the wider health community. Being transparent about both successes and challenges builds trust and credibility. It shows we're monitoring injectable PrEP carefully and making decisions based on evidence." [P13, Medical Doctor]

Participants viewed the dissemination of success stories as a powerful strategy for enabling the adoption of injectable PrEP. They believed that visible examples of success could help foster trust, dispel misconceptions, and instil optimism among both

healthcare providers and students, thereby strengthening the foundation for broader implementation.

In summary, the participants believed that the successful implementation of injectable PrEP would depend on a coordinated approach that combines training, leadership support, clear policy guidance, and active community involvement. Together, these facilitators were perceived as having the potential to strengthen both PHC worker preparedness and client acceptance, laying the groundwork for sustainable program integration.

Objective 4: To develop recommendations for improving the uptake and integration of injectable PrEP into existing HIV prevention services on campus

Theme 1: PHC Workers' Recommendations for Injectable PrEP Implementation

In addition to identifying potential barriers and facilitators, PHC workers offered a range of practical recommendations to support the successful introduction and scale-up of injectable PrEP. Their recommendations included: (1) structured training and continuous professional development, (2) pilot phase before full-scale implementation, (3) targeted awareness campaigns, (4) clear communication strategies, (5) robust monitoring and evaluation systems, and (6) phased roll-out approach.

Sub-theme 1: Structured training and continuous professional development

Participants strongly emphasized that comprehensive training for healthcare workers should be prioritized before the introduction of injectable PrEP. They recommended that training programs should cover both theoretical knowledge and practical skills, including administrative techniques, eligibility criteria, counselling approaches, side-effect management, and follow-up protocols. One nurse explained:

"We need proper training before we start giving the injections. This should include theoretical knowledge, understanding how injectable PrEP works, its efficacy, contraindications, and side effects, as well as practical skills like injection technique, patient positioning, and post-injection observation. We also need training on counselling approaches, documentation procedures, and integration with other

services. Ideally, the training should be hands-on, with opportunities to practice under supervision before we start administering injectable PrEP to real patients.” [P02, PHC Nurse]

A counsellor reinforced this need:

“Training sessions would make us more confident to recommend it. Right now, I don't feel comfortable promoting injectable PrEP because I don't know enough about it. But if I received comprehensive training, understood the evidence, and could answer students' questions accurately, I'd be much more enthusiastic about offering it. Training builds confidence, and confidence translates into better counselling and higher uptake.” [P16, HIV Counsellor]

Another participant emphasized the need for ongoing professional development rather than one-time training:

“We need structured training sessions that cover everything, how to administer it, who qualifies, what side effects to watch for, and how to counsel patients. It's not enough to just read about it online. We need hands-on training, clear protocols, and maybe even a helpline or resource person we can contact when we have questions. Without that support, I think many of us would feel unprepared to offer this service confidently.” [P03, PHC Nurse]

Another nurse emphasized the need for continuous support:

“It can't be just a one-time training. We need continuous professional development as we implement injectable PrEP, encounter challenges, and new research becomes available. Regular refresher courses, case discussions, mentorship from experienced providers, and access to technical support would all be valuable. We should also have opportunities to share our experiences with colleagues from

other clinics, to learn from each other's successes and mistakes.”

[P08, PHC Nurse]

Overall, participants viewed structured, ongoing training as a fundamental prerequisite for successful implementation, emphasizing that adequate preparation would enhance their confidence, competence, and ability to deliver injectable PrEP safely and effectively.

Sub-theme 2: Pilot phase before full-scale implementation

Participants recommended that the introduction of injectable PrEP should begin with a pilot phase before full-scale implementation. They believed that piloting the intervention within selected campus health clinics would provide valuable insights into operational challenges, refine service delivery processes, and assess overall feasibility in a controlled environment. A pilot phase was viewed as an opportunity to identify potential challenges, including storage, supply systems, and training.

One participant explained the rationale for this approach, stating:

“We should start with a small group of students before scaling up. A pilot will help us to test everything, our training, storage and supply systems, counselling, follow-up, and documentation. It will allow us to spot problems while they’re still manageable and fix them before they get bigger. If we rush into full implementation without a pilot, we would risk mistakes that could harm the program and make students lose trust in our services.” [P18, HIV Counsellor]

Moreover, they suggested that lessons learned from the pilot phase could inform the development of context-specific guidelines, training materials, and monitoring systems to ensure a smoother transition to broader implementation. As one participant remarked,

“I think it should be tested with a small group first, it will give us a chance to learn without overwhelming the system. We could select students who are motivated, easy to follow up with, and representative

of the wider student population. We'd monitor them closely, get feedback, measure results, and use that information to guide full implementation. Doing it in phases seems safer and more likely to succeed than rolling it out to everyone at once." [P12, Medical Doctor]

Another participant echoed this, noting that:

"Starting small also gives us time to adjust before a full rollout. We might find our counselling script is too long or complicated, or that our appointment system causes bottlenecks. Perhaps staffing arrangements would require adjustment, or certain times of day would be more effective than others. A pilot would allow us to experiment, learn, and improve based on real experience rather than just theory. It's a much safer and smarter way to introduce something new." [P05, PHC Nurse]

Participants emphasized that a pilot approach would allow facilities to evaluate patient responses, observe logistical demands, and test how injectable PrEP could be effectively integrated into existing workflows without overwhelming current systems. One nurse explained:

"We need to see how injectable PrEP fits into our daily operations. Will it require dedicated clinic sessions, or can it be integrated into general consultations? How much time does each appointment really take? How do students respond to the injection itself? What questions do they ask? What concerns do they raise? A pilot will provide answers to these practical questions that no amount of theoretical planning can offer. We learn by doing, and a pilot would allow us to learn in a controlled, safe way." [P09, PHC Nurse]

In addition to operational learning, participants highlighted the role of a pilot in shaping communication and advocacy strategies. One nurse explained:

“Seeing real results locally would help staff and students trust it more. When we can point to actual students at our own campus who've successfully used injectable PrEP, who've stayed HIV-negative, who've had positive experiences, that's incredibly powerful. It makes the intervention real and tangible rather than abstract. It builds confidence among healthcare workers who might be sceptical and among students who might be hesitant. Local success stories are the most persuasive form of evidence.” [P03, PHC Nurse]

Overall, participants regarded a pilot phase as a critical preparatory step toward successful implementation. They believed that starting with a smaller, controlled rollout would not only help refine logistical and clinical processes but also foster their confidence and students' trust, as well as inform sustainable scale-up strategies within campus health services.

Sub-theme 3: Targeted awareness campaigns

In addition to piloting, PHC workers recommended targeted awareness campaigns to increase community understanding and acceptance of injectable PrEP. They emphasized that these campaigns should not only promote knowledge about HIV prevention but also specifically address students' limited understanding and misconceptions about injectable PrEP. Some participants proposed using multiple channels and social media as key tools for disseminating information about injectable PrEP. As one participant noted,

“Awareness campaigns on campus would help students understand injectables. Many students have never heard of injectable PrEP. Others have heard about it but don't understand what it is, how it works, or who it's for. Comprehensive awareness campaigns can fill these knowledge gaps. We should use multiple channels, posters in residences, information sessions during orientation, social media content, peer educator presentations, radio spots on campus radio, and articles in student newspapers. The message should be clear, accurate, youth-friendly, and destigmatizing.” [P17, HIV Counsellor]

Participants also recommended early engagement to improve awareness and credibility of injectable PrEP. One participant explained,

“We should start educating students about injectable PrEP even before it’s available at the clinics. That way, by the time we’re ready to offer it, they already know what it is and are interested. This early awareness can include information about what injectable PrEP is, who can use it, why it’s being introduced, and when it will become available. This will create excitement and understanding, so when it finally comes, students see it as a positive new option, not something strange or suspicious.” [P08, PHC Nurse]

Furthermore, some participants emphasised the importance of addressing misconceptions and stigma. One participant stated,

“Our education campaigns really need to tackle the misconceptions head-on. Some students still think injectable PrEP is only for sex workers or people who have many partners. Others mix it up with HIV treatment or even think it’s like a vaccine. Some worry that it’s unsafe or still being tested. We need to address those beliefs directly with clear, factual information. ” [P14, HIV Counsellor]

Overall, participants viewed targeted awareness campaigns as a cornerstone of successful injectable PrEP implementation. By using targeted awareness campaigns, supported by early engagement and multiple information dissemination channels, participants believed that such campaigns could strengthen student understanding, reduce stigma, and increase uptake of injectable PrEP within campus communities.

Sub-theme 4: Clear communication strategies

In addition to targeted awareness campaigns, participants highlighted the need for clear and consistent communication strategies, both within campus health clinics and between PHC workers and targeted users in the student population. Participants suggested that transparent information-sharing and regular feedback would help

ensure smooth coordination during the rollout phase. Some participants highlighted that clear communication would also be crucial for adherence. One doctor explained:

“Students need to clearly understand from the start that injectable PrEP means coming back every two months. That must be explained properly during counselling, written down on their appointment card, and backed up with reminders. If they don’t fully understand the schedule, they might miss their second injection and lose protection. So, clear communication about follow-up dates and what’s expected from them is essential.” [P11, Medical Doctor]

Moreover, participants emphasized the importance of strengthening clear communication within the patient–provider relationship, highlighting that open and consistent dialogue is essential for building trust, addressing concerns, and supporting adherence to injectable PrEP. Participants believed that effective interpersonal communication could encourage students to ask questions freely, disclose challenges, and remain engaged with the services. As one participant noted,

“We need open communication channels between staff and students. Students should feel comfortable asking questions, expressing concerns, or reporting side effects. Healthcare workers should be approachable, nonjudgmental, and responsive. We could establish a dedicated injectable PrEP helpline or WhatsApp line where students can reach out with questions between appointments. This ongoing communication could strengthen the provider-patient relationship and improve adherence and satisfaction.” [P15, HIV Counsellor]

Furthermore, participants emphasised that clear communication should extend beyond the patient–provider relationship to include regular communication among healthcare workers, ensuring that all staff remain informed about clients’ progress and that service delivery remains coordinated and consistent. One participant explained that,

“It’s also important that we communicate well among ourselves as staff. Sometimes, a student might see a different nurse when they

come for their next injection, so there must be a proper handover. Everyone should be aware of the student's history, including when they last received the injection, whether they experienced any side effects, and whether they expressed any concerns. Effective communication would help us in providing consistent care and minimise mistakes. We should also have regular team meetings to talk about how injectable PrEP is going, share challenges, and celebrate what's working well." [P06, PHC Nurse]

Overall, participants viewed clear and consistent communication, both among healthcare workers and between providers and students, as essential to the successful implementation of injectable PrEP. They emphasised that clear communication would help build trust, strengthen service delivery, and foster ongoing engagement with injectable PrEP within campus health clinics.

Sub-theme 5: Robust monitoring and evaluation systems

Alongside clear communication, participants identified the establishment of robust monitoring and evaluation systems as another key recommendation to track uptake, adherence, and client outcomes. They recommended that data collected during the pilot phase should be used to inform adjustments before expanding implementation. One participant emphasized the need for continuous monitoring, stating,

"We need proper monitoring and reporting systems right from the start. Everything about injectable PrEP should be tracked: how many students start, how many come back for the second injection, how many stay on it for a year, any side effects, and even new HIV cases among users. That information helps us see whether the programme is working, identify problems early, and make changes based on real evidence. Without proper monitoring, it would be like we're working in the dark." [P18, HIV Counsellor]

Another participant echoed this view that monitoring would be critical for reporting to the university management and funders, stating,

“It’s important for us to have proper indicators and check them regularly. For instance, we should look at how many eligible students take up injectable PrEP, how many come back after two or six months, and how many report side effects. We should also track HIV cases over time to see if the program is really making a difference. Those numbers will help us identify where we’re excelling and where we need to improve. They also help us show management and funders that the resources are being used properly and that the programme is delivering results.” [P10, PHC Nurse]

Participants also emphasized the importance of utilizing monitoring systems not only for data collection but also for enhancing service delivery. One healthcare worker explained,

“We need to use our data to keep improving the service. For example, if we notice that many students aren’t returning for their second injection, we should investigate the reason. Maybe the reminders aren’t working, or the appointment times don’t suit them, or there’s some confusion about when to come back. Once we identify the cause, we can address it and then verify if the changes have an impact. That kind of ongoing monitoring and adjustment is what will make injectable PrEP really work in the long run.” [P13, Medical Doctor]

Overall, participants viewed robust monitoring and evaluation systems as vital for ensuring accurate data collection, improving service delivery, and generating reports to inform ongoing implementation efforts. They believed that monitoring and evaluation systems would strengthen the long-term success of injectable PrEP within campus health clinics.

Sub-theme 6: Phased roll-out approach

In addition to emphasizing the need for robust monitoring and evaluation systems, participants recommended adopting a phased rollout approach to ensure that the implementation of injectable PrEP is gradual, supported by evidence, and responsive

to lessons learned from the initial pilot phase. They believed that gradual implementation would provide an opportunity to learn from experience, test systems, and make necessary adjustments before scaling up to a broader institutional level.

One participant explained this perspective, stating,

“We really need to start with a proper pilot before going all out. Even if the pilot goes well, we shouldn’t rush to roll it out at every campus or clinic right away. It’s better to add one or two sites at a time, ensuring each gets sufficient support, training, and resources. That way, we don’t stretch ourselves too thin and can maintain consistent quality. It also gives us a chance to learn from each phase and improve how we do things as we go.” [P04, PHC Nurse]

Another participant added,

“It’s better to roll out injectable PrEP slowly and properly, instead of trying to do it everywhere all at once. If we rush, we’ll end up short on resources, staff will become overwhelmed, and the quality of care won’t be consistent across clinics. However, if we begin with a few pilot sites, observe what works, address what doesn’t, and then expand step by step, we’ll build a stronger system. We must be patient and plan carefully; it’s not about how fast we start, but how well we sustain it.” [P09, PHC Nurse]

Some participants linked the idea of a phased rollout to efficient resource utilization and staff readiness. One healthcare worker noted,

“Before rolling out injectable PrEP, each clinic really needs to be checked for readiness. Not all of them will be ready at the same time. Some clinics still require proper storage or additional space, while others may need extra staff or further training. There should be clear guidelines on what counts as ‘ready’, like having a working fridge, enough trained staff, a good patient load, and proper systems for

follow-up. That way, we only start where it's actually feasible, and we don't set clinics up to fail." [P16, HIV Counsellor]

Overall, participants viewed a phased rollout as an essential strategy for promoting evidence-informed, sustainable implementation of injectable PrEP. They believed that beginning with a small number of sites would allow challenges to be identified and addressed early, distribute resources effectively, and prepare staff for readiness before scaling up across all campus health clinics.

Conclusion

In conclusion, this study's findings provide a detailed account of healthcare workers' perspectives on the introduction of injectable PrEP in primary healthcare settings. The findings illustrate a continuum of awareness, perceptions, and readiness among PHC workers regarding the introduction of injectable PrEP. While participants demonstrated varying levels of knowledge, their overall perceptions were positive, reflecting optimism about the intervention's potential to enhance HIV prevention by improving adherence and convenience.

At the same time, barriers such as limited training, staff shortages, and logistical challenges emerged as critical constraints to practical implementation. Participants identified several facilitators, including structured training, leadership support, clear operational protocols, and community engagement, as essential to overcoming these challenges. Participants suggested recommendations, including piloting, phased rollout, and continuous evaluation to ensure sustainable and effective integration of injectable PrEP into existing HIV prevention programs.

The next chapter offers a critical discussion and interpretation of the findings, situating them within the broader context of existing research and the theoretical framework.

CHAPTER 8

DISCUSSION AND INTERPRETATION OF FINDINGS

8.1 Introduction

This chapter presents a comprehensive discussion and interpretation of the findings from the qualitative study exploring PHC workers' perceptions of implementing HIV injectable PrEP in campus health clinics at a public university in KwaZulu-Natal, South Africa. The study involved 18 PHC workers, comprising ten PHC nurses, three medical doctors, and five HIV counsellors, whose insights provide valuable perspectives on the readiness, challenges, and opportunities associated with introducing this innovative HIV prevention technology in campus-based settings.

The findings presented in Chapter 7 revealed a complex landscape of awareness, attitudes, and preparedness among healthcare workers. While participants demonstrated varying levels of knowledge about injectable PrEP, their overall perceptions reflected cautious optimism tempered by legitimate concerns about implementation feasibility. Healthcare workers identified significant potential benefits, particularly improved adherence, convenience, and reduced stigma, alongside substantial barriers, including inadequate training, staff shortages, logistical challenges, and uncertainty about clinical effectiveness in local contexts.

This chapter interprets these findings in relation to existing literature on HIV prevention implementation, healthcare innovation adoption, and health system strengthening in resource-limited settings. Throughout the discussion, Rogers' Diffusion of Innovations theoretical framework serves as the primary analytical lens, enabling systematic examination of how innovation attributes, communication channels, social systems, and the innovation-decision process influence healthcare workers' readiness to adopt and implement injectable PrEP. By situating the study's findings within broader theoretical and empirical contexts, this chapter aims to deepen understanding of the factors shaping healthcare workers' readiness to implement injectable PrEP. Moreover, it seeks to generate insights that can inform evidence-based

implementation strategies for this promising HIV prevention innovation in South African campus health settings and beyond.

In this chapter, the discussion and interpretation of the findings are organized in alignment with each of the study's objectives to ensure a coherent and focused analysis.

8.2.1 Objective 1: Awareness and Knowledge of Healthcare Workers Regarding HIV Injectable PrEP

Beyond awareness and knowledge levels, PHC workers expressed diverse perceptions about injectable PrEP that warrant careful interpretation. A complex interplay of professional experiences, workplace contexts, and limited technological understanding shapes healthcare professionals' perceptions of emerging HIV prevention technologies. Multiple studies substantiate this claim, underscoring the critical role of knowledge and perception in shaping attitudes toward HIV prevention technologies. For instance, Wheelock *et al.* (2012) found that among 91 participants across seven countries, only 50 were aware of PrEP, with notable variations in support. Building on this, Rubincam *et al.* (2018) revealed that many participants equated a lack of 100% effectiveness with being unsafe, demonstrating how limited information impacts perception. Similarly, Kambutse, Igiraneza and Ogbuagu (2018) specifically noted that over 50% of respondents had insufficient PrEP knowledge, though 86.5% of healthcare workers expressed interest. Taken together, these findings indicate that perceptions of new HIV prevention methods are nuanced, context-dependent, and heavily influenced by the quality and completeness of information available. Professional backgrounds significantly mediate understanding and acceptance of new HIV prevention methods.

The prevailing perception among healthcare workers was one of cautious optimism, a balanced stance that acknowledged both the potential benefits and the uncertainties surrounding the implementation of injectable PrEP. This tempered optimism is particularly noteworthy within the South African context, where injectable PrEP has not yet been integrated into public health programmes. In this environment, healthcare workers have formed complex, tempered perspectives on injectable PrEP shaped by fragmented information channels and evolving evidence. Empirical evidence supports

this interpretation. Asabor *et al.* (2021) found that healthcare workers emphasized structural barriers while simultaneously expressing cautious optimism about PrEP's potential to reduce HIV transmission. Similarly, Pleaner *et al.* (2023) observed that many providers expressed concerns about possible unintended consequences, with many worried that PrEP might encourage risky sexual behaviour. This explains why their perceptions varied considerably and why many expressed reservations alongside their recognition of potential benefits.

In sub-Saharan African countries where new health technologies are introduced without prior local implementation, healthcare workers often form perceptions based on incomplete information, leading to knowledge gaps and uncertainties (Mgodi *et al.* 2023). South Africa's position as a country preparing for but not yet implementing injectable PrEP means that PHC workers are uniquely positioned, aware of the innovation's existence and potential, yet lacking the experiential knowledge that comes from actual service delivery. This context of anticipatory readiness, rather than active implementation, fundamentally shapes their perceptions and explains the variations in knowledge and the cautious tone that characterized many responses.

South African PHC workers are in a state of anticipatory readiness for injectable PrEP, characterized by awareness of the innovation's potential but limited experiential knowledge. The evidence strongly supports this nuanced position. Femi-Lawal *et al.* (2025) In Nigeria high PrEP awareness (85%) was found among healthcare workers, but poor knowledge (18%) and only moderate positive attitudes (46%). Mbatha, Mpofana and Gumede (2025b) confirms the context of preparation in South Africa, noting the need to map PHC workers' perspectives on injectable PrEP systematically. Pleaner *et al.* (2023) further illustrates this cautious stance, with providers expressing concerns about adding a new service and worrying about potential unintended consequences. The data suggest a complex landscape of anticipation, where healthcare workers are cognizant of PrEP's potential but remain hesitant due to limited implementation experience.

Despite the uncertainties and knowledge gaps, healthcare workers expressed notably optimistic perceptions about injectable PrEP's potential to enhance HIV prevention. These positive perceptions centred on the convenience and long-acting nature of the

injectable formulation, which participants viewed as key advantages that could improve client uptake and adherence compared to daily oral PrEP. Healthcare workers recognize significant challenges in daily oral PrEP adherence among students, primarily stemming from complex social and personal barriers. Multiple studies across African contexts reveal persistent obstacles. Research by Kayesu *et al.* (2022) documented how adolescent girls and young women in Uganda struggled with medication concealment and privacy concerns. Similarly, Pintye *et al.* (2021) found that Kenyan adolescent girls cited forgetfulness, stigma, and disrupted routines as primary adherence challenges. Beesham *et al.* (2022) further demonstrated that pregnant and postpartum women in South Africa, South Africa experienced structural barriers, including pill burden, side effects, and logistical difficulties in maintaining daily regimens. Collectively, these findings underscore that adherence challenges extend beyond individual motivation to encompass complex sociostructurally determinants.

One of the most prominent challenges is the difficulty of maintaining consistent daily pill-taking routines. Students struggle with consistent medication adherence, often finding daily regimens difficult to maintain (Pintye *et al.* 2021). Another critical barrier involves stigma. PrEP use is frequently associated with negative social perceptions, including assumptions of promiscuity or HIV status (Giovenco *et al.* 2021). Such perceptions not only deter individuals from initiating PrEP but also contribute to discontinuation among current users. In addition to stigma, privacy concerns further complicate adherence efforts. Adolescents and young women face significant challenges in concealing medication use, particularly from family and partners (Giovenco *et al.* 2021). Collectively, evidence from multiple qualitative studies across diverse populations underscores the intricate social dynamics that influence PrEP uptake and adherence. These findings reveal that, beyond biomedical efficacy, the success of PrEP interventions depends on addressing social, cultural, and relational factors that shape individuals' daily experiences and health behaviours.

Participants perceived injectable PrEP as an innovation that could particularly benefit individuals who struggle with the demands of daily oral medication. The perception that a bi-monthly injection could eliminate the burden of daily adherence decisions reflects healthcare workers' understanding of the behavioural and contextual barriers their clients face. This view aligns with implementation science perspectives on

innovation adoption, where perceived relative advantage, the degree to which an innovation is seen as better than existing options, is a critical determinant of acceptance (Rogers 2003). Healthcare workers' optimism suggests they perceive injectable PrEP as offering meaningful advantages over oral PrEP for specific populations and contexts. Multiple HIV prevention methods provide critical autonomy and choice for users, mirroring established practices in contraceptive services. Studies consistently demonstrate that offering diverse PrEP options empowers individuals to select prevention methods aligned with their personal circumstances (Calabrese 2020). For instance, research among female sex workers revealed a strong preference for injectable PrEP due to reduced stigma and easier adherence (Mantsios *et al.* 2021). Similarly, a study of contraception practices found that women's PrEP preferences often directly aligned with their existing birth control methods, underscoring the importance of personalized prevention choices (Calabrese 2020). The emerging consensus is that diversifying prevention methods is essential for meeting varied client needs, with multiple studies highlighting that method choice itself can be a powerful form of personal empowerment in HIV prevention.

This perception reflects a patient-centred care philosophy that emphasizes respect for client autonomy and the importance of tailoring services to individual preferences (Ells, Hunt and Chambers-Evans 2011). The ability to choose between formulations was seen as potentially increasing overall PrEP uptake by attracting individuals who might reject oral PrEP but find injectable PrEP acceptable, and vice versa. Healthcare workers also perceived injectable PrEP as a welcome addition to the HIV prevention toolkit, representing an expansion of options that could strengthen combination prevention approaches. This perception demonstrates an understanding that no single prevention method will be universally acceptable or effective for all individuals, and that diverse options are necessary to maximize reach and impact across heterogeneous populations (Bekker *et al.* 2014). The view that injectable PrEP could complement rather than replace oral PrEP suggests that healthcare workers conceptualize HIV prevention as requiring multiple strategies tailored to different needs, contexts, and preferences.

Healthcare workers consistently recognize that medication adherence is a complex, multilevel challenge that extends far beyond individual motivation. Robust evidence

supports this perspective across diverse contexts. Vaughn, Dillon and Kedia (2019) identified structural barriers, including transportation difficulties, healthcare system navigation challenges, and economic constraints, as fundamental impediments to PrEP uptake among mid-South communities. Antonini *et al.* (2023) comprehensively documented that 100% of reviewed studies identified structural barriers, including suboptimal logistics for pill-taking, side effects, and anticipated stigma. Taylor *et al.* (2024) demonstrated through within-participant analyses that adherence fluctuates based on psychological states, social circumstances, and daily life disruptions, confirming the dynamic, multilevel nature of adherence challenges. These converging findings demonstrate that PrEP adherence is influenced by interconnected social, structural, and contextual factors rather than individual willpower alone.

However, it is crucial to note that these optimistic perceptions were formed in the absence of direct implementation experience. Healthcare workers had not administered injectable PrEP, observed its use among their clients, or witnessed its outcomes in their clinical settings. Their positive perceptions remained largely theoretical, based on anticipated rather than observed benefits and informed by their interpretation of international research findings and their extrapolation from experiences with other injectable medications such as contraceptives. This distinction between anticipatory optimism and evidence-based confidence grounded in local expertise is significant for implementation planning.

The anticipatory nature of these perceptions suggests that healthcare workers' optimism could either be reinforced or tempered once implementation begins, depending on actual experiences with efficacy, acceptability, side effects, operational feasibility, and client satisfaction. If early implementations produce positive observable outcomes, successful adherence, client satisfaction, HIV prevention, and manageable side effects, healthcare workers' optimism will likely strengthen and spread through professional networks, accelerating broader adoption. Conversely, if early implementations encounter significant challenges, frequent side effects, client dissatisfaction, operational difficulties, or adherence issues, initial optimism could erode, potentially leading to resistance to continued rollout.

In Sub-Saharan African countries where new health technologies are introduced without prior local implementation, healthcare workers often form perceptions based on incomplete information (Mgodi *et al.* 2023). This explains the observed variations in knowledge among PHC workers in this study. These variations align with previous research on healthcare worker preparedness for new HIV prevention technologies, which has consistently demonstrated that knowledge gaps exist even among professionals working directly in HIV prevention services (Calabrese 2020; Patel *et al.* 2021).

The critical factor explaining these knowledge variations is the absence of injectable PrEP implementation in South Africa at the time of this study. Without formal training programmes, clinical guidelines, or hands-on experience, PHC workers acquired knowledge through informal channels, including online news articles, international research reports, and conversations with colleagues who had heard about injectable PrEP. This informal knowledge acquisition process inevitably produces uneven and incomplete understanding. As noted in Chapter 1, South Africa is in the preparatory phase of the injectable PrEP rollout, with regulatory approvals obtained but widespread implementation not yet underway. This preparatory context creates a knowledge environment in which healthcare workers are aware that change is coming but lack the structured information and training to feel confident and competent.

This is consistent with Mgodi *et al.* (2023), who found that healthcare providers in sub-Saharan Africa often lack comprehensive knowledge about long-acting injectable PrEP despite its proven efficacy in clinical trials. The gap between research evidence and practice knowledge represents a critical barrier to the dissemination of new health innovations in the health sector. The variations observed among nurses, doctors, and HIV counsellors reflect differential access to information, different professional training pathways, and varying levels of engagement with emerging HIV prevention literature, all operating in a context where no formal, structured knowledge dissemination about injectable PrEP has yet occurred through official health system channels.

The limited awareness among nurses is particularly significant given their central role in primary healthcare service delivery in South Africa. Nurses are often the first point of contact for clients seeking HIV prevention services and are responsible for

counselling, education, and medication administration. This gap may hinder the successful rollout of injectable PrEP, as nurses' confidence and competence are essential for effective implementation (Atkins *et al.* 2022; Mahlare *et al.* 2023; Mathur *et al.* 2025). Similarly, the surface-level knowledge among HIV counsellors raises concerns, as they play a crucial role in helping clients make informed decisions about HIV prevention options. Their ability to accurately explain benefits, risks, administration schedules, and eligibility criteria is fundamental to client uptake and adherence. Therefore, addressing these variations through structured national training initiatives will be essential to ensure consistent understanding and readiness across professional groups once injectable PrEP becomes available for use in South Africa.

Beyond basic awareness, the limited understanding of the clinical and operational dimensions of injectable PrEP, particularly regarding its effectiveness, duration of protection, dosage schedules, and eligibility criteria, mirrors the findings of Ntimani, Mokoena-de Beer and Phetlhu (2025), who observed that healthcare providers in resource-limited settings often face challenges in keeping up with rapidly evolving HIV prevention guidelines and emerging biomedical technologies.

The confusion about dosage schedules and the duration of protection reflects a broader challenge in translating clinical trial evidence into practical knowledge for healthcare delivery. While cabotegravir for PrEP has been extensively studied in clinical trials such as HPTN 083 and HPTN 084, which demonstrated its superior efficacy compared to daily oral PrEP (Landovitz *et al.* 2021; Delany-Moretlwe *et al.* 2022), this evidence might not yet have been effectively disseminated to frontline healthcare workers in South African campus health settings. The gap between research evidence and practice knowledge represents a critical barrier to the dissemination of new health innovations in the health sector. Since PHC workers are not yet implementing injectables, their uncertainty about clinical details is understandable and reflects the absence of formal training rather than any deficiency in their professional competence.

The uncertainty surrounding eligibility criteria suggests that PHC workers have not yet begun implementing injectable PrEP. However, this also highlights key areas that should be prioritized in preparatory training before rollout. Injectable PrEP has specific

inclusion and exclusion criteria related to HIV status, kidney function, body weight, and concurrent medications (Clement, Kofron and Landovitz 2020; Landovitz *et al.* 2021). Healthcare workers' inability to clearly articulate who qualifies for injectable PrEP at this preparatory stage is not concerning in itself; rather, it identifies an essential training need. This finding underscores the need for clear, accessible clinical guidelines that are tailored to the South African context and the specific needs of campus health settings, delivered through structured training before implementation begins.

8.2.2 Objective 2: Perceived Benefits and Concerns Regarding Implementation of HIV Injectable PrEP

Oral PrEP is a highly effective biomedical intervention for reducing HIV transmission across populations (Fonner *et al.* 2016). However, despite its effectiveness, uptake and adherence to oral PrEP remain poor (Yigit *et al.* 2024). This is partly due to barriers such as the burden of taking a daily pill (Rousseau *et al.* 2021). Adherence challenges with daily oral regimens have been a persistent barrier to PrEP effectiveness in real-world settings (Beesham *et al.* 2022; Antonini *et al.* 2023). The healthcare workers' emphasis on improved adherence through injectable formulations reflects this well-documented limitation and aligns with Rogers' (2003) concept of 'relative advantage'. For example, (Antonini *et al.* 2023) comprehensively documented that 100% of reviewed articles identified structural barriers to PrEP use, including “suboptimal logistics for taking pills”. Additional barriers include individual factors like side effects, anticipated stigma, and forgetfulness (Beesham *et al.* 2022).

In this context, the emphasis on improved adherence through the injectable aligns with theoretical and empirical work on the diffusion of innovations Rogers (2003), where "relative advantage" (that is, the extent to which an innovation is perceived as better than the idea it supersedes) is a core determinant of adoption. Thus, their views suggest that injectable PrEP may hold meaningful promise in settings where daily pill regimens have limitations. Clinical trials (HPTN 083 and HPTN 084) demonstrated that long-acting injectable cabotegravir was significantly more effective than daily oral PrEP, largely due to improved adherence resulting from the removal of daily decision-making requirements (Landovitz *et al.* 2021; Delany-Moretlwe *et al.* 2022).

Nevertheless, these findings should be interpreted within the broader context of student life, characterized by competing academic demands and social commitments that contribute to busy and often unpredictable schedules. The participants' perceptions likely reflect the realities of how students navigate multiple responsibilities within constrained timeframes, which can pose challenges to maintaining consistent health decisions and behaviours. This insight aligns with research on PrEP adherence among young people, which has consistently identified lifestyle factors, mobility, and competing priorities as barriers to daily pill-taking (Hosek *et al.* 2017; Koss *et al.* 2018; Koss and Parikh 2025). The campus environment, characterized by academic demands, social activities, and frequent travel between home and university, creates particular challenges for daily oral PrEP adherence (Mugo *et al.* 2015). Research examining oral PrEP adherence among university students has documented these challenges, showing that the unpredictability of student schedules significantly impacts consistent medication-taking behaviours (Taylor *et al.* 2024). Therefore, the findings of this study indicate that injectable PrEP is likely compatible with student lifestyles, which represents an important relative advantage that could enhance HIV prevention in this high-risk population (Shamu, Mullick and Christofides 2025). Understanding the structure of student life is crucial for informing the implementation of injectable PrEP in campus health settings.

The extended dosing interval of once every two months was viewed as particularly beneficial for young populations who struggle with daily medication routines. The bi-monthly schedule eliminates the need for daily adherence decisions and reduces the frequency of clinic visits compared to monthly refills required for oral PrEP (Rousseau *et al.* 2021). This less frequent engagement with health services may be especially appealing to students whose academic calendars include examination periods, holiday breaks, and other disruptions that complicate regular clinic attendance. The compatibility between injectable PrEP's dosing schedule and students' temporal realities represents a significant potential facilitator of uptake and persistence, provided that students can successfully navigate the requirement to return for injections every two months.

Enhanced privacy and discretion are critical considerations in settings where HIV-related stigma remains pervasive (Zuch and Lurie 2012; Treves-Kagan *et al.* 2017).

Healthcare workers' emphasis on injectable PrEP's capacity to reduce visible pill-taking reflects their understanding that removing the need to store or consume medication in the presence of others minimizes the risk of judgment, labelling, or unintended disclosure. This is particularly significant in the South African context, where HIV-related stigma remains pervasive despite extensive awareness campaigns (Zuch and Lurie 2012; Treves-Kagan *et al.* 2017). Existing literature has shown that anticipated stigma and concerns about being perceived as HIV-positive are major barriers to oral PrEP uptake and persistence, especially among young people (Eaton *et al.* 2017; Golub 2018; Golub and Myers 2019). Stigma related to PrEP use is often exacerbated when the medication is mistaken for HIV treatment or when its use is interpreted as a sign of multiple sexual relationships (Kayesu *et al.* 2022). By addressing these concerns through its discrete, clinic-based delivery model, injectable PrEP may appeal to students who would otherwise avoid or discontinue HIV prevention services.

Evidence shows that the impact of PrEP stigma can profoundly undermine the confidentiality of HIV prevention choices (Skovdal *et al.* 2021) and contribute to PrEP discontinuation and poor adherence (Pillay *et al.* 2020). Therefore, long-acting injectable PrEP offers a promising alternative that may address challenges with uptake, adherence, and retention among individuals who struggle with daily oral PrEP (Moyo *et al.* 2022; Liegeon and Ghosn 2023). Injectable PrEP reduces the need for daily pill-taking and may offer the potential for enhanced discretion and privacy of product use (Sciannameo *et al.* 2024).

In the phase III HPTN 084 trials conducted across seven sub-Saharan African countries, participants overwhelmingly expressed a preference for the long-acting injectable PrEP formulation over daily oral PrEP, citing attributes such as enhanced ease, convenience, and privacy (Delany-Moretlwe *et al.* 2022; Tolley *et al.* 2024). However, there is limited empirical evidence on how this shift in delivery method affects disclosure dynamics, particularly regarding users' experiences of privacy, confidentiality, and social stigma. Therefore, while injectable PrEP may offer relative advantages in terms of privacy, comprehensive stigma-reduction efforts at institutional and community levels remain essential.

It is important to note, however, that while injectable PrEP reduces visible pill-taking, studies show that it does not eliminate all potential sources of stigma (Calabrese 2020). Students still need to attend clinic appointments every two months, and these visits may be observable by peers or require explanations for time away from academic or social activities. Additionally, injection site reactions, if visible, could potentially prompt questions or concerns. Therefore, injectable PrEP's privacy advantages must be understood as partial rather than complete, and implementation strategies must include ongoing efforts to normalize HIV prevention service use and reduce institutional and community-level stigma.

Uncertainty about injectable PrEP's efficacy is understandable in the South African context, where the intervention remains unavailable despite completed phase III trials demonstrating strong effectiveness (Landovitz *et al.* 2021; Delany-Moretlwe *et al.* 2022). This gap between clinical trial evidence and healthcare workers' knowledge reflects the absence of structured information dissemination in South Africa's preparatory phase.

The HPTN 083 trial, conducted among cisgender men and transgender women who have sex with men, demonstrated that long-acting injectable CAB-LA significantly reduced HIV incidence by approximately two-thirds when compared with daily oral TDF/FTC. However, emerging evidence from phase III trials provides strong support for its effectiveness (Landovitz *et al.* 2021; Delany-Moretlwe *et al.* 2022). In particular, the HPTN 083 trial, conducted among cisgender men and transgender women who have sex with men, demonstrated that long-acting injectable CAB-LA significantly reduced HIV incidence by approximately two-thirds when compared with daily oral TDF/FTC (Landovitz *et al.* 2021).

Similarly, the HPTN 084 trial conducted among cisgender women in seven sub-Saharan African countries, including South Africa, found that CAB-LA was 89% more effective in preventing HIV infection than daily oral PrEP (Delany-Moretlwe *et al.* 2022). These findings highlight the high preventive potential of injectable PrEP and suggest that participant concerns in this study may reflect a lack of exposure to up-to-date evidence rather than scepticism about biomedical prevention itself. Strengthening communication and training around the efficacy of injectable PrEP will therefore be

crucial for facilitating informed uptake and confidence among potential users and healthcare providers once national rollout begins in South Africa, and particularly within campus health settings. Implementation research conducted in South African campus health clinics would provide valuable evidence on effectiveness, feasibility, and cost-effectiveness in the specific context where these healthcare workers operate.

Anticipated side effects and safety monitoring requirements were frequently mentioned as concerns. Healthcare workers' awareness of potential adverse reactions such as injection site reactions, weight gain, and mood changes demonstrates familiarity with emerging implementation data, even if their overall knowledge of injectable PrEP remains limited. Clinical trials have documented that injection site reactions are the most common side effect of long-acting cabotegravir, occurring in approximately 30-40% of recipients, though most reactions are mild to moderate and resolve without intervention (Landovitz *et al.* 2021). Weight gain has been observed in some users, consistent with patterns seen with integrase inhibitor antiretroviral medications. Healthcare workers' recognition that side effects could deter uptake and that negative side effects could spread quickly on campus, reflecting their assessment of how adverse events can influence innovation adoption through social networks, consistent with Rogers (2003), the concept of observability. Side effects that are visible or frequently discussed can create negative observability that discourages uptake, particularly in campus settings where information spreads rapidly through peer networks.

Although phase III evidence demonstrates that injectable PrEP substantially outperforms daily oral PrEP in preventing HIV (Landovitz *et al.* 2021; Delany-Moretlwe *et al.* 2022), concerns about male acceptability of injectable formulations reflect the complex intersection of needle phobia and masculine norms in South Africa. Their concerns centred on the perception that men are generally fearful of needles yet reluctant to express this fear, owing to prevailing masculine norms that equate endurance of pain with strength. This aligns with previous studies in South Africa, which have shown that traditional masculine ideals often discourage men from engaging in preventive health behaviours or seeking care perceived as exposing vulnerability (Mbokazi *et al.* 2020; Chavalala, Lebesse and Makhado 2024).

Additional evidence on injectable contraception in South Africa has documented similar patterns, with needle phobia and gender-related concerns affecting uptake (Cooper *et al.* 2016). Conversely, evidence from a South African study examining perceptions of long-acting PrEP delivery through implants and injectables among men who have sex with men (MSM) and men who have sex with women (MSW) indicated a strong preference for injectable formulations (Atujuna *et al.* 2022). Participants in that study reported that injections were perceived as a familiar and routine aspect of healthcare, given their prior experiences with injectable treatments for various medical conditions (Atujuna *et al.* 2022).

This divergence in perceptions highlights the importance of understanding how prior healthcare experiences, gender norms, and social contexts shape the acceptability of biomedical HIV prevention technologies. These findings also highlight the need for gender-sensitive education and communication approaches that normalize injection-related fear and leverage positive cultural associations with preventive health. Contextualizing such interventions within students' lived realities will be critical for promoting the uptake of injectable PrEP once it becomes widely available.

Risk compensation, where individuals reduce condom use because they feel protected against HIV, represents a legitimate implementation concern. Healthcare workers' scepticism about continued condom use reflects both national data on unintended pregnancies among university students (Woldesenbet *et al.* 2021; Mutinta 2022). Their concern was grounded in the observation of persistently high rates of unintended pregnancies within the university setting, which they interpreted as indicative of inconsistent condom use and broader gaps in sexual risk-reduction practices.

This perception aligns with national data showing that unintended pregnancies remain a significant public health concern among young adults in South Africa, particularly among university students (Woldesenbet *et al.* 2021; Mutinta 2022). Such trends suggest that while awareness of HIV prevention has increased, behavioural adherence to comprehensive protection, including dual protection against both HIV and pregnancy, remains limited. The scepticism voiced by healthcare workers reflects a legitimate concern that access to injectable PrEP, while potentially transformative

for HIV prevention, could inadvertently lead to risk compensation, where individuals reduce condom use because they feel protected against HIV infection.

Studies have documented similar patterns following the introduction of oral PrEP, with some studies finding little evidence of significant increases in condomless sex or sexually transmitted infections (STIs) following PrEP initiation (Calabrese *et al.* 2017; Traeger *et al.* 2018; Milam *et al.* 2019). However, other studies have documented modest increases in STI rates among PrEP users, though it remains unclear whether this reflects actual behaviour change or improved STI screening among individuals engaged in prevention services (Jenness *et al.* 2017; Nguyen *et al.* 2018; Bonafé 2025).

Manguro *et al.* (2022) found that condom use increased substantially among both female sex workers (FSW) and men who have sex with men (MSM) following the introduction of oral PrEP. This positive trend was attributed to the delivery of PrEP as part of a comprehensive combination prevention package, which included regular counselling, condom provision, and continuous risk-reduction education. However, the observed increase in condom use may also have been influenced by low retention rates among PrEP initiators, meaning that those who remained in care were likely to be individuals already more engaged in preventive behaviours. In contrast, Irungu *et al.* (2021) reported that some PrEP users exhibited decreased condom use and greater reliance on PrEP alone for protection, reflecting potential risk compensation behaviour.

These divergent findings highlight the complexity of behavioural responses to PrEP initiation, suggesting that the context and design of PrEP delivery, particularly the integration of counselling and ongoing support, play a crucial role in shaping condom use patterns among key populations. In student populations, these dynamics may be compounded by factors such as alcohol use, peer influence, and limited sexual health literacy. Therefore, as South Africa prepares for the rollout of injectable PrEP, it will be essential for healthcare workers to integrate clear messaging around combination prevention, emphasizing that PrEP complements but does not replace condom use.

8.2.3 Objective 3: Barriers and Facilitators Influencing the Adoption and Implementation of HIV Injectable PrEP

The absence of structured training represents a fundamental barrier rooted in professional ethics and competence. This concern aligns with implementation science literature, which consistently identifies healthcare provider training as a critical determinant of intervention adoption (Flottorp and Aakhus 2013; Powell *et al.* 2015). For injectable PrEP, competence extends beyond the clinical procedure itself to encompass eligibility assessment, counselling protocols, side effect management, and follow-up scheduling, each requiring distinct knowledge and skills.

The insistence on continuous rather than one-time training demonstrates a sophisticated understanding of how clinical competence develops. Evidence on the effectiveness of continuing professional development shows that brief, isolated training sessions rarely produce sustained changes in clinical practice (Forsetlund *et al.* 2021). In resource-limited settings such as South Africa, where healthcare workers face competing demands and limited time, the challenge is designing learning approaches that are accessible, practical, and sustained (Boulle *et al.* 2021). The desire for hands-on training, mentorship, and technical support indicates that competence cannot be achieved through passive knowledge transfer but requires active skill-building and confidence development within real-world service contexts. Without addressing this training gap, healthcare workers may lack the confidence and competence necessary to deliver injectable PrEP safely and effectively, potentially compromising both service quality and client outcomes.

Chronic understaffing and excessive workload represent structural barriers that training alone cannot resolve. These concerns reflect the well-documented reality of human resource constraints in South Africa's public health system (Pillay, Govender and Reddy 2023; Ntimani, Mokoena-de Beer and Phetlhu 2025). The tension between introducing beneficial interventions and maintaining existing service quality highlights a critical challenge in global health: innovation adoption within health systems already operating beyond capacity.

Workload concerns extend beyond inconvenience to encompass risks to care quality. When healthcare workers are overstretched, the likelihood of errors increases, patient-

provider interactions become hurried, and the holistic, patient-centred care required for effective HIV prevention may be undermined (Atkins *et al.* 2022). Moreover, chronic workload pressure contributes to healthcare worker burnout, affecting staff retention, motivation, and service delivery sustainability (Aarons, Sommerfeld and Willging 2011). While injectable PrEP holds promise for improving HIV prevention outcomes, its implementation must be accompanied by honest assessments of health system capacity and, where necessary, investment in additional human resources. Introducing new services without addressing underlying capacity constraints risks creating a situation where healthcare workers are asked to do more with less, ultimately compromising both the new service and existing programmes (Yakam and Gruénais 2009). This barrier underscores that successful implementation requires not only technical interventions but also fundamental health system strengthening.

Stigma continues to undermine HIV prevention efforts at multiple levels. The enduring challenge of HIV-related stigma in South Africa persists despite decades of public education and anti-stigma campaigns (Zuch and Lurie 2012; Treves-Kagan *et al.* 2017). Stigma operates through interconnected mechanisms: internalized stigma among individuals at risk, enacted stigma from peers and community members, and structural stigma embedded in institutional practices and societal norms (Earnshaw *et al.* 2014; Earnshaw *et al.* 2021).

Critically, stigma impacts both oral and injectable PrEP uptake, indicating that although injectable formulations may lessen certain forms of stigma by removing visible pill-taking, they do not address the core issue that seeking HIV prevention services remains socially marked, Field (Calabrese 2020). Clinic attendance, regardless of the specific service used, may still be perceived by peers as evidence of HIV risk or infection. This suggests that while injectable PrEP offers benefits in terms of privacy, it must be supported by wider stigma-reduction efforts that target community norms, peer attitudes, and institutional cultures. Reframing HIV prevention as a responsible health behavior points to multi-level stigma interventions that go beyond individual services to reshape social narratives about HIV risk, prevention, and care-seeking, Field (Golub 2018; Calabrese 2020). Without addressing stigma across these multiple levels, even the most innovative biomedical prevention tools may fail to reach those who need them most.

Cold chain storage requirements and supply chain reliability emerged as practical yet critical barriers often overlooked in discussions of innovation adoption. These concerns reflect existing cold chain deficiencies in South Africa's health system, where inconsistent electricity supply, inadequate refrigeration capacity, and temperature monitoring gaps are well-documented (Mutshatshi and Phukubye 2025). Long-acting cabotegravir requires refrigerated storage at 2–8°C, similar to many vaccines, and must be protected from freezing. Ensuring appropriate storage across multiple campus health clinics, some with limited infrastructure, will require investment in equipment, backup power systems, and monitoring protocols. Moyo *et al.* (2022) specifically identifies refrigeration as a key health system-level challenge for implementing long-acting cabotegravir, particularly in resource-constrained settings.

Supply chain reliability concerns are equally critical and reflect painful historical experiences with medication stockouts that have disrupted HIV treatment and prevention programmes in South Africa (Ngwenya *et al.* 2020). Given that injectable PrEP is administered every two months, supply interruptions could leave clients without protection for extended periods, potentially resulting in preventable HIV infections. These logistical barriers highlight a crucial reality: even the most clinically effective and acceptable interventions will fail if the basic infrastructure and supply systems necessary for their delivery are not in place (Moyo *et al.* 2022; Venter *et al.* 2024). Addressing these challenges requires robust procurement planning, adequate buffer stock, contingency plans, and transparent communication about product availability. Without guarantees of reliable supply, even enthusiastic healthcare workers may hesitate to initiate clients on a service they cannot sustain.

On the facilitating side, structured training represents the most powerful enabler identified. The specific training needs articulated, theoretical knowledge, practical skills, counselling approaches, and ongoing support provide actionable guidance for capacity-building interventions. Evidence-based principles of clinical skills education emphasize experiential learning and deliberate practice (McGaghie *et al.* 2010; Cohen 2016), suggesting that effective training must go beyond didactic instruction to include hands-on experience with supervision and feedback.

The desire for a comprehensive professional development ecosystem, regular refresher courses, case discussions, mentorship, and technical support reflects an understanding that competence develops through sustained engagement rather than one-time events (De Sousa Drumond and Kotsiopolou 2022). If designed and delivered effectively, such training could serve as a powerful lever for successful implementation. However, training must be adequately resourced, scheduled to accommodate existing workloads, and delivered by credible trainers who understand both clinical aspects and service delivery realities. Furthermore, training should address not only clinical procedures but also counselling, stigma reduction, patient-centred communication, and the social and behavioural dimensions of HIV prevention among young people (Mahlare *et al.* 2023; Mathur *et al.* 2025). Studies show that effective training transforms healthcare workers from passive recipients of directives into confident, competent implementers who understand not only how to deliver injectable PrEP but why it matters and how it fits into broader HIV prevention efforts (Irungu *et al.* 2019).

Strong leadership is a critical facilitator for creating an enabling environment for innovation adoption. This aligns with organizational change theory and implementation science literature, which consistently demonstrates that leadership commitment, visible support, and active championing of innovations are critical determinants of implementation success (Aarons, Sommerfeld and Willging 2011; Gifford *et al.* 2018). Effective leadership functions must operate at multiple levels: facility managers ensuring adequate staffing and supplies, district health officials coordinating training and supervision, provincial leaders allocating budgets and setting priorities, and national policymakers establishing guidelines and monitoring implementation. Leadership support signals to healthcare workers that injectable PrEP is a priority, that their concerns are heard, and that the resources necessary for success will be made available (Huang *et al.* 2022). This visible commitment motivates frontline workers to invest the effort required for successful implementation. In the absence of such support at any level, implementation efforts are likely to falter regardless of healthcare workers' individual enthusiasm or competence. Leadership is not merely about issuing directives but about creating the conditions, resources, policies, and accountability structures, that enable successful innovation adoption and sustained implementation (Huang *et al.* 2022).

The need for comprehensive, step-by-step guidelines reflects the complexity of introducing a new clinical service and the necessity of explicit, detailed guidance to reduce uncertainty and variability. Evidence demonstrates that clinical practice guidelines, when well-designed and contextually appropriate, can improve the quality and consistency of care (Grimshaw, Eccles and Tetroe 2004).

However, guidelines alone are insufficient; they must be accessible, practical, and supported by training and supervision. The potential of standardized guidelines to reduce uncertainty and stress suggests that in their absence, healthcare workers feel vulnerable to making errors or being held accountable for decisions made without adequate guidance. Well-developed guidelines not only improve clinical care but also provide professional protection by establishing evidence-based standards of practice (Guerra-Farfan *et al.* 2023). Barnighausen *et al.* (2020) found that healthcare workers actively adapt implementation guidelines to improve PrEP education and delivery. A. Wagner *et al.* (2023) documented healthcare workers employing strategies like task shifting, patient flow modifications, and demand generation to overcome implementation challenges.

For injectable PrEP, guidelines must address eligibility criteria, pre-initiation assessments, injection technique, side effect management, follow-up scheduling, documentation requirements, and integration with other services. Critically, these guidelines should be developed collaboratively with healthcare workers to ensure they are realistic and feasible within the constraints of campus health settings. Guidelines developed in isolation from frontline realities, however technically sound, risk being impractical and ultimately unused.

The power of peer networks in shaping health behaviours among young people cannot be overstated (Salvy *et al.* 2012). This insight suggests that traditional, provider-centric health education approaches may be less effective than peer-led strategies for promoting injectable PrEP among students. Peer education operates through mechanisms of social modelling, normative influence, and reduction of perceived social distance between messenger and audience (Tolli 2012).

For injectable PrEP, peer educators could play multiple roles: raising awareness, correcting misconceptions, sharing testimonials, normalizing prevention-seeking behaviour, and providing social support to users. By leveraging existing social networks and trusted relationships, peer advocacy can complement formal healthcare services and reach students who might otherwise remain uninformed or hesitant (Terui *et al.* 2020). Community engagement extends beyond individual peer educators to include campus leadership, student organizations, residence life staff, and other stakeholders who shape the social environment in which students make health decisions. Guides and Team Specifically note that community group engagement interventions work “through community groups to influence individual behaviours and/or social norms” rather than targeting individuals in isolation. This broader engagement approach recognizes that individual behaviour change occurs within social contexts and that sustainable adoption of new health behaviours requires supportive community norms and institutional cultures.

High perceived compatibility represents a significant facilitator, reflecting injectable PrEP's alignment with existing HIV prevention services and operational practices. Rogers (2003) framework identifies compatibility as a key factor in innovation adoption, with innovations perceived as consistent with existing values, experiences, and needs being more readily adopted. South African PHC nurses' extensive experience with depot medroxyprogesterone acetate (DMPA) and other injectable contraceptives provides an existing competency base for injectable PrEP delivery.

The operational similarities, intramuscular injection technique, scheduled follow-up appointments, side effect monitoring, and client counselling suggest that the learning curve for injectable PrEP may be less steep than for an entirely novel procedure (Mayer, Agwu and Malebranche 2020; Durham *et al.* 2023). However, compatibility does not automatically translate into enthusiastic adoption. Change management strategies are needed to help healthcare workers see injectable PrEP as a natural extension of existing work rather than a burdensome addition. Emphasizing similarities with familiar services, streamlining integration into existing workflows, and recognizing healthcare workers' prior expertise can all enhance perceptions of compatibility and facilitate smoother adoption (Holahan *et al.* 2015). This facilitator underscores the

value of building on existing strengths rather than imposing entirely new systems, a principle central to sustainable health system strengthening.

The importance of observability in shaping both healthcare worker and client adoption reflects fundamental principles of social influence (Cialdini and Goldstein 2004). Visible outcomes, students successfully using injectable PrEP, reduced HIV infections in clinics, provide empirical validation that reinforces commitment to providing the service. For students, seeing peers successfully using injectable PrEP creates social proof that the intervention is acceptable, safe, and effective.

This finding highlights the potential value of early demonstration projects or pilot implementations that can generate visible success stories. If initial implementations produce positive experiences, maintained adherence, and HIV prevention, this could create a positive feedback loop, accelerating adoption. Conversely, negative early experiences could impede broader rollout through unfavourable word-of-mouth. This dual-edged nature of observability underscores the importance of ensuring that initial implementations are well-supported and carefully managed to maximize the likelihood of positive outcomes. Strategic use of testimonials, peer-to-peer learning platforms, and visible celebration of successes can leverage observability to drive adoption (Valente 2010; Flodgren *et al.* 2019). However, this requires deliberate planning, observability does not occur automatically but must be facilitated through platforms for sharing experiences and mechanisms for making success visible to both healthcare workers and potential clients.

8.2.4 Objective 4: Recommendations for Improving Uptake and Integration of Injectable PrEP

The consistent emphasis on structured training and targeted information dissemination reflects a fundamental principle in Rogers' Diffusion of Innovations framework: that knowledge about an innovation must precede persuasion and decision-making. Without adequate knowledge, healthcare workers cannot progress through the innovation-decision process toward adoption (Rogers 2003).

The desire for hands-on training, clear protocols, and accessible resource persons demonstrates healthcare workers' recognition that passive information dissemination

is insufficient for building the competence and confidence required to deliver a new clinical service. This aligns with adult learning theory and the evidence base on healthcare professional education, which consistently shows that interactive, practice-based training is more effective than didactic approaches for developing clinical skills (Harris and Bacon 2019; Forsetlund *et al.* 2021).

Furthermore, the desire for ongoing support mechanisms such as helplines and resource persons reflects the complexity of implementing injectable PrEP and the reality that questions and challenges will arise during real-world service delivery. This finding resonates with implementation science literature, which emphasizes the importance of technical assistance and mentorship during the rollout of new health interventions (Powell *et al.* 2015). Healthcare workers need not only initial training but also continuous support to troubleshoot challenges, clarify uncertainties, and refine their practices based on emerging experience.

The need for targeted training is particularly urgent given South Africa's commitment to expanding PrEP access and the potential role of injectable PrEP in achieving HIV prevention targets. As injectable PrEP becomes more widely available in South Africa following regulatory approvals and procurement processes, the gap between current knowledge levels and the competencies required for safe, effective delivery will become increasingly problematic (Moyo *et al.* 2022; Mahlare *et al.* 2023). Proactive investment in comprehensive training programmes developed in collaboration with healthcare workers will be essential to ensuring successful implementation.

The strong consensus around initiating with a pilot phase reflects evidence-based implementation practice. Implementation science consistently demonstrates that piloting allows for identification and resolution of operational challenges, refinement of protocols, assessment of feasibility, and generation of local evidence before committing to large-scale rollout (Damschroder *et al.* 2009; Craig 2016). This approach is particularly important for injectable PrEP given its operational differences from oral PrEP.

While oral PrEP involves medication dispensing, injectable PrEP requires clinical procedures, specific storage conditions, precise scheduling, and management of injection-site reactions (Moyo *et al.* 2022; Valente *et al.* 2023b). Saphonn *et al.* (2017)

emphasize that these operational requirements are best tested and refined on a small scale before expanding to all eligible clients and clinic sites. Additionally, piloting generates local data on acceptability, adherence, side effects, and HIV incidence that can inform both implementation refinement and stakeholder advocacy. Such context-specific evidence addresses healthcare workers' legitimate desire for local effectiveness data rather than relying solely on international clinical trial results (Asabor *et al.* 2021; Velloza *et al.* 2023).

Thoughtful pilot participant selection requires a strategic approach that simultaneously recruits enthusiastic early adopters and ensures broader representativeness through carefully designed inclusion criteria and recruitment methods. The evidence supporting this approach comes from multiple studies. Wasti *et al.* (2023) emphasizes selecting study sites with diverse participants' backgrounds and considering factors like gatekeepers and logistical challenges. Joseph, Keller and Ainsworth (2016) recommend five key recruitment techniques: leveraging social networks, collaborating with community gatekeepers, developing comprehensive recruitment platforms, creating clear study materials, and building trusting relationships. The pilot phase should be adequately resourced, generously supported, carefully monitored, and explicitly framed as a learning laboratory rather than simply a scaled-down version of full implementation (Damschroder 2020).

Comprehensive awareness campaigns are prerequisites for successful uptake, recognizing that knowledge and demand generation must precede service availability. The research consistently demonstrates that awareness is a multi-phase process requiring sustained, targeted interventions. For instance, McCoy *et al.* (2025) found that effective demand creation involves integrating strategies addressing awareness, knowledge, motivation, and access. Seymour (2018) Specifically recommends campaigns using diverse media channels, tailored to different ages, cultures, and perspectives (Koester *et al.* 2021). The multi-channel communication approach described, posters, information sessions, social media, peer educators, campus radio, and student newspapers, aligns with health communication theory, which emphasizes using multiple channels and formats to reach target audiences with varied media consumption patterns and information preferences (Noar 2012).

The strategic recommendation to begin education before service availability can build anticipation and demand, ensuring that when injectable PrEP becomes available, students are already informed and interested. However, timing is critical. Premature awareness-raising could lead to frustration if implementation is delayed, while delayed communication might result in slow initial uptake as students gradually become aware. Therefore, awareness campaigns must be carefully coordinated with actual service availability, ideally beginning 2-3 months before rollout to build knowledge and interest without creating unrealistic expectations.

The emphasis on directly addressing misconceptions reflects a sophisticated understanding of persuasive communication. Simply providing information is often insufficient to change beliefs; effective communication must recognize and counter specific misconceptions, offer corrective information, and involve trusted messengers (Lewandowsky *et al.* 2012). For injectable PrEP, common misconceptions might include beliefs that it is experimental, dangerous, only for certain types of people, or equivalent to HIV treatment (Golub 2018). Awareness campaigns should actively address these misconceptions with evidence-based, culturally appropriate messages that resonate with students' lived experiences and concerns. Furthermore, campaigns should emphasize not only what injectable PrEP is but also what it is not, clarifying that it prevents HIV but not other STIs or pregnancy, thereby reinforcing the need for comprehensive prevention strategies.

The emphasis on transparent communication about follow-up expectations reflects awareness that injectable PrEP success depends on continued engagement, not just initial uptake. Injectable PrEP requires strict adherence to scheduled injections, with missed appointments potentially compromising HIV prevention protection. Unlike daily oral PrEP, injectable formulations require precise timing, as missed injections can lead to periods of reduced or no protection (Liegeon and Ghosn 2023). One study demonstrated the critical importance of this, showing that 85% of injections were on-time in a low-barrier PrEP program, with 83% six-month retention (Spinnewijn *et al.* 2024). Patients may need HIV testing before receiving subsequent injections if scheduling lapses, underscoring the need for comprehensive patient education and commitment to return visits. Rogers *et al.* (2023) further highlighted that while patients are interested in long-acting PrEP, they require more information about safety,

efficacy, and proper use to ensure consistent protection. Communication strategies should be multi-layered: verbal explanation during initial counselling, written appointment cards, SMS reminders, phone call follow-ups, and possibly peer support to encourage adherence to injection schedules. The suggestion of digital communication platforms such as dedicated helplines or WhatsApp lines reflects recognition that questions and concerns arise outside clinic visits. Digital platforms are increasingly used in health service delivery and have shown promise for supporting medication adherence, answering questions, and maintaining client engagement (Catalani *et al.* 2013). For young people who are highly connected digitally, such platforms may be particularly acceptable and effective.

Internal communication among staff is equally critical. The recognition that students might see different healthcare providers at different visits underscores the need for robust handover processes and shared information systems to ensure continuity of information even when provider continuity is not possible. Electronic medical records or well-designed paper-based tracking systems that document each client's injectable PrEP history, side effects, and upcoming appointments are essential infrastructure to ensure this information continuity. Information systems are critical for maintaining patient care quality and preventing potentially dangerous gaps in medical follow-up. Multiple studies demonstrate that without robust tracking systems, healthcare providers risk significant patient management challenges (Chalker *et al.* 2013).

The call for comprehensive monitoring and evaluation reflects appreciation for data's role in quality improvement, accountability, and evidence generation. The emphasis on tracking uptake rates, continuation rates, side effects, and HIV incidence describes a balanced scorecard approach that measures both process and health outcomes. This aligns with frameworks for monitoring HIV prevention programmes, which emphasize measuring both coverage and effectiveness (Garnett *et al.* 2017). Data-driven quality improvement is a dynamic, iterative approach that leverages continuous monitoring and analysis to identify and address challenges in healthcare services. The evidence strongly supports this approach across multiple healthcare settings. Gimbel *et al.* (2022) describe the Systems Analysis and Improvement Approach (SAIA), which engages healthcare workers in analyzing facility-level data to promote systems-level thinking and quality improvement. This iterative, data-driven approach is fundamental

to implementation science and contrasts with static, protocol-driven implementation that does not adapt to emerging challenges (Chambers and Norton 2016, 2021).

Effective monitoring systems must be carefully designed to align with healthcare workers' existing capabilities, ensuring data collection is perceived as valuable rather than bureaucratic. Evidence from multiple studies supports this approach. Mutale *et al.* (2013) demonstrate that health information system (HIS) interventions must be tailored to specific settings and implemented with a flexible, iterative approach. Wagenaar *et al.* (2017) found that successful data-driven quality improvement requires explicit engagement and collaborative ownership of data. The key is creating systems that are not just technically sound but also motivationally aligned with healthcare workers' needs and perspectives.

The recommendation for phased rollout reflects strategic implementation planning that balances the urgency of expanding access with the need to maintain quality and learn from experience. Phased approaches allow for systematic expansion while preserving quality, adapting to resource constraints, and ensuring that each new implementation site receives adequate support (Damschroder *et al.* 2009; Damschroder 2020).

Readiness assessment before implementing injectable PrEP at each site acknowledges that facilities vary in their capacity, infrastructure, staffing, and patient populations. Readiness assessment for injectable PrEP reveals significant variability in healthcare facilities' implementation capacity, with most sites only partially prepared for successful rollout. Multiple studies demonstrate that clinic readiness is complex and context-dependent. Tarfa *et al.* (2023) found that only 52% of clinics were slightly or somewhat ready to implement long-acting injectable PrEP, with 20% not ready at all. Koester *et al.* (2023) noted that while organizational commitment was high (85% agreeing to implementation), current systems could only support a limited number of stable patients.

However, phased approaches must balance caution with urgency. HIV continues to affect young South Africans (Dellar, Dlamini and Karim 2015), and effective prevention tools should be made available as quickly as feasible. Phased implementation should not be used to justify indefinite delays or overly cautious incrementalism. Clear

expansion timelines, transparent readiness criteria, and commitment to progressive scale-up are necessary to ensure that phased implementation leads to meaningful coverage within a reasonable timeframe. The goal is not to delay rollout indefinitely but to expand thoughtfully, learning from each phase and building on successes while addressing challenges before they become systemic. A carefully phased, strategic approach to injectable PrEP implementation can indeed maximize the likelihood of successful, effective rollout by addressing systemic challenges before full-scale deployment. The “Layer Plus Approach” provides a structured framework for this goal (Pilgrim, Evans and Czarnogorski 2022). This method involves first “layering” injectable PrEP into existing care models, preparing healthcare professionals, and improving access, while the “Plus” component expands coverage to previously underserved populations.

8.3 Integration with Theoretical Framework

Rogers' Diffusion of Innovations theory provided a robust framework for understanding healthcare workers' perceptions and the factors influencing injectable PrEP adoption. The findings demonstrate clear alignment with the five key attributes of innovations that influence adoption: relative advantage, compatibility, complexity, trialability, and observability.

Table 5 presents a synthesis of how the study's empirical findings align with Rogers' five key innovation attributes, demonstrating the framework's explanatory power for understanding healthcare workers' perceptions and identifying implementation leverage points.

Table 5: Integration of Study findings with Rogers’ Diffusion of Innovations Framework

Innovation Attribute	Healthcare Workers' Perceptions	Key Findings	Implementation Implications
Relative Advantage	Strong perception that injectable PrEP offers advantages over oral PrEP	• Improved adherence through reduced pill burden • Increased privacy and reduced stigma	• Emphasize evidence-based advantages in training

		• Better fit with student lifestyles • Some uncertainty about effectiveness	• Acknowledge that benefits vary by individual • Provide comparative effectiveness data
Compatibility	High compatibility with existing services and skills	• Similar to family planning injections • Leverages existing injection skills • Fits into current HIV prevention approach • Some resistance to "new protocol"	• Link explicitly to familiar services • Emphasize building on existing competencies • Address concerns about additional workload
Complexity	Moderate to high perceived implementation complexity	• Clinical procedure itself is simple • Supporting systems are complex (eligibility, storage, scheduling, monitoring) • Strong training needs expressed	• Develop clear, step-by-step protocols • Provide comprehensive training • Create user-friendly job aids • Establish ongoing technical support
Trialability	Strong desire to trial before full adoption	• Consistent recommendation for pilot phase • Want to test in own context • Need to develop confidence gradually	• Mandate pilot implementation phase • Select pilot sites strategically • Use pilots as learning laboratories • Disseminate lessons learned widely
Observability	Critical importance of visible outcomes	• Want to see "real results" in own clinics • Students influenced by peer experiences • Need for success stories • Concern about negative word-of-mouth	• Ensure early implementations are well-supported • Create platforms for sharing success stories • Monitor and address problems quickly • Facilitate peer-to-peer learning

This integration demonstrates that injectable PrEP adoption is not simply a matter of training healthcare workers, but rather requires addressing multiple dimensions of innovation perception and organizational readiness simultaneously.

8.3.1 Relative Advantage

Healthcare workers strongly perceived injectable PrEP as offering a relative advantage over oral PrEP, primarily through improved adherence due to reduced pill burden, increased privacy, and convenience for individuals with unpredictable lifestyles. The consistent emphasis on injectable PrEP's superiority for adherence support, its fit with student lifestyles, and its potential to reduce stigma all reflect perceptions of relative advantage. This perception aligns with empirical evidence from implementation studies. Atujuna *et al.* (2022) found that South African men expressed a strong preference for injectable PrEP due to perceived convenience and reduced daily burden compared to oral formulations. Similarly, Sciannameo *et al.* (2024) demonstrated that both people living with and without HIV in Argentina preferred long-acting injectables, citing reduced pill fatigue and enhanced discretion as primary advantages. Tolley *et al.* (2024) reported that HPTN 084 participants overwhelmingly favored injectable over oral PrEP, emphasizing ease, convenience, and privacy as key differentiating factors. These findings confirm that perceived relative advantage is a critical motivator of innovation adoption, particularly when it addresses tangible barriers encountered with existing prevention methods. This perception of advantage reflects a crucial motivator for early acceptance, as innovations perceived to offer tangible improvements are likely to be more readily adopted (Rogers 2003).

However, uncertainty about the effectiveness of oral PrEP among healthcare workers suggests that perceived relative advantage was not universal. This suggests that efforts to promote injectable PrEP adoption must clearly communicate its evidence-based advantages, including clinical trial data showing superior effectiveness, while also acknowledging areas where oral PrEP may retain advantages (such as easier discontinuation if desired, no injection procedures, or no injection site reactions).

The strength of perceived relative advantage likely influences both healthcare workers' willingness to offer injectable PrEP and clients' desire to choose it over oral PrEP.

Therefore, communication strategies should emphasize relative advantages while honestly acknowledging that injectable PrEP is not universally superior in all dimensions; rather, it offers advantages that will be particularly valuable for certain individuals in certain circumstances.

8.3.2 Compatibility

The perception that injectable PrEP aligns well with existing HIV prevention services and operational practices in campus health clinics demonstrates compatibility. Rogers (2003) defines compatibility as "the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters." Healthcare workers' comparisons of injectable PrEP with family planning injections indicated that the intervention aligned naturally with current service delivery models and professional practices, suggesting high perceived compatibility.

This finding resonates with the broader implementation science literature which demonstrates that perceived compatibility significantly influences adoption success. Holahan *et al.* (2015) found that technology adoption in healthcare settings depends critically on alignment with existing workflows, professional values, and established routines, with compatibility serving as a more powerful predictor of effective use than perceived usefulness alone. Wagner *et al.* (2023) documented how Kenyan healthcare workers successfully integrated PrEP into maternal and child health services precisely because they perceived it as compatible with existing reproductive health objectives and family planning counselling practices. Similarly, Barnighausen *et al.* (2020) observed that Eswatini healthcare workers adapted PrEP delivery protocols to enhance compatibility with local clinic operations, demonstrating that perceived compatibility can be actively constructed through thoughtful implementation design. These studies confirm that innovations aligned with existing professional competencies, institutional values, and operational systems encounter fewer adoption barriers than those requiring fundamental restructuring of practice patterns.

This compatibility operates at multiple levels. Clinically, the findings of this study show that injectable PrEP is compatible with existing HIV prevention approaches, serving the same ultimate goal of preventing HIV infection while offering an alternative delivery method. Operationally, it leverages existing skills (injection administration),

infrastructure (cold chain storage, appointment systems), and service delivery models (scheduled clinic visits) that healthcare workers already use for other services. Philosophically, it is compatible with patient-centered care values, offering choice and tailoring prevention to individual preferences and circumstances.

However, the finding about staff resistance towards learning a new protocol suggests that compatibility is not absolute. Some healthcare workers may perceive injectable PrEP as an unnecessary complication or additional burden rather than an extension of their work. This resistance reflects well-documented patterns in healthcare innovation literature. Atkins *et al.* (2022) found that Kenyan healthcare workers expressed concerns about PrEP implementation, which added to already overwhelming workloads, with some viewing new protocols as burdensome despite recognizing their clinical benefits. Ntimani, Mokoena-de Beer and Phetlhu (2025) documented that South African nurses implementing HIV prevention guidelines experienced significant strain from additional responsibilities amid chronic resource constraints, leading to selective engagement with new protocols. Yakam and Gruénais (2009) observed that introducing new HIV services without addressing underlying capacity limitations generated resistance among Cameroonian healthcare workers who felt overstretched and inadequately supported. This variation in perceived compatibility likely reflects differences in workload, attitudes toward innovation, professional confidence, and institutional culture. Implementation strategies must address these perceptions by explicitly demonstrating how injectable PrEP builds on existing competencies rather than requiring entirely new systems, while also acknowledging that some adaptation and learning will be necessary.

High perceived compatibility is a significant facilitator of adoption. Rogers (2003) emphasizes that innovations requiring dramatic changes to existing practices, values, or systems face substantially greater adoption barriers than those that align naturally with current ways of working. This principle is supported by extensive empirical evidence. Damschroder *et al.* (2009) identified compatibility with existing workflows as a core construct in their Consolidated Framework for Implementation Research, noting that interventions requiring extensive adaptation encounter sustained resistance. Gifford *et al.* (2018) found, through a systematic review, that healthcare innovations compatible with professional values and established routines achieved significantly

higher adoption rates than those that demanded fundamental practice restructuring. Consequently, injectable PrEP's compatibility with existing services suggests that with appropriate support, integration into campus health clinics should be feasible without fundamentally restructuring service delivery models.

8.3.3 Complexity

Perceptions of complexity were mixed, reflecting both the relative simplicity of the basic concept (an injection instead of daily pills) and the operational complexities of implementation. Rogers (2003) defines complexity as the degree to which an innovation is perceived as challenging to understand and use. In this study, healthcare workers' concerns about a lack of training, uncertainty about clinical protocols, logistical challenges, and monitoring requirements suggest that injectable PrEP is perceived as highly complex to implement.

The complexity is not primarily in the clinical procedure itself, but rather in the supporting systems: eligibility assessment, counselling for informed decision-making, storage and cold chain management, scheduling and tracking two-month follow-up visits, managing injection site reactions, handling missed appointments, and integrating documentation into existing health information systems. Each of these components adds layers of complexity that, while manageable individually, collectively create a service delivery model more complex than oral PrEP dispensing. This multifaceted complexity is characteristic of biomedical prevention innovations in resource-limited settings. Moyo *et al.* (2022) identified cold chain requirements, adherence-monitoring systems, and clinical protocols as key factors contributing to the complexity of implementing long-acting cabotegravir in Africa. Koester *et al.* (2023) found that only 52% of US clinics assessed themselves as ready for injectable PrEP implementation, with perceived complexity in patient flow, storage requirements, and scheduling systems as the primary barriers. Valente *et al.* (2023a) documented that healthcare providers identified operational complexity, including insurance authorization processes and workflow integration challenges, as more daunting than clinical administration itself. These findings confirm that implementation complexity extends far beyond technical clinical competence, encompassing organizational systems, logistical infrastructure, and care coordination processes.

The strong emphasis on training needs reflects healthcare workers' recognition of this complexity and their desire to be adequately prepared before implementation. This aligns with diffusion theory, which suggests that complexity is a modifiable attribute; innovations that initially seem complex can become more acceptable as potential adopters gain knowledge, skills, and experience (Rogers 2003).

8.3.4 Trialability

The strong recommendation for pilot implementation reflects healthcare workers' desire for trialability, the opportunity to test the implementation of injectable PrEP on a limited basis before committing to full-scale adoption. Rogers (2003) defines trialability as the degree to which an innovation may be experimented with on a limited basis. Healthcare workers consistently advocated initiating implementation with carefully selected small groups before scaling up, recognising that experiential learning in authentic clinical contexts would be essential for building confidence and identifying operational challenges.

Within the framework of the Diffusion of Innovations Theory, trialability plays a pivotal role in shaping the adoption process of new health interventions, such as injectable PrEP. First, it enables healthcare workers to develop skills and confidence in a low-risk, supportive environment, where mistakes are learning opportunities rather than crises. Second, it generates local evidence on feasibility, acceptability, and outcomes that can inform broader implementation decisions. Furthermore, it provides opportunities to identify and resolve operational challenges before they impact a large number of clients. Finally, it creates early adopters and success stories that can influence later adopters through peer influence and social proof.

The emphasis on trialability also reflects appropriate professional caution. Healthcare workers are being asked to implement a relatively new intervention in their context, and they recognize that despite strong clinical trial evidence, real-world implementation may encounter unforeseen challenges. This preference for piloting aligns with established principles of implementation science. Damschroder (2020) emphasizes that piloting enables iterative refinement through Plan-Do-Study-Act cycles, allowing implementers to identify and resolve operational challenges before widespread deployment. Czarnogorski (2022) describe the "Layer Plus Approach" for

injectable PrEP, which explicitly incorporates pilot phases to test integration into existing care models, build provider confidence, and refine workflows. Craig (2016) argues that complex interventions require feasibility and pilot studies to assess acceptability, optimize implementation strategies, and generate preliminary outcome data before definitive evaluation. By trialling injectable PrEP before full implementation, healthcare workers can satisfy themselves that it works in their setting, with their clients, within their operational constraints. This gradual, evidence-building approach is more likely to result in sustainable, high-quality implementation than rapid, mandated rollout without opportunity for learning and adaptation.

8.3.5 Observability

Healthcare workers emphasized the critical importance of witnessing tangible implementation outcomes and observing successful client experiences before fully committing to injectable PrEP adoption. Rogers (2003) defines observability as the degree to which the results of an innovation are visible to others. Participants articulated that seeing evidence of student satisfaction, sustained adherence, and HIV prevention effectiveness in their own clinical settings would strengthen their confidence and commitment. Similarly, they recognized that student peers would be powerfully influenced by observing others successfully using injectable PrEP, creating positive social proof that could accelerate broader uptake.

This emphasis on observability reflects well-established diffusion principles supported by implementation research. Valente (2010) demonstrates that observable outcomes create network effects, in which successful early adopters influence later adopters through visible demonstrations of benefits, thereby reducing perceived risk and uncertainty. Flodgren *et al.* (2019) found that opinion leaders' visible endorsement and use of innovations significantly accelerated adoption among professional peers, with observability serving as a more powerful influence mechanism than didactic education. Spinnewijn *et al.* (2024) documented, through qualitative analysis, that clinicians' adoption of shared decision-making innovations depended critically on witnessing positive patient outcomes and colleagues' success, with observable results overcoming initial scepticism more effectively than evidence presentations. In the context of PrEP specifically, Manguro *et al.* (2022) found that observable increases in condom use among early PrEP adopters in Kenya positively influenced peer

perceptions and subsequent uptake, demonstrating how visible behavioural outcomes shape community-level adoption patterns. These findings confirm that observability operates through multiple mechanisms, providing empirical validation for healthcare workers while creating social proof that influences potential clients through peer networks.

Observability operates through multiple mechanisms. For healthcare workers, seeing positive outcomes, including students continuing on injectable PrEP, few side effects, and no HIV infections among users, would provide empirical validation of the intervention's value and reinforce their commitment to delivering it. For students, seeing peers successfully using injectable PrEP, appearing healthy, expressing satisfaction, and benefiting from HIV protection would create social proof that the intervention is acceptable, safe, and effective.

8.4 Summary of Theoretical Integration

Overall, Rogers' Diffusion of Innovations framework offers an explanatory value for understanding how healthcare workers perceive injectable PrEP as a novel HIV prevention intervention. The framework provides valuable insights into the interplay among individual perceptions, professional contexts, and broader system-level factors that influence perceptions of implementation. Overall, Rogers' Diffusion of Innovations framework provides substantial explanatory value for understanding how healthcare workers perceive injectable PrEP as a novel HIV prevention intervention. The framework illuminates the complex interplay between individual perceptions, professional contexts, and broader system-level factors that influence implementation readiness. Healthcare workers perceived injectable PrEP as having a clear relative advantage over daily oral regimens, primarily because it can enhance adherence and reduce patient burden by eliminating daily pill-taking. Simultaneously, injectable PrEP was viewed as largely compatible with existing HIV prevention objectives and service delivery frameworks, particularly given healthcare workers' extensive experience with injectable contraceptives, reinforcing its alignment with professional values and public health priorities. However, perceptions of moderate-to-high complexity, particularly regarding training needs, patient monitoring protocols, cold chain logistics, and follow-up scheduling systems, highlight that perceived ease of implementation remains a conditional factor shaping adoption readiness. The attributes of trialability and

observability emerged as particularly influential in healthcare workers' recommendations. They emphasized the importance of opportunities to test the intervention within controlled or pilot settings before full-scale implementation, reflecting a professional desire for experiential learning, local evidence generation, and confidence building within authentic clinical contexts. Similarly, the emphasis on observability underscores that visible outcomes will substantially influence adoption decisions, as healthcare workers witness successful implementation in their own clinics and students observe peers' positive experiences. The integration of Rogers' framework into this analysis illuminates how perceptions of advantage, compatibility, complexity, trialability, and observability collectively shape healthcare workers' conditional willingness to adopt injectable PrEP. These multidimensional perceptions suggest that successful diffusion will require coordinated strategies addressing each attribute: communicating evidence-based advantages clearly, leveraging compatibility with existing services, reducing complexity through comprehensive training and operational support, enabling trialability through well-designed pilot implementations, and enhancing observability by facilitating the sharing of success stories and outcome data. Taken together, the findings demonstrate that healthcare workers occupy a position of informed ambivalence, neither uniformly enthusiastic nor categorically resistant, but thoughtfully weighing potential benefits against implementation challenges while articulating the specific conditions under which they would be prepared to champion this innovation.

8.5 Conclusion

This chapter has presented a comprehensive discussion and interpretation of the study's findings regarding healthcare workers' perceptions of implementing HIV injectable PrEP in campus health clinics. The analysis has addressed each of the four research objectives, situating findings within existing literature and applying Rogers' Diffusion of Innovations theoretical framework as an analytical lens.

The discussion demonstrates that healthcare workers' perspectives are fundamentally shaped by the perceived relative advantage and compatibility of injectable PrEP with existing HIV prevention services, juxtaposed with substantive concerns regarding implementation complexity and operational feasibility. This duality of cautious optimism and legitimate apprehension reflects the inherently negotiated nature of

innovation diffusion within constrained health systems, where enthusiasm for clinical benefits must be reconciled with pragmatic realities of limited resources, inadequate training infrastructure, and chronic workforce shortages. Healthcare workers' perspectives reveal a sophisticated understanding that innovations are not adopted or rejected wholesale but rather carefully evaluated against multiple criteria simultaneously, clinical effectiveness, operational feasibility, alignment with professional values, resource requirements, and potential impact on existing service quality.

The attributes of trialability and observability emerged as particularly salient throughout the findings, underscoring the critical importance of creating structured opportunities for healthcare workers to experiment with and witness the benefits of injectable PrEP before widespread implementation is mandated. Pilot initiatives, demonstration projects, and peer-led learning platforms could therefore serve as effective mechanisms to foster confidence, reduce uncertainty, build technical competence, and generate momentum for broader adoption. The emphasis on these attributes signals that healthcare workers require more than didactic training and written protocols; they need experiential learning opportunities within authentic clinical contexts where they can develop practical competence, troubleshoot challenges, observe outcomes, and build professional confidence gradually rather than being expected to implement with full proficiency immediately.

More broadly, the discussion highlights that successful diffusion depends not solely on the innovation's intrinsic characteristics but also critically on the context in which it is introduced. Factors such as information flow through professional networks, institutional leadership support, resource availability, and prevailing social norms regarding HIV prevention significantly shape how new technologies are understood, evaluated, and ultimately integrated into routine practice. The preparatory phase context of South Africa, where injectable PrEP has received regulatory approval but widespread implementation has not yet commenced, creates a particular landscape of anticipatory readiness characterized by awareness without experiential knowledge, theoretical optimism without empirical validation, and willingness contingent upon supportive implementation conditions.

The theoretical integration demonstrates that Rogers' framework provides actionable guidance for translating innovation into sustainable practice. By systematically addressing each dimension of the framework, enhancing perceived relative advantage through clear communication of evidence-based benefits, leveraging compatibility with existing services and professional competencies, reducing complexity through comprehensive training and simplified operational protocols, enabling trialability through well-designed pilots, and enhancing observability by facilitating the sharing of success stories, implementers can create conditions conducive to adoption. However, the framework also illuminates fundamental tensions in implementation: the need to move quickly to provide potentially life-saving prevention versus the imperative to move carefully to ensure quality and sustainability; the desire to leverage existing systems versus the recognition that some degree of adaptation and learning is unavoidable; and the aspiration for uniform implementation versus the reality that different contexts may require differentiated approaches.

Ultimately, this analysis reveals that healthcare workers in campus health clinics occupy a position of informed ambivalence regarding injectable PrEP, neither uniformly enthusiastic advocates nor categorical resisters, but rather thoughtful professionals carefully weighing potential benefits against implementation challenges while articulating clear conditions under which they would be prepared to champion this innovation. This position represents both challenge and opportunity: a challenge because ambivalence could slow implementation momentum, but an opportunity because healthcare workers' concerns are legitimate, their needs are clearly articulated, and their conditional willingness to adopt provides a foundation upon which successful implementation can be built. Moving healthcare workers from informed ambivalence toward confident adoption will require coordinated action across multiple domains: comprehensive capacity building through sustained training and mentorship; health system strengthening to address workforce and infrastructure gaps; clear policy guidance and operational protocols; community engagement and demand generation to create supportive social environments; and establishment of robust monitoring systems that enable continuous quality improvement. If these enabling conditions are created, healthcare workers are positioned to become effective champions and skilled implementers of injectable PrEP. If these needs remain unaddressed, implementation will likely encounter persistent challenges that undermine both healthcare worker

confidence and client outcomes, potentially compromising the public health potential of this promising HIV prevention innovation.

The next and final chapter will synthesize the study's overall findings, present conclusions relative to the research aim and objectives, discuss study limitations, articulate implications for policy and practice, and offer evidence-based recommendations for future research and program implementation.

CHAPTER 9

CONCLUSION AND RECOMMENDATIONS

9.1 Introduction

This final chapter synthesizes findings from a qualitative study exploring PHC workers' perceptions of implementing HIV injectable PrEP in campus health clinics at a public university in KwaZulu-Natal, South Africa. The research was conducted during a critical period in South Africa as the country prepares to introduce long-acting injectable PrEP, a biomedical innovation with significant potential to transform HIV prevention among young people who bear a disproportionate burden of new infections. Through semi-structured interviews with 18 PHC workers, nurses, doctors, and HIV counsellors, the study generated rich, contextually grounded insights into healthcare workers' preparedness, concerns, and implementation priorities. Four research objectives guided the inquiry: (1) exploring PHC workers' knowledge, attitudes, and beliefs about injectable PrEP; (2) identifying perceived benefits and concerns; (3) examining barriers and facilitators; and (4) generating recommendations for improving uptake and integration.

This chapter provides both closure and forward-looking guidance. It begins by summarizing the key findings in relation to its research objectives, followed by an integrated synthesis that situates these findings within broader theoretical and practical contexts, articulating the study's contribution to knowledge. It then reflects the strengths and limitations of the study. Building on this foundation, the chapter outlines a comprehensive implementation framework with prioritized, actionable recommendations tailored to relevant stakeholder groups and aligned with the proposed research agenda. It also includes a reflexive account of how the researcher's positionality informed the conduct and interpretation of the inquiry. The chapter concludes with final reflections that affirm the study's significance and put forward a concluding remark.

9.2 Summary of Key Findings

Healthcare workers demonstrated variable knowledge of injectable PrEP, with awareness outpacing comprehensive understanding of clinical protocols, eligibility criteria, and operational requirements. Despite knowledge gaps, attitudes were characterized by cautious optimism. Participants recognized potential benefits while seeking evidence from local implementation contexts before fully committing to adoption. This informed hesitancy reflected professional maturity rather than resistance.

Several unexpected findings challenge conventional assumptions about innovation adoption. Healthcare workers' cautious stance reflected professional maturity rather than resistance; what appeared as hesitancy proved to be informed skepticism grounded in systems awareness. Providers spontaneously identified parallels between injectable PrEP and familiar contraceptive services, suggesting existing competencies could facilitate integration without creating parallel systems. Most significantly, risk compensation concerns were framed specifically within reproductive health contexts, with emphasis on pregnancy prevention alongside STI risk, highlighting holistic sexual health perspectives often absent from HIV-focused implementation literature. Table 6 summarises the key findings and conclusions.

Table 6: Summary of Key Findings and Conclusions

Research Objective	Key Findings (Themes and Sub-themes)	Conclusions
RO1: Knowledge, Attitudes, and Beliefs about Injectable PrEP	Theme 1: Variable Knowledge Across Professional Categories - Doctors demonstrated greater awareness than nurses and HIV counsellors - Awareness exceeded comprehensive understanding of clinical protocols, eligibility criteria, and operational requirements - Information acquired through informal channels (online news, peer	Healthcare workers' cautious stance reflects professional maturity and systems awareness rather than resistance to innovation. Attitudes exist on a nuanced continuum, not binary positions of acceptance or rejection. Training must address comprehensive competencies, not just awareness-raising. The spontaneous identification of parallels with contraceptive services suggests existing competencies

	conversations) rather than structured professional development Theme 2: Cautious Optimism • Recognition of potential benefits alongside desire for local evidence • Informed hesitancy rather than resistance to innovation • Spontaneous parallels drawn with contraceptive injection services	could facilitate integration without creating parallel systems.
RO2: Perceived Benefits and Concerns	Theme 1: Anticipated Benefits • Improved adherence through reduced pill burden • Enhanced privacy and discretion • Compatibility with student lifestyles and academic schedules • Clinic-based delivery potentially reducing HIV-related stigma Theme 2: Significant Concerns • Efficacy uncertainty compared to oral PrEP • Patient acceptability challenges (needle phobia, gender norms) • Risk compensation specifically framed within reproductive health context • Side effect management and long-term safety questions	Risk compensation concerns were uniquely framed within reproductive health contexts, emphasizing pregnancy prevention alongside STI risk. This highlights the interconnectedness of HIV prevention with broader sexual and reproductive health in young populations. Counselling approaches must simultaneously address HIV prevention, STI risk, and pregnancy prevention rather than treating these as separate issues. The reproductive health framing represents a novel insight absent from existing HIV prevention literature.
RO3: Barriers and Facilitators to Implementation	Theme 1: Multi-level Barriers • Inadequate training identified as the most fundamental barrier • Staff shortages and workload pressures • Persistent HIV-related stigma affecting service provision • Infrastructure gaps (cold chain requirements, supply chain reliability) Theme 2: Key Facilitators • Structured comprehensive training programs • Strong leadership commitment and clear operational protocols • High compatibility with existing injectable contraceptive services	Readiness exists on a continuum shaped by interacting individual (knowledge, confidence), organizational (resources, leadership), and systemic (policy, infrastructure) factors operating simultaneously rather than sequentially. Healthcare workers spontaneously identified contraceptive service compatibility as a facilitator, demonstrating tacit implementation knowledge. The emphasis on observable local success over published international efficacy data reveals the critical importance of social proof mechanisms in building provider confidence. Implementation strategies must address multi-level factors simultaneously rather than assuming

	• Observable local success stories valued over international evidence • Community engagement through peer advocacy	individual-level interventions alone will ensure success.
RO4: Implementation Recommendations from Healthcare Workers	Theme 1: Preparation as Prerequisite • Comprehensive competency-based training before service launch • Pilot implementation positioned as "learning laboratories" not "demonstration projects" • Infrastructure and supply chain readiness verified before commitments Theme 2: Implementation and Sustainability Strategies • Targeted awareness campaigns utilizing peer educators • Robust monitoring and evaluation systems designed for continuous improvement • Phased expansion approach based on demonstrated readiness criteria • Training as prerequisite activity, not concurrent with service delivery	Healthcare workers provided sophisticated, systems-level recommendations reflecting deep understanding of implementation realities rather than superficial observations. They positioned pilot sites as opportunities for genuine learning and adaptation rather than merely demonstrating feasibility. Training emerged as non-negotiable prerequisite that must precede rather than accompany service delivery. Healthcare workers should be treated as essential implementation partners whose recommendations guide program design rather than passive recipients of policy mandates. Their insights demonstrate that frontline implementers possess tacit knowledge about health system realities that academic frameworks and international evidence alone cannot provide.

The following sections provide additional context for each objective's conclusions.

Research Objective 1: Knowledge, Attitudes, and Beliefs

Knowledge varied significantly across professional categories, with doctors demonstrating greater awareness than nurses and HIV counsellors, though even among doctors, a detailed understanding of clinical protocols remained incomplete. Most participants had encountered information about injectable PrEP through informal channels, such as online news and peer conversations, rather than through structured professional development opportunities. Despite knowledge gaps, attitudes were characterized by cautious optimism. Participants recognized injectable PrEP's potential benefits but wanted to see evidence of its effectiveness in South African settings before fully committing to its adoption. This informed hesitancy reflected professional maturity rather than resistance to innovation.

A significant unexpected finding emerged when healthcare workers spontaneously drew parallels between injectable PrEP and familiar contraceptive injection services. This insight, unprompted by interview questions and absent from existing literature, suggests that existing competencies could facilitate integration without requiring entirely new service delivery systems.

Research Objective 2: Perceived Benefits and Concerns

Anticipated benefits centered on improved adherence through reduced pill burden, convenience for students managing unpredictable academic schedules and social lives, enhanced privacy compared to daily pill-taking, and the discrete clinic-based delivery model that could potentially reduce HIV-related stigma. However, significant concerns emerged alongside these benefits: uncertainty about efficacy compared to oral PrEP, questions about patient acceptability, particularly regarding needle phobia and gendered perceptions of injectable medications, anticipated side effects, and concerns about risk compensation.

The risk compensation concerns revealed a particularly important finding. Rather than framing risk compensation solely as reduced condom use leading to increased STI risk (the typical framing in HIV prevention literature), participants specifically emphasized concerns within reproductive health contexts. Healthcare workers worried that students protected from HIV through injectable PrEP might reduce condom use, leading to increased rates of unintended pregnancy alongside STI acquisition. This reproductive health framing highlights the interconnectedness of HIV prevention, sexual health, and reproductive health in young populations, a holistic perspective often absent from HIV-focused implementation literature.

Research Objective 3: Barriers and Facilitators

Barriers operated at multiple levels simultaneously. At the individual level, inadequate training emerged as the most fundamental barrier, with healthcare workers expressing uncertainty about their preparedness to deliver a new clinical service. At the organizational level, staff shortages and workload pressures raised concerns about the capacity to add new responsibilities. At the community level, persistent HIV-related stigma affected both provider comfort and anticipated patient willingness to access services. At the systems level, logistical challenges, including cold-chain requirements

and supply chain reliability, reflected concerns rooted in prior experiences with procurement failures and stockouts.

Facilitators similarly operated across multiple levels. Structured comprehensive training programs addressing clinical, counselling, and operational competencies were identified as essential. Strong leadership commitment signalling institutional prioritisation and clear operational protocols, reducing ambiguity about service delivery processes, were seen as organisational facilitators. High compatibility with existing injectable contraceptive services represented both a technical facilitator (leveraging existing competencies) and a systems facilitator (integrating rather than creating parallel services). Perhaps most significantly, healthcare workers emphasized that observable local success stories would matter more than international efficacy studies in building provider confidence, revealing the importance of social proof mechanisms in innovation adoption.

The findings demonstrate that readiness is not a binary state (ready vs. not ready) but exists on a continuum shaped by interacting individual, organizational, and systemic factors. Moreover, these factors operate simultaneously rather than sequentially, meaning that addressing individual-level training alone will prove insufficient if organizational capacity and systems infrastructure remain unaddressed.

Research Objective 4: Implementation Recommendations

Healthcare workers provided pragmatic, experience-informed recommendations that reflected a sophisticated understanding of implementation realities. Their recommendations emphasized comprehensive training as a prerequisite rather than a concurrent activity; services should not launch until healthcare workers feel genuinely prepared. They advocated for pilot implementation positioned explicitly as learning laboratories where challenges could be identified and solutions developed, rather than demonstration projects meant primarily to prove feasibility. Infrastructure and supply chain readiness must be verified before any service commitments are made to patients, reflecting concerns grounded in previous experiences with announced services that could not be sustained.

Beyond preparation, healthcare workers recommended targeted awareness campaigns utilizing peer educators who could reach students effectively, robust monitoring and evaluation systems designed for continuous improvement rather than punitive surveillance, and phased expansion approaches that allow new sites to learn from early implementers before launching services. Critically, they emphasized that training must precede service delivery; concurrent training while attempting to provide services would compromise both learning quality and patient care.

These recommendations reveal that healthcare workers are not passive recipients waiting to be told what to do, but rather essential implementation partners who possess tacit knowledge about health system realities that academic frameworks and international evidence alone cannot provide. Their insights should guide program design rather than being solicited merely for stakeholder engagement appearances.

9.3 Synthesis, Theoretical Insights, and Contribution to Knowledge

This study applied Rogers' (2003) Diffusion of Innovations framework to understand how healthcare workers evaluated injectable PrEP. The framework's five attributes, relative advantage, compatibility, complexity, trialability, and observability, effectively captured participants' primary concerns and evaluation criteria.

Healthcare workers recognized clear relative advantages: injectable PrEP could improve adherence and offer greater privacy than daily oral PrEP. They identified strong compatibility with existing contraceptive injection services, a spontaneous insight suggesting that existing competencies could facilitate integration. However, complexity concerns emerged prominently, particularly regarding training requirements and operational feasibility given current workload pressures.

Most significantly, participants emphasized trialability and observability. They advocated for pilot sites functioning as "learning laboratories" generating local evidence, and stressed that observing successful South African implementations would build confidence more effectively than international efficacy studies alone.

9.3.1 Theoretical Adaptations Required for Context

This study revealed important contextual nuances requiring adaptation of diffusion theory. Rogers (2003) framework assumes individuals have genuine autonomy in adoption decisions. However, in South Africa's public health system, injectable PrEP implementation may be policy-mandated, requiring healthcare workers to deliver services regardless of personal attitudes (Pillay, Govender and Reddy 2023).

This necessitates integrating diffusion theory with implementation science frameworks that address both individual and system-level factors (Nilsen 2020). The Consolidated Framework for Implementation Research (CFIR) explicitly accounts for provider characteristics alongside organizational readiness and external policies (Damschroder *et al.* 2009). The SEM similarly recognizes that individual behaviour occurs within nested contexts of organizational, community, and policy influences (McLeroy *et al.* 1988). In settings where provider autonomy is limited, these multi-level frameworks may offer more comprehensive explanatory power than diffusion theory alone.

Healthcare workers' emphasis on local success stories reinforces social proof mechanisms from behavioural science (Flodgren *et al.* 2019). They repeatedly stressed that visible, local successes would matter more than published efficacy data, suggesting that implementation strategies should deliberately create and leverage observability through peer-learning platforms, site visits, documented case studies, and peer mentorship programs. In contexts where trust in external evidence is limited due to past implementation failures, local observability becomes critical for building confidence and facilitating adoption (Greenhalgh *et al.* 2004).

9.3.2 Contribution to Implementation Science Knowledge

This study addresses significant gaps in HIV prevention implementation research by focusing on campus health settings serving university students, a strategically important but underexplored population. While most PrEP implementation research examines public clinics serving key populations (Grant *et al.* 2014; Fonner *et al.* 2016), this study illuminates unique considerations relevant to university contexts: student lifestyles, campus infrastructure, academic calendars, peer networks, and confidentiality concerns specific to institutional settings.

The pre-implementation timing creates both opportunities and constraints. Findings can inform planning proactively, allowing strategies to be designed responsively rather than reactively. This contrasts with implementation research conducted retrospectively, when addressing challenges is more difficult and costly. However, the anticipatory nature means perceptions are hypothetical rather than experientially grounded, necessitating ongoing research during actual implementation.

The study's explicit integration of theoretical frameworks during analysis strengthens conceptual coherence and demonstrates how theory can guide both data interpretation and practical application. A detailed contextual description of the research setting, participant characteristics, and analytical processes provides sufficient information for readers to assess transferability to other settings (Lincoln and Guba 1985).

9.4 Strengths and Limitations of the Study

9.4.1 Key Strengths

Institutional Access and Rapport Building: Conducting this research at the university where I study provided significant advantages. My institutional affiliation facilitated access to campus health clinics and enabled me to build rapport with healthcare workers more effectively than an external researcher might have. This insider status helped participants feel comfortable sharing candid perspectives, including critical views about institutional readiness and systemic challenges.

Methodological Rigour: The study employed purposive sampling that ensured representation across diverse healthcare worker categories (doctors, nurses, HIV counsellors) and multiple campus clinic sites, capturing varied perspectives. The sample size (n=18) achieved data saturation, with the final three interviews yielding no substantially new themes. Rigorous qualitative methodology included theory-informed interview guides, systematic analysis using Babchuk (2019) 10-step process, and explicit application of trustworthiness criteria throughout data collection and analysis.

Pre-Implementation Timing: The anticipatory nature of this research represents a unique strength. By investigating perceptions before implementation begins, the study

identifies potential barriers and facilitators proactively, allowing strategies to be designed responsively. This timing enables program planners to address healthcare worker concerns before they become entrenched implementation problems, potentially improving rollout success.

Inclusion of Diverse Healthcare Worker Categories: Unlike studies focusing solely on Doctors or nurses, this research included HIV counsellors, whose frontline perspectives on patient concerns and counselling challenges proved invaluable for understanding implementation realities.

9.4.2 Limitations and How They Were Addressed

Exclusion of Student Perspectives: This study captured only healthcare worker perspectives, not those of potential users (students). This represents a significant limitation because successful implementation requires understanding both provider readiness and patient acceptability. Students' awareness, attitudes, concerns, and willingness to use injectable PrEP remain unknown. I navigated this limitation by explicitly acknowledging it in the research design and recommending complementary research with students as a priority for future investigation. However, this gap means the study provides an incomplete picture of implementation readiness from a holistic perspective of service delivery.

Contextual Specificity: The study was conducted at campus health clinics within a single public university in KwaZulu-Natal. During data collection, I observed that campus clinics operate in relatively well-resourced settings compared to rural or under-resourced urban clinics. This limits transferability to other universities (particularly private institutions with different resources), other provinces, or non-campus health facilities serving broader populations. I addressed this by providing detailed contextual descriptions to enable readers to assess applicability to their settings.

Predominantly Female Sample: The sample was predominantly female (16/18), reflecting workforce composition but potentially influencing perspectives on gender-specific concerns. During interviews, I noticed that female participants emphasized concerns about unintended pregnancy more prominently than male participants, which

may reflect their professional experiences but could also indicate a gender lens. I navigated this by explicitly noting gender composition in findings and avoiding generalization of gendered perspectives across all healthcare workers.

Anticipatory Rather Than Experiential Data: Because injectable PrEP had not yet been implemented, participants' views were anticipatory rather than based on experience. During interviews, I noticed that participants sometimes qualified their responses with phrases like "I imagine..." or "I would expect..." This means anticipated benefits may not materialize as expected, and concerns may prove more or less significant than predicted. I addressed this limitation by explicitly framing findings as anticipatory perceptions and emphasizing the need for ongoing research during actual implementation.

9.5 Implementation Framework and Recommendations

Building on healthcare workers' insights and grounded in implementation science principles, this section presents prioritized, evidence-based recommendations for the implementation of injectable PrEP in campus health settings.

Recommendation 1: Develop and Deliver Comprehensive Competency-Based Training Programs

Healthcare workers identified inadequate training as the most fundamental barrier. Training must be comprehensive, competency-based, and completed before service delivery begins. Competency-based training has proven effective in oral PrEP rollout in South Africa (Cowan *et al.* 2016) and long-acting injectable antiretrovirals (Goyal *et al.* 2025), with studies showing that brief awareness sessions are insufficient for complex procedures requiring counselling and eligibility assessment (Petroll *et al.* 2017). Training must utilize interactive methodologies with supervised practice, include competency certification, and provide ongoing mentorship.

Provincial and national authorities should begin by developing standardized curricula with accompanying competency certification to ensure consistency in training across institutions. Building on this foundation, university leadership must allocate sufficient budget to provide protected training time for staff. In turn, facility managers should coordinate and schedule these training sessions, ensuring that all personnel complete

them before the launch of any new program. Finally, healthcare workers should engage actively in the process and view the training as an essential component of their professional development.

Recommendation 2: Establish Pilot Implementation Sites as Learning Laboratories

Healthcare workers emphasized pilots should generate local evidence, not merely prove feasibility. Phased implementation with strategic pilots has proven effective in HIV prevention scale-up, with systematic documentation improving subsequent quality and reducing costs (Shubber et al., 2014; Schneider & Lehmann, 2016). Select 3-5 diverse sites (geographic, resource levels, size, populations), provide intensive support, conduct regular learning sessions, document challenges transparently, and create observation opportunities for prospective implementers.

To support effective implementation, provincial and national authorities should first fund pilot initiatives and facilitate cross-site learning to strengthen shared insights. Building on this foundation, university leadership must commit adequate resources and provide the flexibility needed to ensure pilot activities proceed smoothly. In addition, research institutions should partner with these sites to conduct rigorous evaluations that generate credible evidence for scale-up. At the same time, pilot healthcare workers should document their experiences and mentor future implementers to ensure continuity and practical learning. Finally, advocacy organizations should amplify success stories while acknowledging challenges, thereby promoting informed support for broader implementation.

Recommendation 3: Ensure Infrastructure and Supply Chain Readiness Before Service Launch

Healthcare workers' infrastructure concerns reflect previous implementation failures. Readiness assessments reduce delays and prevent premature launches, undermining confidence (Moucheraud *et al.* 2017), with cold chain failures and supply interruptions significantly reducing continuation and trust (Spinelli, Grinsztejn and Landovitz 2022). Conduct facility assessments with standardized checklists, address gaps before commitments, and establish supply chain management with buffer stock and contingency plans.

To ensure effective implementation, university leadership must first invest in necessary infrastructure upgrades and allocate sufficient capital budget to support service readiness. Building on these institutional commitments, provincial and national authorities should establish robust procurement systems that include adequate buffer stock to prevent supply interruptions. In parallel, facility managers must conduct thorough assessments and address any operational gaps well before program launch. Finally, healthcare workers should actively participate in ongoing evaluations and monitor compliance, thereby helping maintain quality and strengthen long-term sustainability.

Recommendation 4: Implement Robust Monitoring, Evaluation, and Learning Systems

Healthcare workers recommended monitoring for continuous improvement, not punitive surveillance. Evidence shows that non-punitive monitoring approaches focusing on system-level learning rather than individual performance significantly enhance data quality and organizational engagement (Patel *et al.* 2021; Sandborg *et al.* 2021). Establish data collection from launch, provide regular feedback in accessible formats, build protected review time, and conduct collaborative quality meetings.

To strengthen implementation, provincial and national authorities should first develop monitoring and evaluation frameworks that balance accountability with learning opportunities. Building on this foundation, university leadership must invest in reliable data systems and cultivate a culture of continuous quality improvement. In turn, facility managers should allocate protected time for staff and create safe, supportive environments where challenges can be openly discussed. Meanwhile, healthcare workers should actively engage with data and participate in regular quality meetings to inform ongoing improvement. Finally, research institutions should contribute by supporting rigorous evaluation and providing capacity-building opportunities that enhance the overall learning system.

9.5.5 Recommendations for Future Research

While this study provides valuable insights into healthcare worker perceptions, several critical knowledge gaps require investigation to strengthen evidence-based implementation:

1. Implementation Research During Actual Rollout

Future studies should examine injectable PrEP implementation as services are actively delivered within campus health settings. Real-time evaluation can identify operational challenges, document adaptations made by healthcare workers, and generate practical insights for optimization and scale-up. Mixed-methods research tracking implementation fidelity, healthcare worker experiences, patient uptake patterns, and early outcomes would provide a comprehensive understanding of translation from planning to practice. Such research is essential because this study captured only anticipatory perceptions; actual implementation may reveal unanticipated facilitators and barriers requiring adaptive responses.

2. Student Acceptability, Uptake, and Continuation Studies

This study captured only healthcare worker perspectives. Understanding students' awareness, attitudes, concerns, and willingness to use injectable PrEP is essential for comprehensive implementation planning. Research should examine how students perceive injectable versus oral PrEP, factors influencing acceptability and uptake decisions, barriers to initiation, and, most critically, continuation patterns over time. Longitudinal studies tracking initiation, continuation, reasons for discontinuation, and satisfaction would provide insights into sustained engagement, which is essential for assessing population-level impact on HIV incidence among university students.

3. Stigma Dynamics and Evolution

Healthcare workers expressed concerns about HIV-related stigma affecting injectable PrEP uptake. Future research should investigate whether stigma associated with oral PrEP (assumptions about promiscuity, HIV-positive status, or high-risk behaviour) transfers to the injectable option, shifts in character, or diminishes due to the discrete delivery model. Understanding stigma dynamics among both students and healthcare workers is essential for developing effective destigmatization strategies and ensuring services reach those who would benefit most, rather than only those who are comfortable accessing HIV prevention services.

4. Long-term Implementation Outcomes and Equity Analysis

Longitudinal research should assess sustained impact on HIV incidence among university students, continuation rates beyond initial enthusiasm, cost-effectiveness of

different delivery models, and critically, whether services reach highest-risk populations or concentrate among more advantaged students with better health literacy and healthcare access. Equity analyses examining uptake patterns by gender, race, socioeconomic status, sexual orientation, and residence location (on-campus vs. off-campus) are essential for ensuring implementation reduces rather than exacerbates health disparities. Such research would inform policy decisions about resource allocation, service delivery optimization, and program sustainability.

9.6 Personal Reflection

Conducting this research revealed unexpected dynamics in healthcare worker engagement with academic inquiry. During initial recruitment, a few potential participants showed immediate resistance when approached about the study. This initial reluctance appeared to stem from anxiety about being evaluated or "answering wrong," perhaps reflecting concerns about being judged on their knowledge of a new intervention they had not yet been trained to deliver. However, these participants consistently shifted from apprehension to genuine interest once I explained that the study's purpose was to understand their perspectives and concerns, not to test their knowledge. This pattern, though not widespread, taught me that some healthcare workers may perceive academic research as evaluative rather than exploratory, and that explicitly framing research as valuing experiential wisdom rather than assessing competence can facilitate more authentic engagement.

My positionality as a younger university student interviewing experienced healthcare professionals created both challenges and unexpected opportunities. Some participants initially adopted mentoring stances, offering simplified explanations. However, expressing genuine appreciation for their expertise and asking elaborative questions unlocked rich insights grounded in decades of frontline experience. My institutional insider status facilitated access and rapport but required constant vigilance about participants potentially filtering critical perspectives about university readiness. Repeated confidentiality assurances and interviews conducted in private settings, away from administrative oversight, helped create space for authentic dialogue, though I remain aware that some self-censorship likely occurred.

The most transformative aspect of this research was recognizing healthcare workers' spontaneous identification of parallels with contraceptive injection services, an insight absent from the academic literature I had reviewed and unprompted by my interview questions. This taught me that implementation wisdom often resides with those doing the work rather than those designing programs. It reinforced my commitment to participatory research approaches that genuinely centre frontline voices, not as data sources to extract from, but as expert partners whose tacit knowledge shapes successful implementation. This understanding will fundamentally inform all my future work at the intersection of innovation and practice.

9.7 Concluding Remarks

As South Africa stands on the threshold of introducing long-acting injectable PrEP, this study provides critical evidence at a pivotal moment. Healthcare workers serving university students, a population bearing a disproportionate HIV burden, have articulated both the promise and the prerequisites for successful implementation. Their cautious optimism reflects neither resistance to innovation nor naive enthusiasm, but rather professional maturity grounded in lived experience with South Africa's complex health system realities. The findings reveal that biomedical innovation alone cannot reduce HIV incidence; success demands adequate preparation, sustained support, infrastructure readiness, and genuine partnership with those who will deliver services. The pieces exist: efficacious intervention, regulatory approval, accessible campus health platforms, and willing healthcare workers, but they must be assembled thoughtfully, not hastily.

This research affirms that healthcare workers are not passive recipients of policy mandates but essential implementation partners whose insights should guide program design. Their spontaneous recognition of compatibility with existing contraceptive services, their emphasis on local observable success over international efficacy data, and their sophisticated recommendations for phased implementation with robust monitoring systems demonstrate implementation wisdom that academic frameworks alone cannot provide. Ignoring their concerns about training adequacy, infrastructure gaps, and workload pressures will not make these barriers disappear; it will simply ensure that implementation falls short of its potential. Conversely, heeding their voices

and addressing their legitimate concerns systematically creates conditions where innovative prevention reaches those who need it most.

The true value of this research is not just in its contribution to academic literature but in whether it influences the implementation of injectable PrEP in South African universities. If these findings lead to training that effectively prepares healthcare workers, pilot sites that serve as learning laboratories rather than just demonstration projects, infrastructure investments that foster supportive environments, and monitoring systems that enable ongoing improvement, then the 18 healthcare workers who generously shared their time, expertise, and concerns will have significantly shaped the way implementation occurs for young South Africans' benefit. The chance to transform HIV prevention for university students is present now. May this evidence help in seizing that opportunity wisely.

References

- Aarons, G. A., Sommerfeld, D. H. and Willging, C. E. 2011. The soft underbelly of system change: The role of leadership and organizational climate in turnover during statewide behavioral health reform. *Psychological services*, 8 (4): 269.
- Ajzen, I. 2011. *The theory of planned behaviour: Reactions and reflections*: Taylor & Francis.
- Antonini, M., Silva, I. E. d., Elias, H. C., Gerin, L., Oliveira, A. C. and Reis, R. K. 2023. Barriers to Pre-Exposure Prophylaxis (PrEP) use for HIV: an integrative review. *Revista brasileira de enfermagem*, 76 (3): e20210963.
- Arksey, H. and O'Malley, L. 2005. Scoping studies: towards a methodological framework. *International journal of social research methodology*, 8 (1): 19-32.
- Asabor, E. N., Lett, E., Moll, A. P. and Shenoi, S. V. 2021. "We've Got Our Own Beliefs, Attitudes, Myths": A Mixed Methods Assessment of Rural South African Health Care Workers' Knowledge of and Attitudes Towards PrEP Implementation. *AIDS and Behavior*, 25: 2517 - 2532.
- Atkins, K., Musau, A., Mugambi, M., Odhyambo, G., Tengah, S. A., Kamau, M., Kumau, R., Reed, J. and Were, D. 2022. Health system opportunities and challenges for PrEP implementation in Kenya: A qualitative framework analysis. *PLoS ONE*, 17 (10): e0259738.
- Atujuna, M., Nyamaizi, A. M., Duby, Z., Minnis, A., Diaz, M., Palanee-Phillips, T., Tenza, S., Reddy, K., Nkomana, N. and Bekker, L.-G. 2022. Men's voices on Long-acting Pre-Exposure Prophylaxis (LA PrEP) delivery modalities: Acceptability and Preferences among Cis-gender men and men who have sex with men in South Africa. *JAIDS Journal of Acquired Immune Deficiency Syndromes*, Article ID: 10.1097.

Babchuk, W. A. 2019. Fundamentals of qualitative analysis in family medicine. *Family Medicine and Community Health*, 7.

Barnighausen, K., Dalglish, S., Matse, S., Hughey, A., Hettema, A., Kahn, K., Barnighausen, T., Geldsetzer, P. and McMahon, S. 2020. PrEP in primary care; health care worker adaptations to PrEP delivery in Eswatini. Article ID.

Beesham, I., Dovel, K., Mashele, N., Bekker, L.-G., Gorbach, P., Coates, T. J., Myer, L. and Joseph Davey, D. L. 2022. Barriers to oral HIV pre-exposure prophylaxis (PrEP) adherence among pregnant and post-partum women from Cape Town, South Africa. *AIDS and Behavior*, 26 (9): 3079-3087.

Bekker, L. G., Venter, F., Cohen, K., Goemare, E., van Cutsem, G., Boulle, A. and Wood, R. 2014. Provision of Antiretroviral Therapy in South Africa: The Nuts and Bolts. *Antiviral Therapy*, 19: 105 - 116.

Bertrand, J. T. 2004. Diffusion of Innovations and HIV/AIDS. *Journal of Health Communication*, 9: 113 - 121.

Beymer, M. R., Holloway, I. W., Pulsipher, C. and Landovitz, R. J. 2019. Current and Future PrEP Medications and Modalities: On-demand, Injectables, and Topicals. *Current HIV/AIDS Reports*, Article ID: 1-10.

Biello, K. B., Mimiaga, M. J., Santostefano, C. M., Novak, D. and Mayer, K. H. 2018. MSM at Highest Risk for HIV Acquisition Express Greatest Interest and Preference for Injectable Antiretroviral PrEP Compared to Daily, Oral Medication. *AIDS and Behavior*, 22: 1158-1164.

Bleasdale, J., Hequembourg, A., Morse, G. D. and Przybyla, S. M. 2025. Medical and Pharmacy Students' Awareness, Knowledge, and Attitudes Toward Injectable HIV Pre-Exposure Prophylaxis (PrEP). *Journal of Community Health*, Article ID: 1-8.

Bleasdale, J., McCole, M., Cole, K., Hequembourg, A., Morse, G. D. and Przybyla, S. M. 2024. Perspectives on Injectable HIV Pre-Exposure Prophylaxis: A Qualitative

Study of Health Care Providers in the United States. *AIDS patient care and STDs*, 38 4: 177-184.

Bonafé, G. A. 2025. Pre-exposure prophylaxis (PrEP) as an-HIV prevention strategy and its effects on rates of other STIs: a literature review. *South Health and Policy*, Article ID(4): 36.

Boulle, T. M., Cromhout, P., August, K. and Woods, D. 2021. Skills2Care: An innovative, cooperative learning programme for community health workers in South Africa. *African Journal of Primary Health Care & Family Medicine*, 13 (1): 2922.

Butler, V., Kutywayo, A., Martin, C. E., Pleaner, M., Mojapele, M. V., Ncube, S., Fipaza, Z., Mundeta, B. and Mullick, S. 2023. Implementing differentiated and integrated HIV prevention services for adolescent girls and young women: experiences from oral PrEP rollout in primary care services in South Africa. *Journal of Adolescent Health*, 73 (6): S58-S66.

Calabrese, S. K. 2020. Understanding, contextualizing, and addressing PrEP stigma to enhance PrEP implementation. *Current HIV/AIDS Reports*, 17 (6): 579-588.

Calabrese, S. K., Magnus, M., Mayer, K. H., Krakower, D. S., Eldahan, A. I., Hawkins, L. A. G., Underhill, K., Hansen, N. B., Kershaw, T. S. and Betancourt, J. R. 2017. "Support your client at the space that they're in": HIV pre-exposure prophylaxis (PrEP) prescribers' perspectives on PrEP-related risk compensation. *AIDS patient care and STDs*, 31 (4): 196-204.

Catalani, C., Philbrick, W., Fraser, H., Mechael, P. and Israelski, D. M. 2013. mHealth for HIV treatment & prevention: a systematic review of the literature. *The open AIDS journal*, 7: 17.

Celum, C. L., Delany-Moretlwe, S., McConnell, M., Van Rooyen, H., Bekker, L. G., Kurth, A., Bukusi, E., Desmond, C., Morton, J. and Baeten, J. M. 2015. Rethinking HIV prevention to prepare for oral PrEP implementation for young African women. *Journal of the International AIDS Society*, 18: 20227.

Chalker, J. C., Wagner, A. K., Tomson, G., Johnson, K., Wahlström, R., Ross-Degnan, D. and Therapy, I. N. f. t. R. U. o. D. I. o. A. t. A. 2013. Appointment systems are essential for improving chronic disease care in resource-poor settings: learning from experiences with HIV patients in Africa. *International health*, 5 (3): 163-165.

Chambers, D. A. and Norton, W. E. 2016. The adaptome: advancing the science of intervention adaptation. *American journal of preventive medicine*, 51 (4): S124-S131.

Chambers, D. A. and Norton, W. E. 2021. Sustaining impact after scaling using data and continuous feedback. In: *The Scale-Up Effect in Early Childhood and Public Policy*. Routledge, 280-300.

Chavalala, L., Lebesse, R. T. and Makhado, L. 2024. Professional Nurses' Views and Experiences of Poor Health-Seeking Behavior Among Men in Limpopo Province, South Africa. In: *Proceedings of Healthcare*. MDPI, 2320.

Chireshe, E., Chifurira, R., Chinhamu, K., Batidzirai, J. M. and Kharsany, A. B. 2025. Spatial Analysis of HIV Determinants Among Females Aged 15–34 in KwaZulu Natal, South Africa: A Bayesian Spatial Logistic Regression Model. *International Journal of Environmental Research and Public Health*, 22 (3): 446.

Cialdini, R. B. and Goldstein, N. J. 2004. Social influence: Compliance and conformity. *Annu. Rev. Psychol.*, 55 (1): 591-621.

Clement, M. E., Kofron, R. and Landovitz, R. J. 2020. Long-acting injectable cabotegravir for the prevention of HIV infection. *Current Opinion in HIV and AIDS*, 15 (1): 19.

Cohen, J. 2016. South Africa's bid to end AIDS. *Science*, 353 6294: 18-21.

Cohen, M. H., Benekigeri, C. and Anastos, K. 2024. Bringing together the pieces: the need for holistic care for women with HIV. *Journal of the International AIDS Society*, 27 (3): e26228.

Cooper, D., Harries, J., Moodley, J., Constant, D., Hodes, R., Mathews, C., Morroni, C. and Hoffman, M. 2016. Coming of age? Women's sexual and reproductive health after twentyone years of democracy in South Africa. *Reproductive health matters*, 24 (48): 79-89.

Cowan, F. M., Delany-Moretlwe, S., Sanders, E. J., Mugo, N. R., Guedou, F. A., Alary, M., Behanzin, L., Mugurungi, O. and Bekker, L. G. 2016. PrEP implementation research in Africa: what is new? *Journal of the International AIDS Society*, 19: 21101.

Craig, P. 2016. Researching Complex Interventions in Health: The State of the Art. *BMC Health Services Research*, 16 (1): K1.

Creswell, J. W. 2014. *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. Thousand Oaks, CA: SAGE Publications.

Creswell, J. W. and Poth, C. N. 2016. *Qualitative inquiry and research design: Choosing among five approaches*. Sage publications.

Cronn-Mills, D. 2018. The Interpretive Paradigm. In: *Understanding Communication Research Methods*. 8.

Crowley, T., Merwe, A. v. d. and Skinner, D. 2020. Development of a cultural and contextual appropriate HIV self-management instrument using interpretive phenomenology and focus group cognitive interviews. *International Journal of Africa Nursing Sciences*, 12: 100207.

Damschroder, L. J. 2020. Clarity out of chaos: use of theory in implementation research. *Psychiatry research*, 283: 112461.

Damschroder, L. J., Aron, D. C., Keith, R. E., Kirsh, S. R., Alexander, J. A. and Lowery, J. C. 2009. Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. *Implementation Science*, 4 (1): 50.

De Sousa Drumond, J. D. and Kotsiopolou, G. 2022. Building an Effective Ecosystem for an Integrated Community of Practice and Frustration-Free Technical Knowledge Hub that Maximizes Engagement and Participation of Local and Field Resources Across Multiple Operating Countries. In: *Proceedings of Abu Dhabi International Petroleum Exhibition and Conference*. SPE, D032S174R001.

Delany-Moretlwe, S., Hughes, J. P., Bock, P., Ouma, S. G., Hunidzarira, P., Kalonji, D., Kayange, N., Makhema, J., Mandima, P., Mathew, C.-A., Spooner, E., Mpendo, J., Mukwekwerere, P. G., Mgodi, N. M., Ntege, P. N., Nair, G., Nakabiito, C., Nuwagaba-Biribonwoha, H., Panchia, R., Singh, N., Siziba, B., Farrior, J., Rose, S. M., Anderson, P. L., Eshleman, S. H., Marzinke, M. A., Hendrix, C. W., Beigel-Orme, S., Hosek, S. G., Tolley, E., Sista, N. D., Adeyeye, A., Rooney, J. F., Rinehart, A. R., Spreen, W. R., Smith, K., Hanscom, B. S., Cohen, M. S., Hosseinipour, M. C., Asmelash Sehurutshi Baguma Marais Kawoozo Malinga, A. A. A. B. P. B., Asmelash, A., Sehurutshi, A., Baguma, A., Marais, A., Kawoozo, B., Malinga, B. P., Mirembe, B. G., Okech, B. A., Esterhuizen, B., Murombedzi, C., Gadama, D., Hwengwere, E., Roos, E. L., Magada, E. S., Shava, E., Piwowar-Manning, E., Tahuringana, E., Muhlana, F., Conradie, F., Angira, F., Nanyonjo, G., Kistnasami, G., Mvula, H., Naidoo, I., Horak, J., Jere, J., Moodley, J., Shin, K., Nel, K., Bokoch, K., Birungi, L., Emel, L., Monametsi, M., Sibanda, M., Mutambanengwe, M., Chitukuta, M., Matimbira, M., Bhondai-Mhuri, M., Sibisi, N., Morar, N. S., Mudzonga, N., Natureeba, P., Richardson, P., Musara, P., Macdonald, P. R., Nkambule, R., Mosime, R., White, R. R., Berhanu, R., Ncube-Sihlongonyane, R., Sekabira, R., Siva, S., Pillay, S., Govender, S., Bamweyana, S., Nzimande, S., Innes, S., Dadabhai, S., Samandari, T., Tembo, T., Lungu Mabedi, T., Chirenda, T., Chidemo, T., Mudhune, V., Naidoo, V., Samaneka, W. P., Agyei, Y., Musodza, Y., Fourie, Y. and Gaffoor, Z. 2022. Cabotegravir for the prevention of HIV-1 in women: results from HPTN 084, a phase 3, randomised clinical trial. *Lancet (London, England)*, 399: 1779 - 1789.

Dellar, R. C., Dlamini, S. and Karim, Q. A. 2015. Adolescent girls and young women: key populations for HIV epidemic control. *Journal of the International AIDS Society*, 18: 19408.

Doyle, L., McCabe, C., Keogh, B., Brady, A.-M. and McCann, M. 2019. An overview of the qualitative descriptive design within nursing research. *Journal of Research in Nursing*, 25: 443 - 455.

Durham, S. H., Milam, A., Waer, D. and Chahine, E. B. 2023. Cabotegravir: the first long-acting injectable for HIV preexposure prophylaxis. *Annals of Pharmacotherapy*, 57 (3): 306-316.

Earnshaw, V. A., Reed, N. M., Watson, R. J., Maksut, J. L., Allen, A. M. and Eaton, L. A. 2021. Intersectional internalized stigma among Black gay and bisexual men: A longitudinal analysis spanning HIV/sexually transmitted infection diagnosis. *Journal of health psychology*, 26 (3): 465-476.

Earnshaw, V. A., Smith, L. R., Shuper, P. A., Fisher, W. A., Cornman, D. H. and Fisher, J. D. 2014. HIV stigma and unprotected sex among PLWH in KwaZulu-Natal, South Africa: a longitudinal exploration of mediating mechanisms. *AIDS care*, 26 (12): 1506-1513.

Eaton, L. A., Kalichman, S. C., Price, D., Finneran, S., Allen, A. and Maksut, J. 2017. Stigma and conspiracy beliefs related to pre-exposure prophylaxis (PrEP) and interest in using PrEP among black and white men and transgender women who have sex with men. *AIDS and Behavior*, 21 (5): 1236-1246.

Ells, C., Hunt, M. R. and Chambers-Evans, J. 2011. Relational autonomy as an essential component of patient-centered care. *IJFAB: International Journal of Feminist Approaches to Bioethics*, 4 (2): 79-101.

Femi-Lawal, V. O., Olawuyi, D. A., Oke, G. I., Kabiawu, Y. N., Ogunlana, O., Ibekwe, J. L. and Adebuseyi, O. 2025. Knowledge, attitudes, and willingness of healthcare workers to offer pre-exposure prophylaxis in Africa: a systematic review and meta-analysis. *AIDS Research and Therapy*, 22 (1): 68.

Finlay, L. 2002. "Outing" the researcher: the provenance, process, and practice of reflexivity. *Qualitative health research*, 12 (4): 531-545.

Flanagan, J. and Beck, C. T. 2024. *Polit & Beck's nursing research: Generating and assessing evidence for nursing practice*. Lippincott Williams & Wilkins.

Flodgren, G., O'Brien, M. A., Parmelli, E. and Grimshaw, J. M. 2019. Local opinion leaders: effects on professional practice and healthcare outcomes. *Cochrane database of systematic reviews*, Article ID(6).

Flottorp, S. and Aakhus, E. 2013. Implementation research: science for improving practice. Article ID.

Fonner, V. A., Dalglish, S. L., Kennedy, C. E., Baggaley, R., O'reilly, K. R., Koechlin, F. M., Rodolph, M., Hodges-Mameletzis, I. and Grant, R. M. 2016. Effectiveness and safety of oral HIV preexposure prophylaxis for all populations. *Aids*, 30 (12): 1973-1983.

Forsetlund, L., O'Brien, M. A., Forsén, L., Mwai, L., Reinar, L. M., Okwen, M. P., Horsley, T. and Rose, C. J. 2021. Continuing education meetings and workshops: effects on professional practice and healthcare outcomes. *Cochrane database of systematic reviews*, Article ID(9).

Garnett, G. P., Krishnaratne, S., Harris, K. L., Hallett, T. B., Santos, M., Enstone, J. E., Hensen, B., Dallabetta, G., Revill, P. and Gregson, S. A. 2017. Cost-effectiveness of interventions to prevent HIV acquisition. *Major Infectious Diseases. 3rd edition*, Article ID.

Gashema, P., Iradukunda, P. G., Saramba, E., Musafiri, T., Umuhoza, T., Ndahimana, F., Ingabire, A., Ndoli, M. M., Mutagoma, G. and Mwikarago, I. E. 2025. Bridging the gap: identifying barriers and strategies for widespread implementation of long-acting injectable antiretroviral therapy in Sub-Saharan Africa: a scoping review. *BMC Infectious Diseases*, 25 (1): 476.

Gerson, K. 2020. *The Science and Art of Interviewing*. Oxford University Press.

Gifford, W. A., Squires, J. E., Angus, D. E., Ashley, L. A., Brosseau, L., Craik, J. M., Domecq, M.-C., Egan, M., Holyoke, P. and Juergensen, L. 2018. Managerial leadership for research use in nursing and allied health care professions: a systematic review. *Implementation Science*, 13 (1): 127.

Gimbel, S., Ásbjörnsdóttir, K., Banek, K., Borges, M., Crocker, J., Coutinho, J., Cumbe, V., Dinis, A., Eastment, M. and Gaitho, D. 2022. The Systems Analysis and Improvement Approach: Data-driven Quality Improvement. Article ID.

Giovenco, D., Gill, K., Fynn, L., Duyver, M., O'Rourke, S., van der Straten, A., Morton, J. F., Celum, C. L. and Bekker, L.-G. 2021. Experiences of oral pre-exposure prophylaxis (PrEP) use disclosure among South African adolescent girls and young women and its perceived impact on adherence. *PLoS ONE*, 16 (3): e0248307.

Gobind, J. and Ukpere, W. I. 2014. Evaluating HIV/AIDS programme within South African universities. *Mediterranean Journal of Social Sciences*, 5 (3): 346-357.

Golub, S. A. 2018. PrEP stigma: implicit and explicit drivers of disparity. *Current HIV/AIDS Reports*, 15 (2): 190-197.

Golub, S. A. and Myers, J. E. 2019. Next-wave HIV pre-exposure prophylaxis implementation for gay and bisexual men. *AIDS patient care and STDs*, 33 (6): 253-261.

Goyal, G., Enogela, E. M., Burkholder, G. A., Kitahata, M. M., Crane, H. M., Eulo, V., Achenbach, C. J., Farel, C. E., Hunt, P. W. and Jacobson, J. M. 2025. Burden of Chronic Health Conditions Among People With HIV and Common Non–AIDS-Defining Cancers. *Journal of the National Comprehensive Cancer Network*, 1 (aop): 1-7.

Grace, D., Gaspar, M., Wells, A., Sinno, J., Daroya, E., Montess, M., Hull, M., Lachowsky, N. J. and Tan, D. H. 2023. Injectable pre-exposure prophylaxis for HIV prevention: perspectives on the benefits and barriers from gay, bisexual, and queer men and health system stakeholders in Ontario, Canada. *AIDS patient care and STDs*, 37 (6): 306-315.

Grant, R. M., Anderson, P. L., McMahan, V., Liu, A., Amico, K. R., Mehrotra, M., Hosek, S., Mosquera, C., Casapia, M. and Montoya, O. 2014. Uptake of pre-exposure prophylaxis, sexual practices, and HIV incidence in men and transgender women who have sex with men: a cohort study. *The Lancet infectious diseases*, 14 (9): 820-829.

Greenhalgh, T., Robert, G., Macfarlane, F., Bate, P. and Kyriakidou, O. 2004. Diffusion of innovations in service organizations: systematic review and recommendations. *The milbank quarterly*, 82 (4): 581-629.

Grimshaw, J., Eccles, M. and Tetroe, J. 2004. Implementing clinical guidelines: current evidence and future implications. *Journal of Continuing Education in the Health Professions*, 24 (S1): S31-S37.

Guerra-Farfan, E., Garcia-Sanchez, Y., Jornet-Gibert, M., Nuñez, J. H., Balaguer-Castro, M. and Madden, K. 2023. Clinical practice guidelines: the good, the bad, and the ugly. *Injury*, 54: S26-S29.

Guest, G., Bunce, A. and Johnson, L. 2006. How many interviews are enough? An experiment with data saturation and variability. *Field methods*, 18 (1): 59-82.

Guides, P. and Team, P. Community Group Engagement: Changing Norms to Improve Sexual and Reproductive Health. Article ID.

Haffejee, F., Fasanmi-Kana, O., Ally, F., Thandar, Y. and Basdav, J. 2023. Four years later: Do South Africans know what pre-exposure prophylaxis for HIV is? *AIDS care*, 35 (4): 466-473.

Harris, N. and Bacon, C. E. W. 2019. Developing cognitive skills through active learning: A systematic review of health care professions. *Athletic Training Education Journal*, 14 (2): 135-148.

Hillis, A., Germain, J., Hope, V., McVeigh, J. and Van Hout, M. C. 2020. Pre-exposure prophylaxis (PrEP) for HIV prevention among men who have sex with men (MSM): a

scoping review on PrEP service delivery and programming. *AIDS and Behavior*, 24 (11): 3056-3070.

Holahan, P. J., Lesselroth, B. J., Adams, K., Wang, K. and Church, V. 2015. Beyond technology acceptance to effective technology use: a parsimonious and actionable model. *Journal of the American Medical Informatics Association*, 22 (3): 718-729.

Diffusion of Innovation Theory. 2022. THE SAGE.

Hosek, S. G., Landovitz, R. J., Kapogiannis, B., Siberry, G. K., Rudy, B., Rutledge, B., Liu, N., Harris, D. R., Mulligan, K. and Zimet, G. 2017. Safety and feasibility of antiretroviral preexposure prophylaxis for adolescent men who have sex with men aged 15 to 17 years in the United States. *Jama Pediatrics*, 171 (11): 1063-1071.

Huang, Z., Sindakis, S., Aggarwal, S. and Thomas, L. 2022. The role of leadership in collective creativity and innovation: Examining academic research and development environments. *Frontiers in psychology*, 13: 1060412.

Irungu, E. M., Ngure, K., Mugwanya, K., Mugo, N., Bukusi, E., Wamoni, E., Odoyo, J., Morton, J. F., Bernabee, G. and Mambo, B. 2019. Training health care providers to provide PrEP for HIV serodiscordant couples attending public health facilities in Kenya. *Global Public Health*, 14 (10): 1524-1534.

Irungu, E. M., Ngure, K., Mugwanya, K. K., Awuor, M., Dollah, A., Ongolly, F., Mugo, N., Bukusi, E., Wamoni, E. and Odoyo, J. 2021. "Now that PrEP is reducing the risk of transmission of HIV, why then do you still insist that we use condoms?" the condom quandary among PrEP users and health care providers in Kenya. *AIDS care*, 33 (1): 92-100.

Jenness, S. M., Weiss, K. M., Goodreau, S. M., Gift, T., Chesson, H., Hoover, K. W., Smith, D. K., Liu, A. Y., Sullivan, P. S. and Rosenberg, E. S. 2017. Incidence of gonorrhea and chlamydia following human immunodeficiency virus preexposure prophylaxis among men who have sex with men: a modeling study. *Clinical Infectious Diseases*, 65 (5): 712-718.

Joseph Davey, D. L., Dadan, S. and Wara, N. 2024. Transforming HIV prevention: the promise of long-acting preexposure prophylaxis in high HIV burden settings. *Current Opinion in HIV and AIDS*, Article ID.

Joseph, R. P., Keller, C. and Ainsworth, B. E. 2016. Recruiting participants into pilot trials: Techniques for researchers with shoestring budgets. *Californian journal of health promotion*, 14 (2): 81.

Kambutse, I., Igiraneza, G. and Ogbuagu, O. 2018. Perceptions of HIV transmission and pre-exposure prophylaxis among health care workers and community members in Rwanda. *PLoS ONE*, 13 (11): e0207650.

Kayesu, I., Mayanja, Y., Nakirijja, C., Machira, Y. W., Price, M., Seeley, J. and Siu, G. 2022. Uptake of and adherence to oral pre-exposure prophylaxis among adolescent girls and young women at high risk of HIV-infection in Kampala, Uganda: a qualitative study of experiences, facilitators and barriers. *BMC women's health*, 22 (1): 440.

Kharsany, A. B., Cawood, C., Khanyile, D., Lewis, L., Grobler, A., Puren, A., Govender, K., George, G., Beckett, S. and Samsunder, N. 2018. Community-based HIV prevalence in KwaZulu-Natal, South Africa: results of a cross-sectional household survey. *The lancet HIV*, 5 (8): e427-e437.

Khumalo, G. E., Segobe, B., Lutge, E. and Mashamba-Thompson, T. P. 2021a. Knowledge and Perceptions of People Living With HIV Regarding The HIV Services That Are Offered By The Community Health Workers in KwaZulu-Natal, South Africa. Article ID.

Khumalo, S., Mabaso, M., Makusha, T. and Taylor, M. 2021b. Narratives of young black men on barriers to health care and poor health care seeking behaviours at a university setting: a qualitative study. *BMC Health Services Research*, 21 (1): 445.

Koester, K. A., Colasanti, J. A., McNulty, M. C., Dance, K., Erguera, X. A., Tsuzuki, M. D., Johnson, M. O., Saucedo, J. A., Montgomery, E. and Schneider, J. 2023. Assessing

readiness to implement long-acting injectable HIV antiretroviral therapy: provider and staff perspectives. *Implementation Science Communications*, 4 (1): 128.

Koester, K. A., Erguera, X. A., Udoh, I., Kang Dufour, M.-S., Burack, J. H. and Myers, J. J. 2021. Exploring the shift from HIV pre-exposure prophylaxis awareness to uptake among young gay and bisexual men. *Frontiers in Public Health*, 9: 677716.

Korstjens, I. and Moser, A. 2018. Series: Practical guidance to qualitative research. Part 4: Trustworthiness and publishing. *European Journal of General Practice*, 24 (1): 120-124.

Koss, C. A., Hosek, S. G., Bacchetti, P., Anderson, P. L., Liu, A. Y., Horng, H., Benet, L. Z., Kuncze, K., Louie, A. and Saberi, P. 2018. Comparison of measures of adherence to human immunodeficiency virus preexposure prophylaxis among adolescent and young men who have sex with men in the United States. *Clinical Infectious Diseases*, 66 (2): 213-219.

Koss, C. A. and Parikh, U. M. 2025. Long-acting preexposure prophylaxis: early data on roll-out in the United States. *Current Opinion in HIV and AIDS*, 20 (1): 25-31.

Krakower, D. S. and Mayer, K. H. 2012. What Primary Care Providers Need to Know About Preexposure Prophylaxis for HIV Prevention. *Annals of Internal Medicine*, 157: 490 - 497.

Krakower, D. S. and Mayer, K. H. 2016. The role of healthcare providers in the roll out of preexposure prophylaxis. *Current Opinion in HIV and AIDS*, 11: 41–48.

Kuo, A. P., Roche, S. D., Mugambi, M. L., Pintye, J., Baeten, J. M., Bukusi, E., Ngure, K., Stergachis, A. and Ortblad, K. F. 2022. The effectiveness, feasibility and acceptability of HIV service delivery at private pharmacies in sub-Saharan Africa: a scoping review. *Journal of the International AIDS Society*, 25 (10): e26027.

Landovitz, R. J., Donnell, D., Clement, M. E., Hanscom, B., Cottle, L., Coelho, L., Cabello, R., Chariyalertsak, S., Dunne, E. F. and Frank, I. 2021. Cabotegravir for HIV

prevention in cisgender men and transgender women. *New England Journal of Medicine*, 385 (7): 595-608.

Levac, D., Colquhoun, H. and O'Brien, K. K. 2010. Scoping studies: advancing the methodology. *Implementation Science*, 5 (1): 69.

Lewandowsky, S., Ecker, U. K., Seifert, C. M., Schwarz, N. and Cook, J. 2012. Misinformation and its correction: Continued influence and successful debiasing. *Psychological science in the public interest*, 13 (3): 106-131.

Liégeon, G., Delaugerre, C. and Molina, J.-M. 2024. HIV Pre-exposure Prophylaxis. *Infectious disease clinics of North America*, 38 (3): 453-474.

Liegeon, G. and Ghosn, J. 2023. Long-acting injectable cabotegravir for PrEP: a game-changer in HIV prevention? *HIV medicine*, 24 (6): 653-663.

Lincoln, Y. G. and Guba, E. 1985. E. 1985. Naturalistic inquiry. *London, Sage Publications. Contextualization: Evidence from Distributed Teams."* *Information Systems Research*, 16 (1): 9-27.

Mahlare, E., Ramutshila, M. E., Musekiwa, M. A., Kuonza, P. L., MB ChB, M. and Mabuto, T. 2023. Knowledge, attitudes and practices of oral HIV pre-exposure prophylaxis (PrEP) among healthcare workers in the Ekurhuleni District, South Africa. *South African medical journal = Suid-Afrikaanse tydskrif vir geneeskunde*, 113 12: 46.

Manguro, G. O., Musau, A. M., Were, D. K., Tengah, S., Wakhutu, B., Reed, J., Plotkin, M., Luchters, S., Gichangi, P. and Temmerman, M. 2022. Increased condom use among key populations using oral PrEP in Kenya: results from large scale programmatic surveillance. *BMC Public Health*, 22 (1): 304.

Mantsios, A., Murray, M., Karver, T. S., Davis, W., Galai, N., Kumar, P. N., Swindells, S., Bredeek, U. F., García, R. R., Antela, A., Gomis, S. C., Bernáldez, M. P., Czarnogorski, M., Hudson, K. J., Walters, N. and Kerrigan, D. 2021. Multi-level considerations for optimal implementation of long-acting injectable antiretroviral

therapy to treat people living with HIV: perspectives of health care providers participating in phase 3 trials. *BMC Health Services Research*, 21.

Mashuri, S., Rasak, M. S. A., Alhabsyi, F. and Syam, H. 2022. Semi-structured Interview: A Methodological Reflection on the Development of a Qualitative Research Instrument in Educational Studies. 12 (1): 22-29.

Mason, M. 2010. Sample size and saturation in PhD studies using qualitative interviews. In: Proceedings of *Forum qualitative Sozialforschung/Forum: qualitative social research*.

Mathur, S., Eromhonsele, A. F., Vallarino, Z., Savel, C., Oche, E., Ononye, O., Shoyemi, E. and Tun, W. 2025. "Let's chat!" Piloting a digital chatbot for HIV prevention among cisgender women and transgender men in Nigeria. *AIDS care*, Article ID: 1-11.

Mayer, K. H., Agwu, A. L. and Malebranche, D. J. 2020. Barriers to the Wider Use of Pre-exposure Prophylaxis in the United States: A Narrative Review. *Advances in Therapy*, 37: 1778 - 1811.

Mbatha, N. N., Mpofana, N. and Gumede, D. 2025a. Perspectives of Primary Healthcare Workers on HIV Injectable Pre-Exposure Prophylaxis (PrEP): A Scoping Review Protocol. *IJERPH*, 22 (6): 1-17.

Mbatha, N. N., Mpofana, N. and Gumede, D. 2025b. Perspectives of Primary Healthcare Workers on HIV Injectable Pre-Exposure Prophylaxis (PrEP): A Scoping Review Protocol. *International Journal of Environmental Research and Public Health*, 22 (6): 830.

Mbokazi, N., Madzima, R., Leon, N., Lurie, M. N., Cornell, M., Schmidt, B.-M. and Colvin, C. J. 2020. Health worker experiences of and perspectives on engaging men in HIV care: A qualitative study in Cape Town, South Africa. *Journal of the International Association of Providers of AIDS Care (JIAPAC)*, 19: 2325958220935691.

McCoy, K., Mantell, J. E., Deiss, R., Liu, A., Bauman, L. J., Bonner, C. P., Vinson, J. and Buchbinder, S. 2025. Pre-Exposure Prophylaxis Awareness and Demand Creation: Overlooked Populations and Opportunities to Move Forward. *JAIDS Journal of Acquired Immune Deficiency Syndromes*, 98 (5S): e170-e180.

McElroy, L. M. and Ladner, D. P. 2020. Defining the Study Cohort: Inclusion and Exclusion Criteria. In: *Clinical Trials*.

McGaghie, W. C., Issenberg, S. B., Petrusa, E. R. and Scalese, R. J. 2010. A critical review of simulation-based medical education research: 2003–2009. *Medical education*, 44 (1): 50-63.

McLeroy, K. R., Bibeau, D., Steckler, A. and Glanz, K. 1988. An ecological perspective on health promotion programs. *Health education quarterly*, 15 (4): 351-377.

Mgodi, N. M., Murewanhema, G., Moyo, E., Samba, C., Musuka, G., Dzinamarira, T. and Brown, J. M. 2023. Advancing the use of Long-Acting Extended Delivery formulations for HIV prevention in sub-Saharan Africa: challenges, opportunities, and recommendations. *Journal of the International AIDS Society*, 26: e26115.

Milam, J., Jain, S., Dubé, M. P., Daar, E. S., Sun, X., Corado, K., Ellorin, E., Blumenthal, J., Haubrich, R. and Moore, D. J. 2019. Sexual risk compensation in a pre-exposure prophylaxis demonstration study among individuals at risk of HIV. *JAIDS Journal of Acquired Immune Deficiency Syndromes*, 80 (1): e9-e13.

Milimu, J. W., Parmley, L., Matjeng, M., Madibane, M., Mabika, M., Livingston, J., Lawrence, J., Motlhaoleng, O., Subedar, H. and Tsekoa, R. 2024. Oral pre-exposure prophylaxis implementation in South Africa: a case study of USAID-supported programs. *Frontiers in Reproductive Health*, 6: 1473354.

Miller, R. L. 2015. Rogers' Innovation Diffusion Theory (1962, 1995). In.

Moloi, H., Daniels, K., Brooke-Sumner, C., Cooper, S., Odendaal, W., Thorne, M., Akama, E. O. and Leon, N. 2023. Healthcare workers' perceptions and experiences of primary healthcare integration: a scoping review of qualitative evidence. *The Cochrane database of systematic reviews*, 7: CD013603.

Moore, K., Bacon, R., Bevitt, T., Bialocerkowski, A., Ciccone, N., Haworth, N., Horstmanshof, L., Milne, N., Naumann, F. and Sanderson, B. 2018. Report: the university health clinic: definition, educational practices and outcomes. *Focus on Health Professional Education: A Multi-Professional Journal*, 19 (2): 1-13.

Moucheraud, C., Schwitters, A., Boudreaux, C., Giles, D., Kilmarx, P. H., Ntolo, N., Bangani, Z., St. Louis, M. E. and Bossert, T. J. 2017. Sustainability of health information systems: a three-country qualitative study in southern Africa. *BMC Health Services Research*, 17 (1): 23.

Moyo, E., Murewanhema, G., Musuka, G. and Dzinamarira, T. 2022. Long-acting injectable drugs for HIV-1 pre-exposure prophylaxis: considerations for Africa. *Tropical Medicine and Infectious Disease*, 7 (8): 154.

Mugo, P. M., Sanders, E. J., Mutua, G., van der Elst, E., Anzala, O., Barin, B., Bangsberg, D. R., Priddy, F. H. and Haberer, J. E. 2015. Understanding adherence to daily and intermittent regimens of oral HIV pre-exposure prophylaxis among men who have sex with men in Kenya. *AIDS and Behavior*, 19 (5): 794-801.

Mugwanya, K. K. and Kinuthia, J. 2021. Integrating pre-exposure prophylaxis delivery in public health family planning clinics: lessons learned from a programmatic implementation project in Kenya. *Frontiers in Reproductive Health*, 3: 683415.

Muhumuza, R., Ssemata, A. S., Kakande, A., Ahmed, N., Atujuna, M., Nomvuyo, M., Bekker, L. G., Dietrich, J. J., Tshabalala, G., Hornschuh, S., Maluadzi, M., Chibanda-Stranix, L., Nematadzira, T., Weiss, H. A., Nash, S., Fox, J. and Seeley, J. 2021. Exploring Perceived Barriers and Facilitators of PrEP Uptake among Young People in Uganda, Zimbabwe, and South Africa. *Archives of Sexual Behavior*, 50: 1730.

Musakwa, N. O., Bor, J., Nattey, C., Lönnermark, E., Nyasulu, P., Long, L. and Evans, D. 2021. Perceived barriers to the uptake of health services among first-year university students in Johannesburg, South Africa. *PLoS ONE*, 16 (1): e0245427.

Mutale, W., Chintu, N., Amoroso, C., Awoonor-Williams, K., Phillips, J., Baynes, C., Michel, C., Taylor, A., Sherr, K., Implementation, w. i. f. t. P. H. and Collaborative, T. A. H. I. D. 2013. Improving health information systems for decision making across five sub-Saharan African countries: Implementation strategies from the African Health Initiative. *BMC Health Services Research*, 13 (Suppl 2): S9.

Mutinta, G. 2022. Unplanned pregnancy among female students at universities in the Eastern Cape Province, South Africa. *African Journal of Reproductive Health*, 26 (7): 29-37.

Mutshatshi, T. E. and Phukubye, T. A. 2025. Maintenance of Cold Chain during. *Basic Health Care in Family Medicine and Public Health*, Article ID: 39.

Naeem, M., Ozuem, W., Howell, K. and Ranfagni, S. 2024. *Demystification and Actualisation of Data Saturation in Qualitative Research Through Thematic Analysis*.

Nguyen, V.-K., Greenwald, Z. R., Trottier, H., Cadieux, M., Goyette, A., Beauchemin, M., Charest, L., Longpré, D., Lavoie, S. and Tossa, H. G. 2018. Incidence of sexually transmitted infections before and after preexposure prophylaxis for HIV. *Aids*, 32 (4): 523-530.

Ngwenya, N., Nkosi, B., Mchunu, L. S., Ferguson, J., Seeley, J. and Doyle, A. M. 2020. Behavioural and socio-ecological factors that influence access and utilisation of health services by young people living in rural KwaZulu-Natal, South Africa: Implications for intervention. *PLoS ONE*, 15 (4): e0231080.

Nilsen, P. 2020. Making sense of implementation theories, models, and frameworks. In: *Implementation Science 3.0*. Springer, 53-79.

Noar, S. M. 2012. An audience–channel–message–evaluation (ACME) framework for health communication campaigns. *Health promotion practice*, 13 (4): 481-488.

Norwood, A. and Zuñiga, J. A. 2022. Knowledge and Attitude About Pre-exposure Prophylaxis Among Primary Care Clinicians at a Federally Qualified Health Center in Central Texas: A Cross-sectional Study. *Journal of the Association of Nurses in AIDS Care*, 34: 24 - 30.

Ntimani, J. M., Mokoena-de Beer, A. G. and Phetlhu, D. R. 2025. Exploring resource availability for nurses implementing HIV prevention guidelines in primary healthcare facilities. *Health SA Gesondheid*, 30: 3084.

Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N. and Hoagwood, K. 2015. Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. *Administration and policy in mental health and mental health services research*, 42: 533-544.

Patel, L. N., Kozikott, S., Ilboudo, R., Kamateeka, M., Lamorde, M., Subah, M., Tsiouris, F., Vorndran, A., Lee, C. T. and Abdu-Aguye, R. 2021. Safer primary healthcare facilities are needed to protect healthcare workers and maintain essential services: lessons learned from a multicountry COVID-19 emergency response initiative. *BMJ global health*, 6 (6).

Payagala, D. S. and Pozniak, A. 2024. The global burden of HIV. *Clinics in dermatology*, Article ID.

Petroll, A. E., Walsh, J. L., Owczarzak, J. L., McAuliffe, T. L., Bogart, L. M. and Kelly, J. A. 2017. PrEP awareness, familiarity, comfort, and prescribing experience among US primary care providers and HIV specialists. *AIDS and Behavior*, 21 (5): 1256-1267.

Pike, C., Rousseau, E. and Bekker, L.-G. 2023. Promises and potential pitfalls of long-acting injectable pre-exposure prophylaxis. *Southern African Journal of HIV Medicine*, 24 (1).

Pilgrim, N. A., Evans, T. M. and Czarnogorski, M. 2022. A layer plus approach to implementation research and collaboration for long-acting injectable preexposure prophylaxis for HIV prevention. *Health promotion practice*, 23 (6): 912-915.

Pillay, D., Stankevitz, K., Lanham, M., Ridgeway, K., Murire, M., Briedenhann, E., Jenkins, S., Subedar, H., Hoke, T. and Mullick, S. 2020. Factors influencing uptake, continuation, and discontinuation of oral PrEP among clients at sex worker and MSM facilities in South Africa. *PLoS ONE*, 15 (4): e0228620.

Pillay, T., Govender, N. and Reddy, P. 2023. Socioeconomic determinants of risky sexual behaviors and HIV seropositivity among university students in South Africa: A case control analysis. *Research in Nursing & Health*, 46 (4): 436-444.

Pintye, J., O'Malley, G., Kinuthia, J., Abuna, F., Escudero, J. N., Mugambi, M., Awuor, M., Dollah, A., Dettinger, J. C. and Kohler, P. 2021. Influences on early discontinuation and persistence of daily oral PrEP use among Kenyan adolescent girls and young women: a qualitative evaluation from a PrEP implementation program. *JAIDS Journal of Acquired Immune Deficiency Syndromes*, 86 (4): e83-e89.

Pleaner, M., Scorgie, F., Martin, C., Butler, V., Muhwava, L. S., Mojapele, M. and Mullick, S. 2023. Introduction and integration of PrEP and sexual and reproductive health services for young people: Health provider perspectives from South Africa. *Frontiers in Reproductive Health*, 4.

Powell, B. J., Waltz, T. J., Chinman, M. J., Damschroder, L. J., Smith, J. L., Matthieu, M. M., Proctor, E. K. and Kirchner, J. E. 2015. A refined compilation of implementation strategies: results from the Expert Recommendations for Implementing Change (ERIC) project. *Implementation Science*, 10 (1): 21.

Rasweswe, M. M., Bopape, M. A. and Ntho, T. A. 2024. HIV voluntary counselling and testing utilisation among School of Healthcare Sciences undergraduate students at the University of Limpopo. *International Journal of Environmental Research and Public Health*, 21 (2): 183.

Rogers, B. G., Chan, P. A., Suttan-Coats, C., Zanolwick-Marr, A., Patel, R. R., Mena, L. A., Goedel, W. C., Chu, C. T., Silva, E., Galipeau, D., Arnold, T., Gomillia, C. E., Curoe, K., Villalobos, J., Underwood, A., Sosnowy, C. and Nunn, A. S. 2023. Perspectives on long-acting formulations of pre-exposure prophylaxis (PrEP) among men who have sex with men who are non-adherent to daily oral PrEP in the United States. *BMC Public Health*, 23.

Rogers, E. 2003. *Diffusion of Innovations 5th*: Free press.

Romo, M. L., Schluck, G., Kosgei, J., Akoth, C., Bor, R., Langat, D., Charles, C., Adjei, P., Gayle, B. and LeeVan, E. 2024. Pre-exposure prophylaxis implementation gaps among people vulnerable to HIV acquisition: a cross-sectional analysis in two communities in western Kenya, 2021–2023. *Journal of the International AIDS Society*, 27 (11): e26372.

Rosenstock, I. M. 1974. Historical origins of the health belief model. *Health education monographs*, 2 (4): 328-335.

Rousseau, E., Katz, A. W., O'Rourke, S., Bekker, L.-G., Delany-Moretlwe, S., Bukusi, E., Travill, D., Omollo, V., Morton, J. F. and O'Malley, G. 2021. Adolescent girls and young women's PrEP-user journey during an implementation science study in South Africa and Kenya. *PLoS ONE*, 16 (10): e0258542.

Rubincam, C., Newman, P. A., Atujuna, M. and Bekker, L.-G. 2018. 'Why would you promote something that is less percent safer than a condom?': Perspectives on partially effective HIV prevention technologies among key populations in South Africa. *SAHARA-J: Journal of Social Aspects of HIV/AIDS*, 15 (1).

Salvy, S.-J., de la Haye, K., Bowker, J. C. and Hermans, R. C. 2012. Influence of peers and friends on children's and adolescents' eating and activity behaviors. *Physiology & behavior*, 106 (3): 369-378.

Sandborg, C. I., Hartman, G. E., Su, F., Williams, G., Teufe, B., Wixson, N., Larson, D. B. and Donnelly, L. F. 2021. Optimizing professional practice evaluation to enable a

nonpunitive learning health system approach to peer review. *Pediatric quality & safety*, 6 (1): e375.

Saphonn, V., Fujita, M., Samreth, S., Chan, S., Rouet, F., Khol, V., Mam, S., Mom, C., Tuot, S. and Le, L.-V. 2017. Cluster of HIV infections associated with unsafe injection practices in a rural village in Cambodia. *JAIDS Journal of Acquired Immune Deficiency Syndromes*, 75 (3): e82-e86.

Schwandt, T. A., Lincoln, Y. S. and Guba, E. G. 2007. Judging interpretations: But is it rigorous? trustworthiness and authenticity in naturalistic evaluation. *New Directions for Evaluation*, 2007.

Sciannameo, S., Zalazar, V., Spadaccini, L., Duarte, M., Cahn, P., Aristegui, I. and Sued, O. 2024. Preference for long-acting injectable for ART and PrEP among people with and without HIV: a cross-sectional study in Argentina. *Therapeutic Advances in Infectious Disease*, 11: 20499361241228341.

Seymour, J. 2018. The impact of public health awareness campaigns on the awareness and quality of palliative care. *Journal of palliative medicine*, 21 (S1): S-30-S-36.

Shah, A. A. 2021. Positivism and Interpretivism. *Qlantic Journal of Social Sciences*, 2 (1): 6.

Shamu, P., Mullick, S. and Christofides, N. J. 2024. Perceptions of the attributes of new long-acting HIV pre-exposure prophylaxis formulations compared with a daily, oral dose among South African young women: a qualitative study. *AIDS care*, 36 (12): 1-11.

Shamu, P., Mullick, S. and Christofides, N. J. 2025. Service delivery characteristics preferences and trade-offs for long-acting injectable pre-exposure prophylaxis among female students in tertiary institutions in South Africa: A discrete choice experiment. *Global Public Health*, 20 (1): 2489710.

Shenton, A. K. 2004. Strategies for ensuring trustworthiness in qualitative research projects. *Education for information*, 22 (2): 63-75.

Shisana, O., Rehle, T., Simbayi, L. C., Zuma, K., Jooste, S., Zungu, N., Labadarios, D. and Onoya, D. 2014. South African national HIV prevalence, incidence and behaviour survey, 2012. Article ID.

Sim, J., Saunders, B., Waterfield, J. and Kingstone, T. 2018. Can sample size in qualitative research be determined a priori? *International journal of social research methodology*, 21 (5): 619-634.

Skovdal, M., Magohe-Mandizvidza, P., Maswera, R., Moyo, M., Nyamukapa, C., Thomas, R. and Gregson, S. 2021. Stigma and confidentiality indiscretions: intersecting obstacles to the delivery of pre-exposure prophylaxis to adolescent girls and young women in East Zimbabwe. In: *Remaking HIV prevention in the 21st century: the promise of TasP, U= U and PrEP*. Springer, 237-248.

Smith, J., Bansi-Matharu, L., Cambiano, V., Dimitrov, D., Bershteyn, A., van de Vijver, D., Kripke, K., Revill, P., Boily, M.-C. and Meyer-Rath, G. 2023. Predicted effects of the introduction of long-acting injectable cabotegravir pre-exposure prophylaxis in sub-Saharan Africa: a modelling study. *The lancet HIV*, 10 (4): e254-e265.

Spinelli, M. A., Grinsztejn, B. G. J. and Landovitz, R. J. 2022. Promises and challenges: cabotegravir for preexposure prophylaxis. *Current Opinion in HIV and AIDS*, 17: 186 - 191.

Spinnewijn, L., Aarts, J. W., Braat, D. and Scheele, F. 2024. Unravelling clinicians' shared decision-making adoption: a qualitative exploration through the lens of diffusion of innovations theory. *BMJ open*, 14.

Tarfa, A., Sayles, H., Bares, S. H., Havens, J. P. and Fadul, N. 2023. Acceptability, feasibility, and appropriateness of implementation of long-acting injectable antiretrovirals: a national survey of Ryan White clinics in the United States. In:

Proceedings of *Open Forum Infectious Diseases*. Oxford University Press US, ofad341.

Taylor, A., Hayes, R., Nwokolo, N., Whitlock, G., Dosekun, O., McCormack, S., Gafos, M. and Evangeli, M. 2024. Psychological and Behavioural Within-participant Predictors of Adherence to Oral HIV Pre-Exposure Prophylaxis (PrEP). *AIDS and Behavior*, 28 (1): 274-284.

Terui, S., Huang, J., Goldsmith, J. V., Blackard, D., Yang, Y. and Miller, C. 2020. Promoting transformative community change for equitable health: peer education and intervention for pre-exposure HIV prophylaxis. *Journal of Health Communication*, 25 (3): 191-203.

Thomas, T. L. 2021. Injectable PrEP superior to oral PrEP. *Nature Reviews Urology*, 18: 576 - 576.

Tisdell, E. J., Merriam, S. B. and Stuckey-Peyrot, H. L. 2025. *Qualitative research: A guide to design and implementation*. John Wiley & Sons.

Tolley, E. E., Bula, A., Chitukuta, M., Ndimande-Khoza, N., Etima, J., Namey, E., Kemigisha, D., Makhale, L., Tsidya, M. and Shoen, M. 2024. Preferences for oral and injectable PrEP among qualitative sub-study participants in HPTN 084. *PLoS ONE*, 19 (10): e0309811.

Tolli, M. V. 2012. Effectiveness of peer education interventions for HIV prevention, adolescent pregnancy prevention and sexual health promotion for young people: a systematic review of European studies. *Health education research*, 27 (5): 904-913.

Traeger, M. W., Schroeder, S. E., Wright, E. J., Hellard, M. E., Cornelisse, V. J., Doyle, J. S. and Stoové, M. A. 2018. Effects of pre-exposure prophylaxis for the prevention of human immunodeficiency virus infection on sexual risk behavior in men who have sex with men: a systematic review and meta-analysis. *Clinical Infectious Diseases*, 67 (5): 676-686.

Treves-Kagan, S., El Ayadi, A. M., Pettifor, A., MacPhail, C., Twine, R., Maman, S., Peacock, D., Kahn, K. and Lippman, S. A. 2017. Gender, HIV testing and stigma: the association of HIV testing behaviors and community-level and individual-level stigma in rural South Africa differ for men and women. *AIDS and Behavior*, 21 (9): 2579-2588.

UNAIDS, O. 2023. WORLD AIDS DAY 2022. *Global HIV & AIDS statistics-Fact sheet*, Article ID.

UNAIDS, U. a. W. i. a. w. t. I. and (IHRI), o. H. R. a. I. 2020. *PrEP Innovation and Implementation in Asia and the Pacific: Virtual Regional Discussion*. . Hosted by UNAIDS, Unitaaid and WHO in association with the Institute of HIV Research and Innovation (IHRI).

Valente, P. K., Operario, D., Rusley, J. C., Bauermeister, J. A. and Biello, K. B. 2023a. The need for a health equity framework in next-generation pre-exposure prophylaxis implementation. *The lancet. HIV*, Article ID.

Valente, P. K., Rusley, J. C., Operario, D. and Biello, K. B. 2023b. Readiness to provide oral and injectable PrEP for sexual and gender minority youth among healthcare providers and clinics in the US Northeast. *Journal of Adolescent Health*, 72 (5): 722-729.

Valente, T. W. 2010. *Social networks and health: Models, methods, and applications*. Oxford University Press.

Vaughn, K., Dillon, P. J. and Kedia, S. K. 2019. Barriers to PrEP uptake: Perspectives of community health workers in the mid-South region of the United States. *Journal of HIV/AIDS & Social Services*, 18 (4): 295-312.

Velloza, J., Roche, S., Concepcion, T. and Ortblad, K. F. 2023. Advancing considerations of context in the evaluation and implementation of evidence-based biomedical HIV prevention interventions: a review of recent research. *Current Opinion in HIV and AIDS*, 18 (1): 1-11.

Venter, W. D. F., Gandhi, M., Sokhela, S., Sikwese, K., Bygrave, H., Da Gama, L., Mphothulo, N., Jamieson, L., Siedner, M. J. and Pozniak, A. L. 2024. The long wait for long-acting HIV prevention and treatment formulations. *The lancet HIV*, 11 (10): e711-e716.

Violette, L. R., Zewdie, K., Gitahi, N., Beima-Sofie, K. and Heffron, R. 2024. The pathway to delivering injectable CAB for HIV prevention: strategies from global PrEP leaders leveraging an adapted version of the Intervention Scalability Assessment Tool (ISAT). *Implementation Science Communications*, 5 (1): 101.

Wagenaar, B. H., Hirschhorn, L. R., Henley, C., Gremu, A., Sindano, N. and Chilengi, R. 2017. Data-driven quality improvement in low-and middle-income country health systems: lessons from seven years of implementation experience across Mozambique, Rwanda, and Zambia. *BMC Health Services Research*, 17 (Suppl 3): 830.

Wagner, A. D., Beima-Sofie, K., Awuor, M., Owade, W., Neary, J., Dettinger, J. C., Pintye, J., Abuna, F., Lagat, H. and Weiner, B. J. 2023. Implementation determinants and strategies in integration of PrEP into maternal and child health and family planning services: experiences of frontline healthcare workers in Kenya. *Frontiers in Reproductive Health*, 5: 1205925.

Wasti, S. P., van Teijlingen, E., Simkhada, P., Rushton, S., Balen, J., Subedi, M., Karki, J., Adhikary, P., Sapkota, S. and Gautam, S. 2023. Selection of study sites and participants for research into Nepal's Federal Health System. *WHO South-East Asia Journal of Public Health*, 12 (2): 116-119.

Wheelock, A., Eisingerich, A. B., Gomez, G. B., Gray, E., Dybul, M. R. and Piot, P. 2012. Views of policymakers, healthcare workers and NGOs on HIV pre-exposure prophylaxis (PrEP): a multinational qualitative study. *BMJ open*, 2 (4): e001234.

Woldesenbet, S., Kufa, T., Lombard, C., Manda, S., Morof, D., Cheyip, M., Ayalew, K. and Puren, A. 2021. The prevalence of unintended pregnancy and its association with

HIV status among pregnant women in South Africa, a national antenatal survey, 2019. *Scientific Reports*, 11 (1): 23740.

Wu, Y., Yang, G. and Meyers, K. 2021. Acceptability, appropriateness, and preliminary effects of the PrEP diffusion training for lay HIV workers: increased PrEP knowledge, decreased stigma, and diffusion of innovation. *AIDS and Behavior*, 25 (10): 3413-3424.

Yakam, J. T. and Gruénais, M. E. 2009. Involving new actors to achieve ART scaling-up: difficulties in an HIV/AIDS counselling and testing centre in Cameroon. *International nursing review*, 56 (1): 50-57.

Yao, N., Kowalczyk, M., Gregory, L., Cheatham, J., DeClemente, T., Fox, K., Ignoffo, S. and Volerman, A. 2023. Community health workers' perspectives on integrating into school settings to support student health. *Frontiers in Public Health*, 11: 1187855.

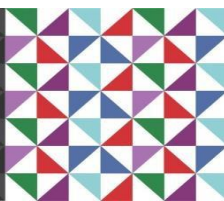
Yigit, I., Budhwani, H., Rainer, C. B., Claude, K., Muessig, K. E. and Hightow-Weidman, L. B. 2024. Associations between PrEP stigma, PrEP confidence, and PrEP adherence: conditional indirect effects of anticipated HIV stigma. *JAIDS Journal of Acquired Immune Deficiency Syndromes*, 97 (2): 99-106.

Zakeyo, K. and Nyashanu, M. 2023. Exploring the potential causes of HIV prevalence among young women in South Africa: a critical literature review. *International Journal of Human Rights in Healthcare*, 16 (1): 65-79.

Zuch, M. and Lurie, M. 2012. 'A virus and nothing else': the effect of ART on HIV-related stigma in rural South Africa. *AIDS and Behavior*, 16 (3): 564-570.

Zuma, K., Simbayi, L., Zungu, N., Moyo, S., Marinda, E., Jooste, S., North, A., Nadol, P., Aynalem, G. and Igumbor, E. 2022a. The HIV epidemic in South Africa: key findings from 2017 national population-based survey. *International Journal of Environmental Research and Public Health*, 19 (13): 8125.

Zuma, K., Simbayi, L., Zungu, N., Moyo, S., Marinda, E., Jooste, S., North, A., Nadol, P., Aynalem, G., Igumbor, E., Dietrich, C., Sigida, S., Chibi, B., Makola, L., Kondlo, L., Porter, S., Ramlagan, S. and Contributors, o. b. o. t. S. V. S. G. 2022b. The HIV Epidemic in South Africa: Key Findings from 2017 National Population-Based Survey. *International Journal of Environmental Research and Public Health*, 19 (13): 8125.



LETTER OF INFORMATION

Title of the Research Study: Perceptions and awareness of HIV injectable pre-exposure prophylaxis among primary health care workers at the Durban University of Technology Clinics KwaZulu Natal, South Africa

Principal Investigator/s/researcher: Nomvuselelo Nomzamo Mbatha (BHSc Environmental Health)

Co-Investigator/s/supervisor/s: Dr Dumile Gumede qualifications- Masters (Psychology and Health Promotion); PhD (Health Promotion)

Co-Investigator/Supervisor: Ms Nomakhosi Mpofana

Brief Introduction and Purpose of the Study:

Dear Participant

We invite you to participate in a research study titled "Perceptions and Awareness of HIV Injectable Pre-Exposure Prophylaxis (PrEP) Among Primary Healthcare Workers in KwaZulu-Natal, South Africa: a qualitative study." This study is being conducted by a Master of Health Sciences student, Nomzamo Mbatha, from the Durban University of Technology in the Faculty of Health Sciences

This study explores the knowledge and perceptions of injectable HIV PrEP among primary healthcare workers and the interplay of factors shaping their knowledge and perceptions to propose recommendations for the PrEP education program in KwaZulu-Natal, South Africa. The findings of this study will contribute to a deeper understanding of the acceptability and feasibility of injectable PrEP, equipping policymakers and healthcare providers with valuable insights to inform evidence-based interventions and policy recommendations, aiming to unravel the intricacies of stakeholders' primary healthcare workers' perspectives and pave the way for informed decision-making in HIV prevention strategies.

If you agree to participate in this study, you will be asked to answer questions that will take approximately 45 minutes. The questions will include information about your demographic background, professional experience, and specific questions related to HIV injectable PrEP.

We do not anticipate any risks or discomforts associated with your participation in this study. However, if you feel uncomfortable answering any question, you may withdraw from the study at any time without any penalty.

While there may be no direct benefit to you, your participation will contribute to a better understanding of the awareness and perceptions of HIV injectable PrEP among healthcare workers. This information could help improve training programs, policymaking, and the implementation of HIV prevention strategies in healthcare settings.

All information collected in this study will be kept confidential. Data will be stored securely and only accessible to the research team. Your responses will be anonymized, and no personal identifying information will be included in any reports or publications resulting from this study.

Your participation in this study is entirely voluntary. You may choose not to participate or to withdraw from the study at any time without any consequences. Your decision will not affect your employment or relationship with the Durban University of Technology and the Institution Research Ethical Committee (IREC).

If you have any questions or concerns about this study, please feel free to contact Nomzamo Mbatha at 0647622123/0683958481(mnomzamo0@gmail.com) or the Institutional Review Board at lavishad@dut.ac.za or

Appendix A



031 373 2375.

By participating in this study, you indicate that you have read and understood this information and agree to participate.

Thank you for your time and contribution to this important research.

Sincerely,

Nomzamo Mbatha

Main Researcher-MSc Health Sciences

Durban University of Technology

0683958481/0647622123



CONSENT

Statement of Agreement to Participate in the Research Study:

- I hereby confirm that I have been informed by the researcher, _____ (Name of Researcher), about the nature, conduct, benefits and risks of this study - Research Ethics Clearance Number: _____,
- I have also received, read and understood the above written information (Participant Letter of Information) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerized system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

_____	_____	_____	_____
Full Name of Participant Thumbprint	Date	Time	Signature/Right

I, _____ (Name of researcher) herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

_____	_____	_____
Full Name of Researcher	Date	Signature
_____	_____	_____
Full Name of Witness (If applicable)	Date	Signature
_____	_____	_____
Full Name of Legal Guardian (If applicable)	Date	Signature

Appendix C

Interview Guide: Perceptions and Awareness of Injectable PrEP Among Primary Health Care Workers.

Introduction

Greetings, and Introduction: Hello, my name is Nomzamo Mbatha. Thank you for taking the time to speak with me today.

We are conducting a study to understand the perceptions and awareness of injectable HIV pre-exposure prophylaxis (PrEP) among primary healthcare workers in KwaZulu-Natal, Durban.

Purpose of the Interview:

The purpose of this interview is to gather your thoughts and experiences regarding injectable HIV PrEP.

Your insights will aid us in improving HIV prevention strategies.

Confidentiality Assurance:

Your responses will remain confidential and will only be utilized for research purposes.

You may choose not to answer any question or to terminate the interview at any point.

Section 1: Background Information

1. Demographics and Professional Role

- a) What is your current role in the healthcare system?
- b) How long have you been working in primary health care?
- c) What type of HIV prevention services do you currently provide?

2. Experience with HIV Prevention

- a) Have you been involved in providing oral PrEP or other HIV prevention services? If yes, please describe your experience.
- b) What are the common challenges you face in delivering HIV prevention services?

Section 2: Awareness and Knowledge of Injectable PrEP

3. General Awareness

- a) Have you heard about injectable PrEP as a new HIV prevention method? If yes, where did you hear about it?
- b) What do you understand about how injectable PrEP works and its benefits?
- c) Are you aware of South Africa's recent approval of injectable PrEP?

Appendix C

4. Knowledge of Effectiveness

- a) In your opinion, how effective do you think injectable PrEP is compared to oral PrEP or other prevention methods?
- b) Do you believe injectable PrEP could address challenges with adherence to oral PrEP? Why or why not?

Section 3: Perceived Attributes of Injectable PrEP

5. Relative Advantage

- a) How do you think injectable PrEP compares to oral PrEP in terms of convenience and effectiveness for patients?
- b) What potential advantages do you see for patients in using injectable PrEP?

6. Compatibility

- a) How do you think injectable PrEP aligns with the current HIV prevention programs at your facility?
- b) Do you think patients in your community would be receptive to using injectable PrEP? Why or why not?

7. Complexity

- a) Do you think injectable PrEP would be easy or difficult to administer and manage in your facility?
- b) What training or resources do you think would be necessary to introduce injectable PrEP?

8. Trialability

- a) Would you feel comfortable introducing injectable PrEP on a small scale in your clinic before full implementation?
- b) What kind of pilot programs or trials would help you build confidence in this method?

9. Observability

- a) What outcomes or feedback would you need to see to be convinced of the value of injectable PrEP?
- b) How would you measure its impact on patients and the community?

Section 4: Barriers and Facilitators

10. Potential Barriers

Appendix C

- a) What challenges do you anticipate in implementing injectable PrEP in your facility?
- b) Are there any cultural, logistical, or systemic issues that might hinder its adoption?

11. Facilitators

- a) What support would you need from management, policymakers, or other stakeholders to implement injectable PrEP successfully?
- b) How do you think community engagement could support the introduction of injectable PrEP?

Section 5: General Perceptions and Recommendations

12. Perceptions

- a) How do you personally feel about the introduction of injectable PrEP in South Africa?
- b) Do you think it has the potential to reduce HIV transmission rates in your community? Why or why not?

13. Recommendations

- a) What strategies do you think would be most effective for introducing injectable PrEP to healthcare workers and patients?
- b) Do you have any additional thoughts or recommendations on how to ensure the success of injectable PrEP in South Africa?



Zertifikat Certificat

Certificado Certificate

Promouvoir les plus hauts standards éthiques dans la protection des participants à la recherche biomédicale
Promoting the highest ethical standards in the protection of biomedical research participants

Certificat de formation - Training Certificate

Ce document atteste que - this document certifies that



Nomzamo Mbatha

a complété avec succès - has successfully completed

Module 1 (2023) - Introduction to Research Ethics

du programme de formation TRREE en évaluation éthique de la recherche
of the TRREE training programme in research ethics evaluation

Release Date: 2024/04/29

CID : kAK2AOPpyk

Professeur Dominique Sprumont
Coordinateur TRREE Coordinator



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Nomzamo Mbatha

a complété avec succès - has successfully completed

Module 2 (2023) - Research Ethics Evaluation

du programme de formation TRREE en évaluation éthique de la recherche
of the TRREE training programme in research ethics evaluation

Release Date: 2024/05/14

CID : ykrz17Hr0X

Professeur Dominique Sprumont
Coordinateur TRREE Coordinator



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Zertifikat Certificat

Certificado Certificate

Promouvoir les plus hauts standards éthiques dans la protection des participants à la recherche biomédicale
Promoting the highest ethical standards in the protection of biomedical research participants

Certificat de formation - Training Certificate

Ce document atteste que - this document certifies that



Nomzamo Mbatha

a complété avec succès - has successfully completed

Module 3 (2023) - Informed Consent

du programme de formation TRREE en évaluation éthique de la recherche
of the TRREE training programme in research ethics evaluation

Release Date: 2024/05/02

CID : BWYZeM3WJp

Professeur Dominique Sprumont
Coordinateur TRREE Coordinator



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Swiss Academy of Medical Science (SAMS/ASSM/SAMTW) (www.samw.ch) - Commission for Research Partnerships with Developing Countries (www.kfpe.ch)

29 July 2025

Ms N N Mbatha
D5475 Section
4 Madadeni
2951

Dear Ms Mbatha

PERMISSION TO CONDUCT RESEARCH AT THE DURBAN UNIVERSITY OF TECHNOLOGY

Your email correspondence in respect of the above refers. I am pleased to inform you that the Institutional Research and Innovation Committee (IRIC) has granted Gatekeeper Permission for you to conduct your research “Perceptions of Primary Healthcare Workers on Injectable HIV Pre-Exposure Prophylaxis (PrEP) in Campus Health Clinics in KwaZulu-Natal, South Africa” at the Durban University of Technology. **Kindly note that this letter must be issued to the IREC for approval before you commence data collection.**

The Durban University of Technology may impose any other condition it deems appropriate in the circumstances having regard to nature and extent of access to and use of information requested.

Upon completion of your research project, you are requested to share the summary of your key research findings.

Yours sincerely

Dr N H Mthombeni
Director (Interim)
Research and Postgraduate Support

06 August 2025

Dear Ms. Mbatha,

Subject: Gatekeeper Permission to Conduct Research at the DUT Campus Clinic

I acknowledge receipt of your request.

I am pleased to inform you that permission is hereby granted to conduct your research at the DUT Campus Clinic, subject to the following conditions:

- The privacy, confidentiality, and rights of all participants must be respected at all times.
- Your research activities must not disrupt the normal operations of the clinic.

I trust that your study will contribute positively to academic knowledge and relevant practice.

I wish you success in your research.

Yours sincerely,

Sr Nomusa Mhlongo

Acting HOD: Campus Clinics

Durban University of Technology

JOIN OUR STUDY ON HIV INJECTABLE PREP!

**ARE YOU A PRIMARY HEALTHCARE WORKER
IN ETHEKWINI, KWAZULU-NATAL?**

**WE INVITE YOU TO PARTICIPATE IN AN
IMPORTANT RESEARCH STUDY EXPLORING
THE PERCEPTIONS AND AWARENESS OF HIV
INJECTABLE PRE-EXPOSURE PROPHYLAXIS
(PREP) AMONG HEALTHCARE WORKERS
LIKE YOU.**



WHY PARTICIPATE?

-  **Contribute to HIV Prevention:** Your insights will help improve HIV prevention strategies in our community.
-  **Enhance Your Knowledge:** Learn more about the latest advancements in HIV prevention.
-  **Make a Difference:** Help shape policies and practices that benefit both healthcare workers and patients.

WHO CAN PARTICIPATE?

- Primary healthcare workers in eThekweni, KwaZulu-Natal.
- Individuals with experience or interest in HIV prevention.

WHAT WILL YOU DO?

-  Participate in a brief interview.
-  Share your experiences and views on HIV injectable PrEP.

HOW TO JOIN?

-  Contact us at: 0683958481 (ask for Nomzamo Mbatha)
-  Email: 21518444@dut4life.ac.za
-  Phone: 0647622123

**WE CARE ABOUT
YOUR HEALTH**

- Confidentiality Assured
-  All information provided will be kept confidential.
-  Participation is voluntary, and you can withdraw at any time.



0647622123



21518444@dut4life.ac.za

21 July 2025

Ms N N Mbatha
D5475 Section 4
Madadeni
2951

Dear Ms Mbatha

Perceptions of Primary Healthcare Workers on Injectable HIV Pre-Exposure Prophylaxis (PrEP) in Campus Health Clinics in KwaZulu-Natal, South Africa

I am pleased to inform you that **PROVISIONAL APPROVAL** has been granted to your proposal subject to:

- Piloting of the data collection tool. *Please note that should there be any changes to the data collection tool, in a letter signed by the researcher and supervisor, list the changes to the documents and submit to DUT-IREC with the final data collection tool. Even when there are no changes to the data collection tool, DUT-IREC has to be notified.*
- Obtaining and submitting the necessary gatekeeper permission/s to DUT-Institutional Research Ethics Committee (DUT-IREC).

PLEASE NOTE THAT THIS IS NOT A FINAL APPROVAL LETTER. KINDLY SUBMIT THE ABOVE MENTIONED DOCUMENTS WITHIN THREE MONTHS TO THE DUT-IREC OFFICE. DATA COLLECTION CAN ONLY COMMENCE WHEN DUT-IREC ISSUES FULL APPROVAL

The Proposal has been allocated the following Ethical Clearance number **IREC 113/25**. Please use this number in all communication with this office.

Approval has been granted for a period of **ONE YEAR**, before the expiry of which you are required to apply for safety monitoring and annual recertification. Please use the Safety Monitoring and Annual Recertification Report form which can be found in the Standard Operating Procedures [SOP's] of the DUT-IREC. This form must be submitted to the DUT-IREC at least 3 months before the ethics approval for the study expires.

It is compulsory for a student or researcher to apply for recertification on an annual basis. The failure to do so will result in withdrawal of ethics clearance. It is the responsibility of the researcher and the supervisor to apply for recertification.

Yours Sincerely



Dr T E Khoza
Deputy Chairperson: DUT-IREC

07 August 2025

Ms N N Mbatha
D5475 Section 4
Madadeni
2951

Dear Ms Mbatha

Perceptions of Primary Healthcare Workers on Injectable HIV Pre-Exposure Prophylaxis (PrEP) in Campus Health Clinics in KwaZulu-Natal, South Africa
Ethical Clearance number IREC I 13/25

The DUT-Institutional Research Ethics Committee acknowledges receipt of your notification regarding the piloting of your data collection tool.

Kindly ensure that participants used for the pilot study are not part of the main study.

In addition, the DUT-IREC acknowledges receipt of your gatekeeper permission letters.

Please note that **FULL APPROVAL** is granted to your research proposal. You may proceed with data collection.

Any adverse events [serious or minor] which occur in connection with this study and/or which may alter its ethical consideration must be reported to the DUT-IREC according to the DUT-IREC Standard Operating Procedures (SOP's).

Please note that any deviations from the approved proposal require the approval of the DUT-IREC as outlined in the DUT-IREC SOP's.

It is compulsory for a student or researcher to apply for recertification on an annual basis. The failure to do so will result in withdrawal of ethics clearance. It is the responsibility of the researcher and the supervisor to apply for recertification.

Please note that you are required to submit a Notification of Completion of Study form together with an abstract to the DUT-IREC office on completion of your study.

Yours Sincerely

Dr T E Khoza
Deputy Chairperson: DUT-IREC

Data Analysis

This codebook documents the systematic coding process used to analyze interview data from 18 primary healthcare workers. It demonstrates how raw participant statements were transformed into analytical categories aligned with the study's four research objectives and informed by Rogers' Diffusion of Innovations framework. The codebook includes: (1) all codes used in analysis, (2) operational definitions for each code, (3) example participant quotes, (4) the hierarchical relationship between codes, categories, and themes, and (5) alignment with research objectives.

Data from the semi-structured interviews were analysed using reflexive thematic analysis as described by Braun and Clarke (2006). This process aimed to identify patterns of meaning related to healthcare workers' awareness, perceptions, and readiness to deliver long-acting injectable pre-exposure prophylaxis (PrEP). Both deductive and inductive approaches were applied. The deductive analysis drew on Rogers' Diffusion of Innovations (DOI) framework, which guided exploration of constructs such as awareness, compatibility, relative advantage, complexity, trialability, and observability. The inductive analysis allowed new insights to emerge directly from participants' narratives.

All interviews were transcribed verbatim, read multiple times for immersion, and manually coded to capture meaningful units of information. Codes were then grouped into subthemes and overarching themes through iterative review and reflection. The process was reflexive and interpretive, involving continuous comparison, analytic, and theoretical reflection to ensure credibility. Data were managed using Microsoft Word.

To enhance trustworthiness, strategies such as reflexive journaling and maintaining an audit trail were employed. Themes were checked against the dataset to ensure coherence and internal consistency.

Eleven key themes were identified: **Awareness and Knowledge, Hesitation on the effectiveness of injectable PrEP, Relative Advantage, Compatibility with existing healthcare services, Perceived Complexity of delivering injectable PrEP, Trialability, Observability, Barriers associated with injectable PrEP adoption and implementation, Perceived Facilitators associated with injectable PrEP, Perceptions, and Recommendations.** These reflect the diverse perspectives of healthcare workers on injectable PrEP. Tables below provide evidence of this process, demonstrating how raw data were transformed into analytical categories.

Theme	Quote	Code
Awareness and General Knowledge	"I've heard about injectable PrEP, but most of what I know comes from online articles. We haven't really had formal training yet."	Limited formal training Basic awareness
Awareness and General Knowledge	"It's a new concept for our clinic. Some staff are aware, but detailed knowledge is still limited."	Basic awareness
Awareness and General Knowledge	"I know it exists and that it's supposed to help prevent HIV, but I'm not confident explaining it to students yet."	Knowledge gaps in counselling
Awareness and General Knowledge	"I only learned about it during a brief webinar. I wish there was more structured education."	Insufficient formal education
Awareness and General Knowledge	"Some patients ask questions about new prevention methods, but we don't have enough information to guide them properly."	Limited counselling capacity

Awareness and General Knowledge	"I understand the concept, but the dosing schedule and side effects are still unclear to me."	Uncertainty about protocols
Awareness and General Knowledge	"I know injectable PrEP is available in some provinces, but not sure how it works exactly."	Partial knowledge Limited exposure
Hesitation on the effectiveness of injectable PrEP	"From what I've read, it's effective, maybe even more reliable than daily pills if taken properly."	Perceived high effectiveness
Hesitation on the effectiveness of injectable PrEP	"Clinical trials show it prevents HIV well, but I'm cautious until we have local data."	Evidence-based cautious optimism
Hesitation on the effectiveness of injectable PrEP	"Patients often ask if it's better than tablets. I tell them that studies suggest it is, but I can't explain the details."	Limited ability to explain effectiveness
Hesitation on the effectiveness of injectable PrEP	"I think it's promising, especially for students who struggle with daily medication adherence."	Advantage for adherence-challenged patients
Hesitation on the effectiveness of injectable PrEP	"Effectiveness seems high, but side effects could affect uptake if not well managed."	Effectiveness vs side effects
Hesitation on the effectiveness of injectable PrEP	"I've seen the stats, and it works, but we need to convey this in a way that makes sense to our patients."	Communication challenge
Hesitation on the effectiveness of injectable PrEP	"It's effective, but some colleagues remain sceptical, thinking oral PrEP is enough."	Peer scepticism
Relative Advantage	"The advantage is obvious—less frequent dosing, which is easier for students."	Convenience Reduced dosing frequency

Relative Advantage	"I think it can reduce forgetfulness and improve adherence compared to pills."	Adherence benefit
Relative Advantage	"It's a good option for those who find daily pills difficult. That's a clear benefit."	Solution for adherence difficulty
Relative Advantage	"I like that it might remove the stigma of taking pills every day."	Reduced stigma
Relative Advantage	"Some students prefer injections because it's discreet."	Discreet option
Relative Advantage	"It's convenient, but we need to monitor for side effects carefully."	Convenience with caution
Relative Advantage	"From a public health perspective, it could significantly lower new HIV infections."	Public health benefit
Compatibility with existing healthcare services	"It fits with what we already do in the clinic, giving vaccines or injections is routine."	Clinical workflow fit
Compatibility with existing healthcare services	"Students are already used to coming for other injections, so this could be accepted easily."	Patient familiarity
Compatibility with existing healthcare services	"It aligns with campus health initiatives, but we need proper scheduling systems."	Alignment with programs
Compatibility with existing healthcare services	"As long as it doesn't interfere with students' academic schedules, it should work well."	Schedule compatibility
Compatibility with existing healthcare services	"We just need to ensure privacy and confidentiality for students."	Confidentiality concern

Compatibility with existing healthcare services	"It's compatible, but some staff may resist learning a new protocol."	Staff resistance potential
Compatibility with existing healthcare services	"The clinic setup can support it, but we need enough staff and supplies."	Resource and capacity consideration
Perceived Complexity Of Delivering Injectable Prep	"It seems straightforward, but managing appointments every two months could be tricky."	Follow-up scheduling challenge
Perceived Complexity Of Delivering Injectable Prep	"The injection itself is easy, but the follow-up schedule could be confusing."	Implementation complexity
Perceived Complexity Of Delivering Injectable Prep	"It's not complicated medically, but counselling students properly requires attention."	Counselling complexity
Perceived Complexity Of Delivering Injectable Prep	"Training on side effects and adherence monitoring is essential to prevent mistakes."	Training necessity
Perceived Complexity Of Delivering Injectable Prep	"Some students might not understand the difference between oral and injectable PrEP."	Patient understanding challenge
Perceived Complexity Of Delivering Injectable Prep	"Documenting every visit could become cumbersome without a clear system."	Documentation burden
Perceived Complexity Of Delivering Injectable Prep	"Overall, the concept is simple, but implementation needs planning."	Implementation planning
Trialability	"We could start with a small group of students and see how it goes before scaling up."	Pilot testing

Trialability	“A pilot project would help us understand practical challenges.”	Trial phase for adaptation
Trialability	“Trialling it with a few willing participants first is sensible.”	Initial small-scale adoption
Trialability	“Seeing real results locally would help staff and students trust it more.”	Local evidence generation
Trialability	“We can evaluate adherence and side effects on a small scale first.”	Evaluation opportunity
Trialability	“Starting small gives us time to adjust protocols before full rollout.”	Incremental implementation
Trialability	“It’s easier to manage expectations and logistics through a pilot.”	Pilot benefits for logistics
Observability	“If we see students staying HIV-negative, it will encourage others to try it.”	Positive outcome visibility
Observability	“Visible success stories motivate uptake.”	Peer influence
Observability	“Clinic data on adherence and outcomes will help build confidence.”	Evidence-based reassurance
Observability	“Peer influence is strong; students seeing friends use it successfully matters.”	Peer modelling
Observability	“Sharing positive experiences during counselling sessions is effective.”	Testimonial-based promotion

Observability	“Observing minimal side effects reassures hesitant staff and students.”	Side effect reassurance
Observability	“Public health campaigns highlighting results will reinforce trust.”	Campaign-based observability
Barriers associated with injectable PrEP adoption and implementation	“Lack of formal training is a big barrier for staff.”	Training barrier
Barriers associated with injectable PrEP adoption and implementation	“Some students might fear injections or side effects.”	Patient fear
Barriers associated with injectable PrEP adoption and implementation	“Staff shortages could limit availability.”	Human resource limitation
Barriers associated with injectable PrEP adoption and implementation	“Supplies and cold chain management might be challenging.”	Resource/logistics barrier
Barriers associated with injectable PrEP adoption and implementation	“Students might default on follow-ups if schedules aren’t flexible.”	Adherence barrier
Barriers associated with injectable PrEP adoption and implementation	“Some staff are hesitant to adopt something new without local evidence.”	Staff scepticism
Barriers associated with injectable PrEP adoption and implementation	“Counselling time per student could be insufficient during busy clinic hours.”	Time/resource constraint
Perceived Facilitators associated with injectable PrEP	“Training sessions and workshops would help staff feel confident.”	Training facilitation

Perceived Facilitators associated with injectable PrEP	“Peer support among staff encourages adoption.”	Peer support
Perceived Facilitators associated with injectable PrEP	“Strong leadership backing makes implementation smoother.”	Leadership support
Perceived Facilitators associated with injectable PrEP	“Having clear protocols and SOPs facilitates administration.”	SOP clarity
Perceived Facilitators associated with injectable PrEP	“Positive student feedback motivates both staff and peers.”	Feedback-driven motivation
Perceived Facilitators associated with injectable PrEP	“Integration with existing health programs helps adoption.”	Program integration
Perceived Facilitators associated with injectable PrEP	“Seeing the public health impact encourages everyone to support it.”	Observed impact
Recommendations	“We need training for all staff.”	Staff training recommendation
Recommendations	“Awareness campaigns for students will improve uptake.”	Student awareness recommendation
Recommendations	“Pilot programs are essential before full implementation.”	Pilot program recommendation
Recommendations	“Clear follow-up schedules must be communicated.”	Scheduling recommendation

Recommendations	“Counselling resources and guides should be made available.”	Resource recommendation
Recommendations	“Monitoring and reporting systems must be in place.”	Monitoring recommendation
Recommendations	“Regular staff feedback sessions will help refine the program.”	Feedback recommendation

Qualitative Codebook

Theme	Inductive Subthemes	Code(s)	Definition	Quotes
1. Awareness and General Knowledge(objective 1)	Limited awareness and misconceptions; Sources of knowledge; Confusion with oral PrEP	Limited understanding; Second-hand information; Confusion with ART	Reflects participants' partial or incorrect understanding of injectable PrEP, primarily informed by informal sources such as colleagues or media.	“I only heard about it on the news. We have not yet had any official training about it.” “I heard about it from a colleague and a patient asked about it, but no one explained how it works or who it's for.”

				"I am not sure if it's already in South Africa or just something still being tested."
2. Hesitation on the effectiveness of injectable PrEP(objective 2)	Uncertainty about effectiveness; Recognition of adherence benefits; Need for local evidence	Uncertain efficacy; Adherence advantage; Need for local data	Captures participants' doubts about the comparative effectiveness of injectable PrEP and the desire for locally relevant research evidence, while recognising potential benefits for adherence.	"With oral PrEP, we were told it works if you take it daily... But with the injection, we don't know the numbers." "We can't just tell patients it works when we ourselves are not sure." "From what I read, the injection is actually

				more effective than the tablets.” “People forget to take tablets. If they only come every two months, that’s easier.”
3. Relative Advantage(objective 2)	Convenience and adherence; Privacy and stigma reduction; Reduced pill burden	Convenience; Longer protection; Reduced stigma; Missed appointment risk	Highlights participants’ view that injectable PrEP offers superior convenience, longer protection, and privacy compared to daily oral PrEP, though some raised concerns about missed appointments.	“Most of our youth patients complain that taking a pill every day is too much. With the injection, they won’t have to think about it daily.” “Adolescents and young women don’t like tablets... they will see it as easier.”

				“People hide their PrEP pills because others think they are HIV positive. If it’s just an injection, no one outside has to know.” “If someone misses their appointment, it could be a problem.”
4. Compatibility with existing healthcare services(objective 2)	Fit with existing services; Patient acceptability; Suitability for different groups	Service alignment; Client familiarity; Staff workload	Refers to how injectable PrEP aligns with existing clinic services, particularly family planning, while acknowledging workload and staffing concerns.	“We already have many women on injectable contraception, so adding another injection is not unusual.” “Some clients tell us they hide their PrEP pills from family,

				especially married women. With an injection, they won't need to explain anything." "We are already understaffed... adding PrEP injections will increase the queue and the workload."
5. Perceived Complexity of delivering injectable PreP(objective 3)	Implementation challenges; Monitoring and counselling burden; Resource and storage constraints	Adequate working space issues; Side effect monitoring; Counselling load	Represents the perceived practical and logistical challenges associated with implementing injectable PrEP, including training, monitoring, and storage.	"Giving an injection is something we do every day. The procedure itself is not complicated." "Some of our clinics don't have enough space. If the injection

				needs to be kept cold, it could be a real challenge.” “If a client misses their injection, we have to track them and make sure they don’t get gaps in protection.” “We need to make sure people understand it does not prevent pregnancy and STIs.”
6. Trialability(objective 4)	Support for piloting; Preference for small-scale rollout; Institutional learning	Pilot implementation; Gradual adoption; Staff readiness	Captures participants’ support for testing injectable PrEP on a smaller scale before full implementation, to build	“If we could start with a small group of clients first, it would be easier to learn how to give it.”

			confidence and identify operational issues.	“Clients might be hesitant at first. If they can try it for a few months... they may be more willing.” “A pilot program helps us understand the clinical outcomes and operational issues.” “If the staff see it working well, they will be more motivated to offer it routinely.”
7. Observability(objective 3)	Visibility of outcomes; Peer influence; Evidence from practice	Visible impact; Peer influence; Demonstrated success	Describes the perceived importance of seeing real-life benefits and outcomes before	“If students see the benefits of using injectable PrEP, they will share with others.”

			committing fully to the innovation.	“If we see that people who receive injections remain negative, it will convince the staff.” “Observing trends in clients, like continued attendance and no new infections, helps in making the case for scale-up.” “If we see a drop in HIV cases, then we will know it is worth it.”
8. Barriers associated with injectable PrEP adoption and implementation(objective 2)	Staff shortages; Infrastructure limitations; Patient fears; Stigma	Understaffing; Fear of injections; Storage issues; Stigma	Represents obstacles that may hinder successful implementation, including	“We are already understaffed... adding injections will

			staff capacity, infrastructure, and patient-related concerns.	increase the workload.” “Some clinics don’t have enough staff, limited working space, and the injection needs to be stored properly.” “Some people hate needles.” “Clients might avoid coming for injections if they think the community will know.”
9.Perceived Facilitators associated with injectable PrEP.(objective 3)	Training and policy support; Integration with existing services;	Capacity building; Management support; Community education	Refers to factors that could support successful rollout, including adequate training, management support,	“If we get proper training on how to give the injection... we will be much more confident.”

	Community engagement		and community sensitisation.	“Having enough staff, more working space, and a system to track appointments will make this easier.” “If we offer injectable PrEP alongside contraception, clients will find it easier to access.” “Educating communities about injectable PrEP... will make people more comfortable.”
10. Perceptions(objective 1)	Positive attitudes; Hesitation; Hopefulness	Optimism; Hesitancy;	Encompasses participants’ mixed feelings about injectable	“It seems like a really good option. Clients

		Behavioural concerns	PrEP, ranging from enthusiasm to cautious optimism and concerns about behavioural disinhibition.	won't have to take pills every day." "It gives clients more control. They don't have to worry about being judged." "It's a welcome addition. Anything that improves adherence is beneficial." "Knowing students, they might stop using condoms."
11. Recommendations(objective 4)	Awareness campaigns; Training;	Awareness raising; Staff training; Phased rollout; Monitoring	Reflects suggestions for enhancing uptake and implementation, including staff training, awareness	"We need proper training before we start giving the injections."

	Infrastructure; Pilot programs		creation, and incremental introduction of injectable PrEP.	“Regular workshops and refresher courses will help ensure that staff are confident.” “We need enough working space, tracking systems, and staff to manage appointments.” “Start small, learn from the first group, adjust procedures, and then expand.” “We need to monitor who comes back for injections, any side
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				effects, and client satisfaction.”
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Table 3 displays the main themes and sub-themes identified from analyzing healthcare workers’ perspectives on introducing HIV injectable PrEP at a campus health clinic. The table shows how deductive themes, based on the study objectives, were expanded with inductive sub-themes that emerged directly from participants’ responses. Each theme is supported by quotes from nurses, doctors, and counselors, grounding the analysis in real experiences. The alignment of themes with the four objectives demonstrates how the data addressed the study goals: exploring knowledge, attitudes, and beliefs; identifying benefits and concerns; examining barriers and facilitators; and offering recommendations for uptake and integration. By organizing the findings this way, the table creates a clear connection between participants’ voices and the research aims, while also illustrating how raw responses develop into analytical themes.

Table 1: Deductive and Inductive Themes with Quotes from PHC Workers, Aligned to Study Objectives

Deductive Theme	Inductive Sub-Themes	Illustrative Quotes	Aligned Objective
1. Awareness and Knowledge	Limited awareness and misconceptions Sources of knowledge (news, colleagues, self-research)	“I only heard about injectables from another colleague ,many staff here don’t know much about it.”	Objective 1: To explore PHC workers’ knowledge, attitudes, and beliefs about injectable PrEP

	Confusion with oral PrEP	“Some patients confuse injectable PrEP with ART injections and think it is treatment, not prevention.”	
2. Hesitation on the effectiveness of injectable PrEP	Uncertainty about effectiveness vs oral PrEP; Recognition of adherence benefits; Need for local evidence	“I’ve read about it online, but I don’t know if it’s as effective as the pills.” “Until I see statistics, I cannot confidently say it is better.” “Daily pills are tough for students, an injection could solve that problem.”	Objective 2: To explore PHC workers’ knowledge, attitudes, and beliefs
3. Relative Advantage	Convenience (less pill burden, easier adherence) Longer protection; Potential to reduce HIV incidence	“An injection every two months is easier for students; they forget to take pills every day.” “It protects for longer than pills, so even if they miss appointments, they’re still covered.”	Objective 2: To identify perceived benefits and concerns

4. Compatibility with existing healthcare services	Alignment with existing services Student/patient acceptability concerns; Suitability for high-risk groups	“We already provide HIV prevention services, this would align well if added to our package.” “It can fit into our PrEP services easily, just like family planning injections.” “There are students who might resist injections, especially males.”	Objective 2: To identify perceived benefits and concerns
5. Percieved Complexity of delivering injectable PrEP.	Concerns about administration and monitoring Training needs	“Giving injections isn’t hard, but monitoring side effects might be a challenge.” “We would need more space to work in and more staff” “We need proper training before we can offer this safely.”	Objective 3: To identify perceived concerns and barriers

6. Trialability	Support for piloting Preference for small-scale introduction Caution about target groups	“We should first try this with a small group of students before going big.” “I’d be more comfortable if we tested it with a small group first.”	Objective 4: To identify perceived concerns
7. Observability	Need for visible outcomes, Patient feedback, community evidence	“If students see others benefiting, more will join.” “We’ll believe in it more if we see reduced infections in our clinic.” “If we see a drop in HIV cases, then we will know it is worth it.”	Objective 3: To identify perceived benefits and concerns
8. Barriers Associated with injectable PrEP adoption and implementation	Mistrust and hesitation; Cultural stigma Staff shortages	“Some patients might not trust it, they worry about side effects.” “Our workload is already too much, adding injections without extra staff will be hard.”	Objective 2: To examine perceived barriers and facilitators

	Long-term safety concerns	“We don’t have enough nurses; adding injections means longer queues.”	
9. Perceived Facilitators associated with injectable PrEP	Management/policy support Training Community engagement Peer advocacy	“If management supports us with guidelines and supplies, we can do it.” “Training sessions would make us more confident to recommend it.” “Community education campaigns would help people trust it more.”	Objective 3: To examine perceived barriers and facilitators
10. Perceptions	Positive attitudes Hesitation/mistrust Hopefulness	“We feel hopeful, this could change the game for prevention.” “Some are excited, but others are still hesitant until they see results.”	Objective 1: To explore knowledge, attitudes, and beliefs; and identify perceived benefits/concerns

		"I think it's a breakthrough ,something our patients have been waiting for."	
11. Recommendations	Awareness campaigns Tailored education Training workshops Phased rollout	"Awareness campaigns on campus would help students understand injectables." "We should start in high-risk groups before going campus-wide." "Awareness campaigns in schools and campuses would be effective."	Objective 4: To generate recommendations for improving uptake and integration

Objective 1: To assess the awareness and knowledge of healthcare workers regarding HIV injectable PrEP

Theme	Inductive Subthemes	Codes	Definition	Quotes
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Awareness and General Knowledge	Limited awareness and misconceptions; Sources of knowledge; Confusion with oral PrEP	Limited understanding; Second-hand information; Confusion with ART	Reflects participants' partial or incorrect understanding of injectable PrEP, primarily informed by informal sources such as colleagues or media.	"I only heard about it on the news. We have not yet had any official training about it." "I heard about it from a colleague and a patient asked about it, but no one explained how it works or who it's for." "I am not sure if it's already in South Africa or just something still being tested."
Perceptions	Positive attitudes; Hesitation; Hopefulness	Optimism; Hesitancy; Behavioural concerns	Encompasses participants' mixed feelings about injectable PrEP, ranging from enthusiasm to cautious optimism and concerns about behavioural disinhibition.	"It seems like a really good option. Clients won't have to take pills every day." "It gives clients more control. They don't have to worry about being judged."

				“It’s a welcome addition. Anything that improves adherence is beneficial.” “Knowing students, they might stop using condoms.”
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Objective 2: To identify perceived benefits and concerns related to the implementation of HIV injectable PrEP in campus health clinic settings

Theme	Inductive Subthemes	Codes	Definition	Quotes
Hesitation on the Effectiveness of Injectable PrEP	Uncertainty about effectiveness; Recognition of adherence benefits; Need for local evidence	Uncertain efficacy; Adherence advantage; Need for local data	Captures participants’ doubts about the comparative effectiveness of injectable PrEP and the desire for locally relevant research evidence, while recognising potential benefits for adherence.	“With oral PrEP, we were told it works if you take it daily... But with the injection, we don’t know the numbers.” “We can’t just tell patients it works when we ourselves are not sure.”

				“From what I read, the injection is actually more effective than the tablets.” “People forget to take tablets. If they only come every two months, that’s easier.”
Relative Advantage	Convenience and adherence; Privacy and stigma reduction; Reduced pill burden	Convenience; Longer protection; Reduced stigma; Missed appointment risk	Highlights participants’ view that injectable PrEP offers superior convenience, longer protection, and privacy compared to daily oral PrEP, though some raised concerns about missed appointments.	“Most of our youth patients complain that taking a pill every day is too much. With the injection, they won’t have to think about it daily.” “Adolescents and young women don’t like tablets... they will see it as easier.” “People hide their PrEP pills because others think they are HIV positive. If it’s just an injection, no one outside has to know.”

				“If someone misses their appointment, it could be a problem.”
Compatibility with Existing Healthcare Services	Fit with existing services; Patient acceptability; Suitability for different groups	Service alignment; Client familiarity; Staff workload	Refers to how injectable PrEP aligns with existing clinic services, particularly family planning, while acknowledging workload and staffing concerns.	“We already have many women on injectable contraception, so adding another injection is not unusual.” “Some clients tell us they hide their PrEP pills from family, especially married women. With an injection, they won’t need to explain anything.” “We are already understaffed... adding PrEP injections will increase the queue and the workload.”
Barriers Associated with Injectable PrEP	Staff shortages; Infrastructure	Understaffing; Fear of injections;	Represents obstacles that may hinder successful	“We are already understaffed... adding

Adoption and Implementation	limitations; Patient fears; Stigma	Storage issues; Stigma	implementation, including staff capacity, infrastructure, and patient-related concerns.	injections will increase the workload.” “Some clinics don’t have enough staff, limited working space, and the injection needs to be stored properly.” “Some people hate needles.” “Clients might avoid coming for injections if they think the community will know.”
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Objective 3: To examine the perceived barriers and facilitators influencing the adoption and implementation of HIV injectable PrEP among healthcare workers

Theme	Inductive Subthemes	Codes	Definition	Quotes
Perceived Complexity of Delivering Injectable PrEP	Implementation challenges; Monitoring and counselling burden;	Adequate working space issues; Side effect monitoring; Counselling load	Represents the perceived practical and logistical challenges associated with implementing injectable	“Giving an injection is something we do every day. The procedure itself is not complicated.”

	Resource and storage constraints		PrEP, including training, monitoring, and storage.	“Some of our clinics don’t have enough space. If the injection needs to be kept cold, it could be a real challenge.” “If a client misses their injection, we have to track them and make sure they don’t get gaps in protection.” “We need to make sure people understand it does not prevent pregnancy and STIs.”
Observability	Visibility of outcomes; Peer influence; Evidence from practice	Visible impact; Peer influence; Demonstrated success	Describes the perceived importance of seeing real-life benefits and outcomes before committing fully to the innovation.	“If students see the benefits of using injectable PrEP, they will share with others.” “If we see that people who receive injections remain

				negative, it will convince the staff.” “Observing trends in clients, like continued attendance and no new infections, helps in making the case for scale-up.” “If we see a drop in HIV cases, then we will know it is worth it.”
Perceived Facilitators Associated with Injectable PrEP	Training and policy support; Integration with existing services; Community engagement	Capacity building; Management support; Community education	Refers to factors that could support successful rollout, including adequate training, management support, and community sensitisation.	“If we get proper training on how to give the injection... we will be much more confident.” “Having enough staff, more working space, and a system to track appointments will make this easier.” “If we offer injectable PrEP alongside contraception,

				clients will find it easier to access.” “Educating communities about injectable PrEP... will make people more comfortable.”
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Objective 4: To explore recommendations for effective implementation and scale-up of injectable PrEP

Theme	Inductive Subthemes	Codes	Definition	Quotes
Trialability	Support for piloting; Preference for small-scale rollout; Institutional learning	Pilot implementation; Gradual adoption; Staff readiness	Captures participants’ support for testing injectable PrEP on a smaller scale before full implementation, to build confidence and identify operational issues.	“If we could start with a small group of clients first, it would be easier to learn how to give it.” “Clients might be hesitant at first. If they can try it for a few months... they may be more willing.” “A pilot program helps us understand the clinical

				outcomes and operational issues.” “If the staff see it working well, they will be more motivated to offer it routinely.”
Recommendations	Awareness campaigns; Training; Infrastructure; Pilot programs	Awareness raising; Staff training; Phased rollout; Monitoring	Reflects suggestions for enhancing uptake and implementation, including staff training, awareness creation, and incremental introduction of injectable PrEP.	“We need proper training before we start giving the injections.” “Regular workshops and refresher courses will help ensure that staff are confident.” “We need enough working space, tracking systems, and staff to manage appointments.” “Start small, learn from the first group, adjust procedures, and then expand.”

				“We need to monitor who comes back for injections, any side effects, and client satisfaction.”
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