

**Data Management and Dispensary: Missing Link Contributing to
Antiretroviral Loss to Follow-Up in Lejweleputswa District**

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201928125

**Research Dissertation in partial fulfilment of the Master's Degree in Public
Health Requirements in the Faculty of Health Sciences, University of Fort
Hare**

Supervisor: Prof D.T. Goon

September 2022



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DECLARATION

I Charlotte Motshele Moatlhodi, declare that this thesis entitled “**Data Management and Dispensary: Missing Link Contributing to Antiretroviral Loss to Follow- Up in Lejweleputswa District**” is my original work and has not been previously submitted to any other institution of higher learning or university for purposes of any examination or academic qualification by myself or any other party. The work that has been done by other researchers has been fully and correctly acknowledged.

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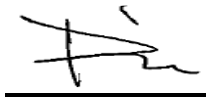
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This thesis, titled “**Data Management and Dispensary: Missing Link Contributing to Antiretroviral Loss to Follow-up in Lejweleputswa District**”, meets the governing regulations for the Master’s Degree award for the University of Fort Hare and is approved for its contribution to scientific knowledge and literacy presentation.



Prof D.T Goon

Supervisor

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DEDICATION

I would like to dedicate this work to my parents (Mr D.R. Moatlhodi and Mrs C.T. Moatlhodi) and my one and only daughter (Tlhonolofatso Moatlhodi, Smunkie love). Your unconditional love, continued support and encouragement has played a huge role throughout this journey. I LOVE you all so much and THANK you.



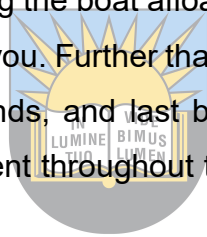
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To the almighty GOD. Thank you, you know my heart the most.

ABSTRACT

Background and aim: The widespread use and access to Anti-Retro Viral Treatment (ART) world-wide has contributed to full preventive and therapeutic benefits. An estimated amount of 68% of HIV positive people received ART in South Africa (SA) as of 2018. However, reports from TIER.Net and DHIS (District Health Information System), indicate that the retention of patients on ART (specifically first line triple combination therapy Tenofovir Emtricitabine Efavirenz (TEE)) continues to decline. Meanwhile, data on TEE dispensed from the dispensary shows increasing quantities patients across the Free State province on a monthly basis. The aim of this study is to determine factors contributing to the discrepancy between Fixed Dose Combination (FDC) TEE dispensing data and patients on FDC TEE captured on TIER.Net and Health Patient Registration System (HPRS), as a means of improving identification and monitoring of patients that carry the potential risk of being lost to subsequent follow-ups (ART collection / clinical visits).

Methods: A retrospective, quantitative, and descriptive record review of 382 medical records of HIV positive patients, along with TIER.Net and Health Patient Registration System (HPRS) reports, was conducted at five primary healthcare (PHC) facilities, each representing the five sub-districts found in Lejweleputswa district using a self-designed data collection tool. Descriptive statistics was used to summarise and present data.

Results: Sixty five percent the TEE collected from the dispensary was captured on TIER. Net. It could not be determined on none of the medical records whether or not the administrative clerk captured dispensed TEE on the same date of collection from the dispensary on TIER.Net. Subsequently, the actual date of capturing the TEE dispenses on TIER.Net following collection of the treatment from the dispensary could also not be determined. The overall data on TEE dispensed/collected from the dispensary the same was not the same as the data captured on TIER.Net. Thirty five percent of patients were reported to have collected their ART according to dispensary data than that reported on TIER.Net. Eighty percent of the TEE collected from the dispensary was captured on HPRS. Eighty percent of facilities had an area and computer dedicated for HPRS and TIER.Net but none had a backup computer in cases of theft/breakage. None of the facilities had access to back up connectivity, a manual

capturing process in the form of paper-based head count registers was instead utilised as back-up.

Conclusion: The following factors were found to contribute to the discrepancy between the TEE dispensing data, TIER.net and HPRS: Poor records keeping, unauthorised dispensing of prescriptions, poor data management, delays and non-capturing of ART medical records and infrastructural and human resource challenges that exist in the data management of the patient medical records. There is a need to address these gaps in order to improve reliability of dispensary data, as well as reports from TIER.Net and HPRS, in order to streamline the identification and monitoring of patients at risk of becoming lost to follow-up.

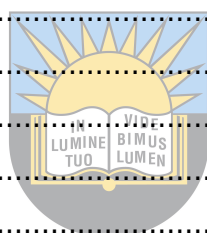
Keywords: Antiretroviral treatment, TIER.Net, retention in care, lost to follow-up, dispensary, data management, health patient registration system



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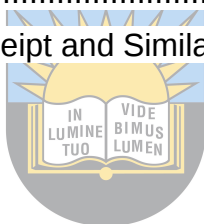
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LIST OF ACRONYMS

ART	Antiretroviral Treatment
ARV	Antiretroviral
CD4	Cluster of Differentiation 4, T- Helper Lymphocytes
CCMDD	Central Chronic Medicine Dispensing And Distribution
DHIS	District Health Information System
EHR	Electronic Health Register
FDC	Fixed Dose Combination
GPP	Good Pharmacy Practice
HAST	HIV/AIDS, STI and TB
HIS	Health Information System
PLHIV	People Living with Human Immunodeficiency Virus
HIV	Human Immunodeficiency Virus
HPRN	Health Patient Registration Number
HPRS	Health Patient Registration System
HREC	Health Research Ethics Committee
HSS	Health System Strengthening
LMICS	Low Middle Income Countries
LTFU	Lost To Follow-up
MMD	Multi Month Dispensing
NDoH	National Department of Health
NIMART	Nurse Initiated Management of Anti-Retroviral Treatment
PEPFAR	The President's Emergency Plan for AIDS Relief
PHC	Primary Healthcare
SA	South Africa

SPSS	Statistical Package for the Social Sciences
STI	Sexually Transmitted Infections
TB	Tuberculosis
TEE	Tenofovir Emtricitabine Efavirenz
TROA	Total Remaining on ART
UNAIDS	Joint United Nations Programme On HIV/AIDS
UTT	Universal Test and Treat
UFH	University of Fort Hare
WHO	World Health Organization



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CHAPTER 1: INTRODUCTION

1.1. Background

Over the past decades, Human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS) has become the greatest global public health problem. The widespread use and access to Anti-Retro Viral Treatment (ART) world-wide has contributed to full preventive and therapeutic benefits. It is reported that ART contributed to a 32% and 16% global decline in AIDS-related deaths and new HIV infections respectively between 2010 and 2016 (Mekonnen et al., 2019). According to Berheto, Haile, and Mohammed (2014), more than 9 million people living with HIV in low- and middle-income countries (LMICs) received ART, and 4.2 million deaths were prevented in LMICs between 2002-2012. Updated World Health Organization (WHO) guidelines in 2016 recommended ARV access to the entire population of people living with HIV irrespective of the CD4, or cluster of differentiation, count. This did not only maximise individual and public health gains, but also led to the development of the universal test and treat (UTT) strategy. In order for this strategy to be successfully implemented, retention in care of people living with HIV has to be effectively sustained (Gosset et al., 2019).

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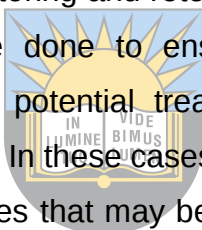
According to Etoori et al., (2020) an estimated amount of 34,6 million people aged 15 years and older were living with HIV globally, 70% of that population was from Sub-Saharan Africa. By the end of 2017, 15.4 million people were initiated on ART, representing 60% of the entire population of people living with HIV (PLHIV) in sub-Saharan Africa. South Africa (RSA) is reported to have the largest population of PLHIV globally, with an estimated amount of 7.2 million people aged between 15 and 49 years living with HIV, represented by 18,8% of the population. As of 2018, an estimated amount of 68% of the country's HIV positive people received ART. According to UNAIDS (2018), South Africa has also managed to achieve the first 90% testing target of the 90-90-90, the second 90% was performing at 68% of the people with living with HIV on ART and viral suppression observed in 78% of those on ART compared to target of 90%. The 90-90-90 principle is defined by UNAIDS as follows (UNAIDS, 2014):

- By 2020, 90% of all people living with HIV will know their HIV status.

- By 2020, 90% of all people with diagnosed HIV infection will receive sustained antiretroviral therapy.
- By 2020, 90% of all people receiving antiretroviral therapy will have viral suppression.

Despite improvements and success observed on the ART coverage within the HIV programme, concerns have been raised regarding high proportion of people living with HIV and on ART who are not retained in care and on treatment, thus, contributing to reported high rates of ART loss to follow-up (Berheto et al., 2014). An article by Kahn (2019) reported on the possibility of the United States global AIDS fund to South Africa being cut. This was based on the progress in the President's Emergency Plan for AIDS Relief's (PEPFAR's) ART programme in South Africa being described as non-performing due to the substantial number of HIV positive patients who started treatment in 2018, but then stopped taking ART.

There is a need to increase access to and provision of ART; however, measures should be put in place for the monitoring and retention of the growing number of HIV positive patients. This should be done to ensure that there are no treatment disruptions, medical toxicities, or potential treatment failures, and so that such instances are proactively identified. In these cases, corrective steps including, but not limited to, possible regimen changes that may be undertaken by clinicians (Mutasa-Apollo et al., 2014).



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According to Makunde et al., (2012) early identification of all patients who failed to attend scheduled clinic visits or medication collection is critical. This is attributed to the fact that some patients are marked as active in the medical records despite them having discontinued ART (Rosen & Fox, 2011). Patients who failed to attend scheduled clinic visits more than two or three times were referred to as lost to follow-up (LTFU) (Larson et al., 2010) should they miss clinic visits for two to three months, and are then classified as drop outs (Calmy et al., 2006). The World Health Organization (2007) classifies health information as one of the health system's six strengthening building blocks.

South Africa's (SA's) Department of Health developed TIER.Net to improve quality of routinely collected HIV data and monitoring and management of HIV positive patients (Skiti, 2017). This is a three-tiered/inter-linked health information system, used for outpatients/day patients in primary health care facilities (PHC) for patients receiving ART and inpatients in hospitals for patients that tested positive and were initiated on

ART, these patients are then transferred to the nearest PHC upon discharge from the hospital. It is used for capturing ART data and thus monitoring the ART programme in SA. The first tier (T1) is a paper-based register system for capturing ART, recommended for use in facilities with less than 500 patients on ART. The second tier (T2) is an electronic register system for capturing ART, recommended for use in facilities with more than 500, but less than 2000 patients on ART. The third Tier (T3) is a fully electronic medical record software recommended for use in facilities with more than 2000 patients on ART. An estimated amount of 3,830 health facilities were using Web-DHIS to report ART data in SA by March 2019, of which 3 600 of them represented by 94%, fully on TIER.Net. A facility that has managed to reach Phase 6 (ranges from 0 to 6 of TIER.Net implementation) is considered as fully implementing this HIV electronic system (Makazha, 2020).

All primary healthcare (PHC) facilities in the Lejweleputswa health district of the Free State Province, South Africa, use standardised medical records called clinical stationery. This is a paper document that is divided into three sections: firstly, the patient details section, secondly: the patient's clinical details including: findings, history, pre- and post-operative care, diagnostic test results, progress, and lastly the prescription section on which the prescribed ART is written in line with the laws and regulations governing valid prescribing of ART. These records are completed by clinicians (nurses and doctors) upon enrolment of patients for HIV care and should be updated and signed at subsequent visits. The dispensary dispenser is also expected to record information about the dispensed anti-retroviral treatment on the prescription section of the clinical stationery and sign it off to confirm that it was indeed dispensed. The clinical stationery is aligned to the TIER.Net system, and specific details about the patient's visit to the facility (including but not limited to viral load status, CD4 status, date of next visit, ART prescribed and dispensed) recorded on the clinical stationery ought to be transcribed into the system by an administrative clerk and capturing of such information confirmed in a form of the administrative clerk's signature.

The data collection process starts with Health Patient Registration System (HPRS), a networked, electronic system used to register each patient that comes to a health facility. It was developed for the registration and tracking of patients visiting any PHC facility nationally, and to subsequently improve access to medical records, service delivery, operational efficiencies, and strengthen disease surveillance at facility level

(Katurura et al., 2018). It records each patient's demographic information and also tracks patients' unique identifier information using a South African (SA) identity document (ID) number, passport number or asylum seeker number. The system assigns a health patient registration number (HPRN) for each registered patient. This number is reflected on the medical record. The last four digits of the number are then used for the filing purpose of the medical record and thus used to access the medical record (Asah, 2021).

Figure 1.1 on the next page illustrates the Flow of ART data from medical records from the filing system into HPRS and TIER.Net. The patient arrives at the facility registry and is, upon presenting their unique identifier information (SA ID, passport or asylum seeker number) using the pre-assigned HPRN provided with their medical records by the administrative clerk, the actual date and reason for the clinic visit is then captured on HPRS by the administrative clerk. This means that previous information on the date and reasons for clinic visit by any patient on HPRS may be accessed any time. In the case where the patient is due for a follow up with the clinician, then such a patient takes the medical record to the clinician to be reviewed, the medical record is updated and signed by the clinician, the prescription for the same ART is renewed or ART regimen changed in the case where treatment has been changed by the clinician. The date of prescribing, name, dosage, quantity of item prescribed should be clearly indicated on the prescription, the date of next clinical visit or collection of ART should also be indicated. The patient then goes to the dispensary to collect their prescribed ART and is expected to leave the medical record at the dispensary. This is to make sure that no medical record leaves the facility unauthorised and all medical records that left the facility registry are accounted for. In the case where the patient is due for collection of ART, then such a patient goes directly to the dispensary to collect their prescribed ART and leaves the medical record at the dispensary. The dispenser which in this case is a qualified post-basic Pharmacist Assistant is expected to assess the prescription for validity before dispensing it, if the prescription is not valid then the matter should be taken up with the clinician to make sure that it is valid and that the patient is not inconvenienced. If it is valid (details of the prescriber, patient and prescribed ART indicated on the prescription) then it may be dispensed and all the required information including the date, quantity of ART dispensed indicated by the dispenser. The dispenser should at all times sign the prescription as proof of

confirming that the patient was provided with their treatment and also as way of accounting for the ART which will be included in the dispensary data of the facility for the specific item. In the case where the authorised dispenser is not on duty, the facility operational manager is expected to allocate dispensing responsibilities to a professional nurse within the facility to ensure that treatment disruptions do not occur. The administrative clerk is expected to collect all the medical records left by patients from the dispensary following collection of treatment. This should be done before the end of the day for all patients seen on the particular day for data reconciliation and accountability purposes. The clinical visit information including ART dispensing should then be captured on TIER.Net by the administrative clerk into a facility designated TIER.Net computer and such capturing confirmed through the administrative clerk's signature before returning it for filing into the registry. Unlike HPRS, TIER.Net doesn't not have a functionality of indicating when exactly the medical record was captured by the administrative clerk, but does make provision of the information on the medical record to be captured at any given time following the visit of the patient to the facility.

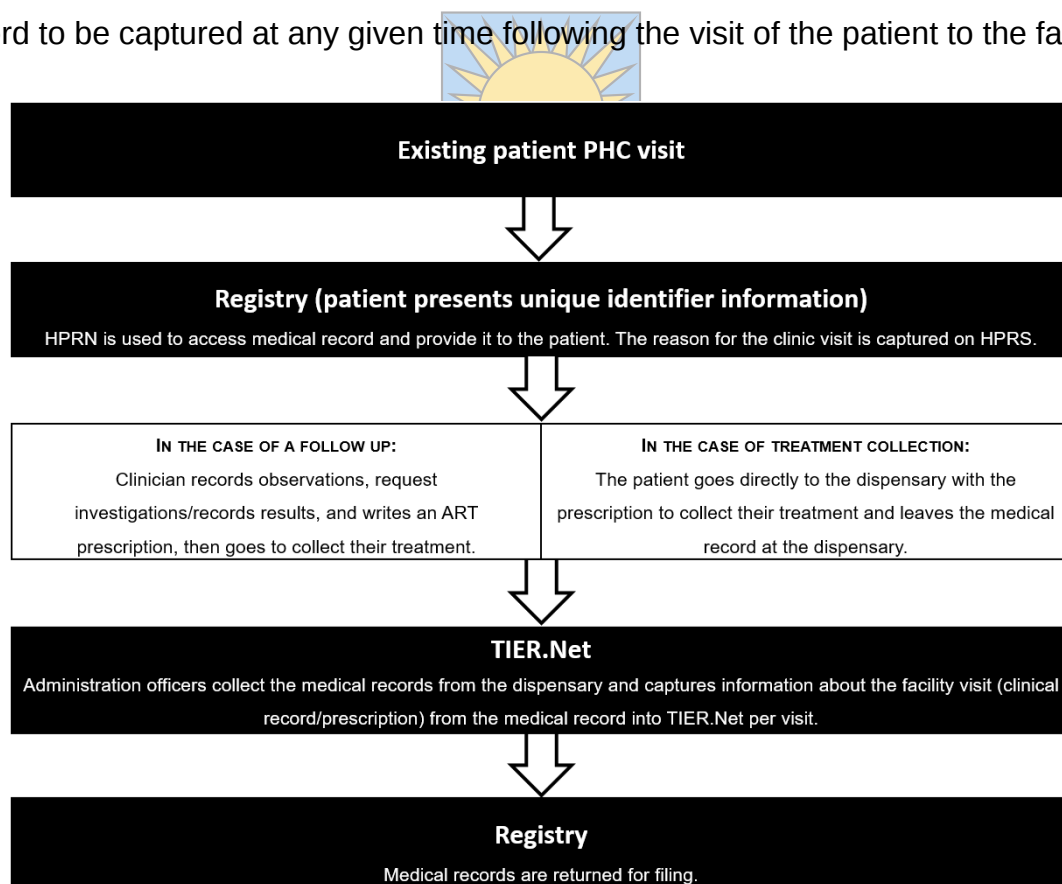


Figure 1.1: Flow of HIV & ART Data From Medical Records Into HPRS and TIER.Net

1.2. Research Problem

According to Skiti (2017), operational managers of health facilities and HIV/AIDS, Sexually Transmitted Infections (STI), and Tuberculosis (TB) (HAST) coordinators continue experiencing challenges regarding the reliability and utilisation of reports from TIER.Net. The Free State Department of Health procurement pharmacist also raised a concern on the continued increase of the single unit fixed dose combination TEE FDC orders received by the medical depot from districts in the Free State against declining number of patients captured on TIER.Net for the same ART (Free State Pharmaceutical Services Strategic Meeting Minutes, 2019). Subsequently, the President's Emergency Plan for AIDS Relief (PEPFAR) indicated the possibility of cutting funds to SA (\$670M in 2018 fiscal year to \$400M in 2019) due to poor performance in retaining HIV positive patients in care (Kahn, 2019).

A study conducted in Gugulethu and Masiphumelele clinics in the Western Cape province of South Africa found patients' dispensing (pharmacy pick-up) data suitable to evaluate the ART programme and identify patients who may be lost to follow-up visits and ART collection at an early stage (Wood et al., 2008). Therefore, the current study was designed to determine the factors contributing to the poor utilisation of pharmacy dispensing data, in conjunction with TIER.Net and HPRS reports, for the early identification and monitoring of these LTFU at-risk patients.

1.3. Aim of the Study

The aim of this study is to determine factors contributing to the discrepancy between the fixed dose combination (FDC) Tenofovir/Emtricitabine/Efavirenz (TEE) dispensing data and patients on FDC TEE captured on TIER.Net and Health Patient Registration System (HPRS) as a means of improving identification and monitoring of patients at risk of becoming lost to follow-up.

1.4. Objectives

The objectives of the study are outlined as follows.

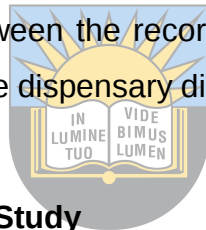
- a) To assess completeness of information recorded on the ART medical records by the prescriber for TEE therapy.
- b) To assess validity of prescriptions dispensed by dispensers for TEE therapy.

- c) To assess the capturing process of ART medical records for patients on TEE therapy from the dispensary and by the administrative clerks on TIER.Net and HPRS; and
- d) To compare the records of patients on TEE captured on TIER.Net and HPRS against the dispensary dispensing data for TEE.

1.5. Research Questions

The following research questions are investigated:

- a) Is the information recorded on the ART medical records by the prescriber, complete?
- b) Are the prescriptions dispensed by dispensers valid?
- c) What is the capturing process of ART medical records for patients on TEE therapy from the dispensary and by the administrative clerks on TIER.Net and HPRS?
- d) Is there any difference between the records of patients on TEE captured on TIER.Net and HPRS and the dispensary dispensing data for TEE dispensed to patients?



1.6. Significance of the Study

It is envisaged that the findings from this study will inform health policy managers to design intervention strategies to promote accurate reporting and accountability on TEE expenditure, and strengthen data management and reporting for ART.

1.7. Delimitations of the Study

The study was limited to only five primary healthcare (PHC) facilities in the Lejweleputswa District, Free State. The variables of interest were the socio-demographic details, prescription details, and data management details. Collection of data on human resource and infrastructural and human resource challenges that were identified were limited to the observations made by the data collector.

1.8. Definition of Terms

Administrative Clerk

An official responsible for accessing medical records, issuing them to the patients, capturing information about HIV positive patients' visits from medical records to HPRS and TIER.Net, collecting the medical records from the dispensary and filing them.

ART Collection Date

The date that ART is collected by the patient from the healthcare facility dispensary.

CD4 Count

A test that measures the number of CD4 cells in the blood.

Clinical Stationery

A document used for monitoring and managing a patients' clinical progress.

Clinical Visit

A visit on which a patient is clinically reviewed.

Dispensary

A facility where medicines are kept and dispensed from in a primary healthcare facility.

Dispense

The preparation and issuing of prescribed ART.

Dispenses

Issues of prescribed ART.



Dispenser

A qualified post-basic pharmacist assistant who is authorised to dispense ARVs to a patient.

Health Information System

A system used to collect, integrate, process, use, and report data to improve the effectiveness and efficiency of the health service.

Health Patient Registration Number

A unique 10-digit number assigned to a patient registered on the health patient registration system in healthcare facilities.

Health Patient Registration System

A networked, electronic system used to register each patient that comes to a primary healthcare facility.

Issue

For the purpose of this study, it refers to the act of giving out ART to patients.

Lost to Follow-Up

Describes patients on ART who have missed scheduled clinic visits or ART collections for more than three consecutive months.

Medical Depot

For the purpose of this study, refers to an entity responsible for procurement, storage and distribution of ART on behalf of the Free State Department of Health to Primary Health care facilities.

Medical Record

A paper document that keeps information about the patient's clinical findings, history, pre- and post-operative care, diagnostic test results, progress, and medication. A prescription section is also included in this document.

Medication

ART prescribed and/or dispensed to patients.

NIMART Trained Professional Nurse

Professional nurse who is trained and has a certificate in Nurse Initiated Management of anti-retroviral treatment.



Operational Manager

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In this study, a Professional Nurses appointed as a PHC facility Manager.

Patient(s)

In this study, HIV positive people who received ART at the data collection sites for more than twelve months between 1 January 2018 and 31 January 2019.

Pharmacist Assistant

A healthcare professional who possesses a qualification as a qualified post basic pharmacist assistant working in a PHC facility with the responsibility of dispensing medicines, including ART.

Prescriber

A professional nurse or medical officer authorised to prescribe ARVs.

Prescription

A written instruction by an authorised prescriber that authorises a patient to be issued with a medicine or treatment.

ART Regimen

A specific combination of ART recommended for HIV treatment for a specific period in PLHIV

Retention in Care

Active engagement with ART patients with medical care at a health facility, as well as patients still accessing ART care at the time of assessment and analysis.

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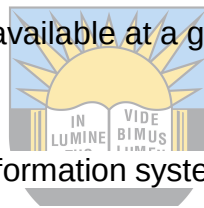
The process of writing a prescription for a patient by a prescriber.

Stock Outs

A situation in which ARVs are not available at a given point in time during the study.

TIER.Net

A three-tiered/inter-linked health information system, used for capturing ART data and monitoring the ART programme in South Africa.



Total Remaining on ART

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Patients initiated on ART who continue to collect and take it on a daily basis.

Universal Test and Treat Strategy

A strategy aimed at improving access of ART for all HIV positive patients by ensuring that newly diagnosed patients are provided with treatment immediately, irrespective of the CD4 count.

Valid Prescription

For the purpose of this study refers to a prescription that has all the following information: name, date of birth/age of a patient, address of a patient, name of a prescriber, qualifications of a prescriber, signature of a prescriber, PHC name, name, quantity, dose and duration of treatment of the medicine prescribed.

Viral Load

A measure of the extent of the HIV spread in an HIV positive patient over a given time.

1 Month TEE Stock

A pack of 28 TEE tablets dispensed to a patient by a dispenser.

90-90-90 Strategy

Targets launched by UNAIDS and partners to diagnose 90% of all HIV positive people, make ARVs accessible to 90% of diagnosed HIV positive patients, and ensure that 90% of people on ARVs are virally suppressed by 2020.

1.9. Outline of Chapters

This study comprises five chapters. Chapter one poses the research problems, the rationale for conducting the study, research objectives, and explanation of key concepts. The second chapter provides a literature review on the global and South African HIV/AIDS disease burden. Furthermore, the chapter discusses access to ART, retention in care of HIV positive patients on ART, ART loss to follow-up of people living with HIV, health information management, data management in facilities and pharmacy dispensing data. Chapter three offers an in-depth explanation of the methodology followed to achieve the objectives of this study. The research design, data collection steps and analysis, as well as ethical considerations are described in detail. The penultimate chapter shows the analysis of results from data obtained, and discusses findings in detail. The relationship between research questions and objectives is clearly defined to indicate how the data collected responds to the research questions. Finally, chapter five discusses findings obtained from the results; key findings of the study are reviewed, and the conclusion and recommendations presented.

CHAPTER 2: LITERATURE REVIEW

This chapter provides the rigour of the literature review and discussion based on synthesised studies.

2.1. Search Methods

The current literature overview is concerned with both the global and national HIV/AIDS disease burden. It also comprises a review of literature regarding access to ART, retention in care of HIV positive patients on ARVs, HIV LTFU, health information management, data management in facilities, and pharmacy dispensing data. The following search engines were used for purposes of literature review: Online Library, Cochrane Library, Google Scholar, JSTOR, PubMed, EBSCO, Science Direct, and Medline Elsevier.

2.2. The Global and South African HIV/AIDS Burden

HIV continues to remain a world-wide challenge, despite considerable progress and efforts that have been put in place to combat it over the past two decades. According to UNAIDS (2020), an estimated amount of 36.9 million people was living with HIV/AIDS world-wide in 2017, with approximately 1.8 million newly infected people in the same year. New infections ranged from 4 000 to 5 000 per day. It was reported with concern that 66% of new HIV infections occurred in Sub-Saharan Africa. South Africa's HIV burden is disproportionately higher with an estimated amount of 19% of the total population living with the virus, new infections reported at 15% and all AIDS related deaths represented by 11% of the total HIV infected population (Mudefi et al., 2019).

2.3. Access to ART

The World Health Organization's updated guidelines (2015) improved access to ART for the entire HIV positive population irrespective of the CD4 count. This did not only maximise on individual and public health gains, but also saw the birth of the strategy known as universal test and treat (UTT) strategy. Successful and effective implementation of this strategy is reliant on the retention in care of people living with HIV (Gosset et al., 2019).

According to Etoori et al., (2020) by the end of 2017, 15.4 million people were initiated on ART, representing 60% of the entire population of people living with HIV (PLHIV)

in sub-Saharan Africa. South Africa (RSA) is reported to have the largest population of PLHIV globally, with an estimated amount of 7.2 million people aged between 15 and 49 years living with HIV, represented by 18,8% of the population. As of 2018, an estimated amount of 68% of the country's HIV positive people received ART.

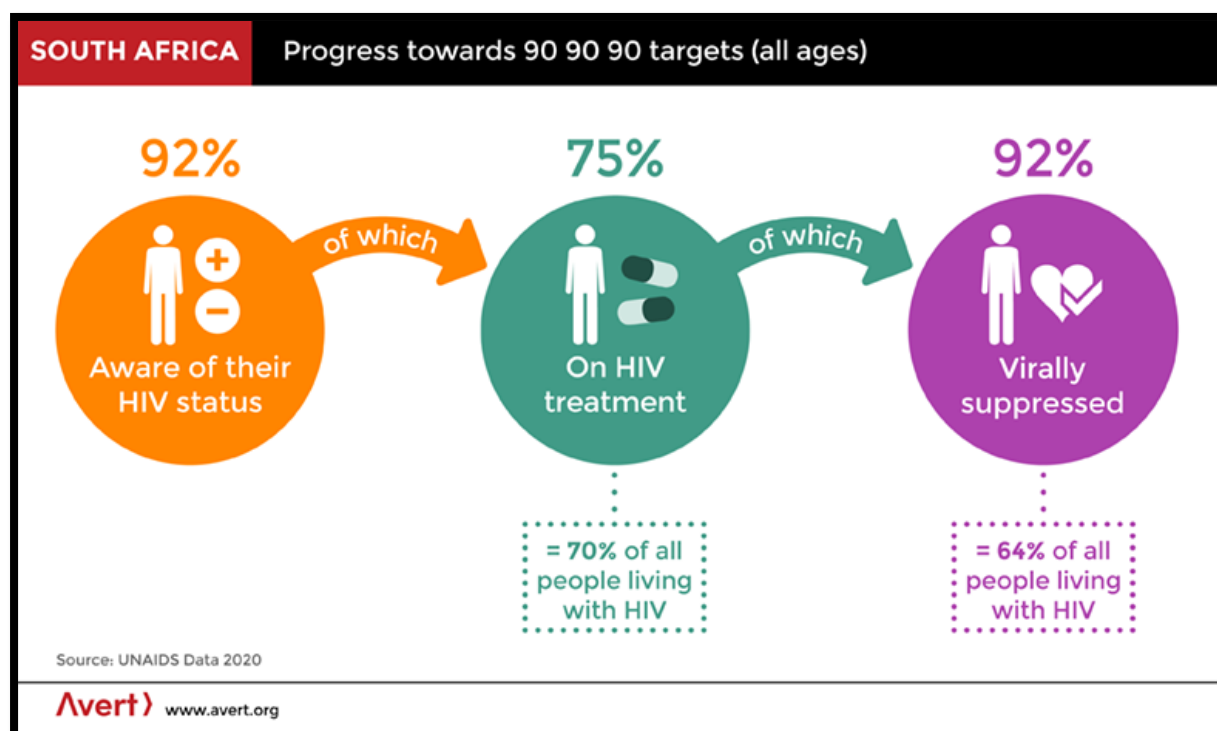


Figure 2.1: South African Progress Towards 90-90-90 Targets (Avert, 2020)

2.4. Retention in Care of HIV Positive Patients on ART

According to Makgato (2018), ensuring the success of the South African ART programme is reliant on identifying HIV positive people in the early stages of the infection. They should be rapidly put on ART so that high viral suppression rates can be achieved. This also aids in the early identification and appropriate mitigation of possible ART toxicities. This generally leads to a significant number of those on ART being retained in care. The ART retention rate targets for South Africa are outlined as follows:

- a) 94% at 12 months;
- b) 88% at 24 months;
- c) 82% at 36 months;
- d) 76% at 48 months; and

- e) 70% at 60 months of being on ART.

However, the country currently still struggles to achieve these targets (Makgato, 2018). According to Penn et al., (2018) sub-Saharan African ART programmes managed to retain between 70% and 80% of patients initiated on treatment in care within the first six months between 2002 and 2009. This was achieved through patient-oriented supportive interventions with an estimated amount of 80 over time, with a retention in care rate after of roughly 70% recorded after 24 months of ART, and 65% after 36 months (Penn et al., 2018).

2.5. ART Lost to Follow-Up of People Living with HIV

High LTFU rates observed for HIV positive patients on ART have a negative impact on the success and effectiveness of ART care. A review study conducted on African ART programmes found concerning cumulative proportions of LTFU after 24 months of patients on ART, ranging between 15% to 54% (Van Cutsem et al., 2011). According to Mberi et al., (2015) the LTFU incidence is highest amongst patients who have been on ART for a prolonged period (in years), and that there should be measures put in place to identify and effectively deal with patients at risk of becoming LTFU. Literature recommends for patients that are reported as lost to follow-up to be followed up/ traced since they might have likely continued treatment at other health facilities to avoid misreporting and account for these patients (Semenya, 2013).

2.6. Health Information Management

The World Health Organization (2007) identifies health information as one of the health system's strengthening building blocks. Information generated by health facilities affords health leaders the opportunity to obtain means through which improved policy planning as well as implementation/evaluation of key health programmes may be measured. However, challenges regarding accuracy, completeness, and timeliness of health information systems have been identified when evaluating health facility routine data, with low- and middle-income countries' (LMIC) health facilities being the most affected (Skiti, 2017).

2.7. Data Management in Facilities

TIER.Net was developed by the South African Department of Health (NDoH) as a health information system to improve the quality of routine data collection for the HIV

programme including monitoring and management of HIV positive patients (Skiti, 2017). According to Tanna (2017), timely access to medical records is not only critical in improving the provision of healthcare services, but also in reducing healthcare related costs, improving productivity, and facilitating seamless and effective communication between patients and healthcare professionals.

The inefficiencies that exist in the national ART programme have contributed to a rise in ART LTFU rates, a high percentage of ART out of stocks, viral load tests being completed and updated for only a certain number of patients, and poor utilisation of TIER.Net reports (Skiti, 2017). According to Struthers et al., (2013) South Africa has put adequate measures in place for generation, collection, and distribution of health information systems; however, utilisation thereof for driving allocation of resources and implementation of corrective actions seems inadequate.

Struthers et al., (2013) further alludes to the challenges on the quality of data generated by health facilities across South African governmental health facilities. The incorrect implementation of available data collection tools, including forms used for data collection and TIER.Net, contributes to some of the factors leading to poor data quality. A study conducted by Skiti (2017) in the Ekurhuleni District of Gauteng found that health facilities and HAST co-ordinators experience challenges regarding effective and efficient utilisation of TIER.Net. The study also shows evidence of poor monitoring and performance of districts on priority indicators, including high lost to follow-up rates amongst HIV positive patients on ART.

According to Menachemi and Collum (2011), some of the benefits associated with implementation of electronic health record (EHR) systems include, but are not limited to:

- a) Migration from paper-based systems to more advanced electronic systems to facilitate effective clinical outcomes, ensuring provision of quality and safe healthcare services;
- b) Organisational outcomes in terms of better operational or financial planning; and

- c) Societal outcomes, which refer to the facilitation of availability and access to data for research purposes, as well as the ability to improve health outcomes of the population.

Health information management at facility level requires robust analysis and monitoring of health indicators based on quality data collected. However; concerns regarding the lack of sufficient skills by frontline managers to analyse and use data generated at facility level have been highlighted in studies conducted within SA and other African countries including Ethiopia, Kenya and Ghana. The responsibility of data management at facility level should not only be limited to administrative officials. Health care managers including nurses should also be able to understand the importance of data, so that they can be better positioned to analyse and monitor key health indicators. Regular training, in particular operationalised training should be conducted for all officials handling data at different levels of care (Asah, 2021). Role clarification within health information management including across health information systems is critical as it allows officials at facility level to not only know and understand what is expected from them but also holds them accountable.

2.8. Dispensary Dispensing Data

According to Tweya et al., (2012) utilisation of pharmacy records on dispensed ART, to estimate retention of patients on ART was the same as the one obtained from the electronic data system- or paper-based registers. Obugu (2011) also found that a system implemented by one hospital in South Africa's Gauteng province was effective in identifying patients who missed ART collections at the pharmacy. This system relied on the submission of such patients' names by the pharmacy section to the administration section for the tracking and tracing of these patients. As such, immediate follow-ups and treatment impediments were quickly addressed. This was reported to improve the retention rate of HIV positive patients on ART (Tweya et al., 2012). However, the success of this system at the hospitals was negatively affected by the following:

- a) No formally documented standard operating procedure was in place at the pharmacy;
- b) The number of patients increased significantly; the pharmacy was always short of manpower and, as such, did not have the capacity to cope with attending to

patients while also paying attention to the number of patients who were coming for treatment; and

- c) The data collection system was not optimal, leading to inadequate follow-up of patients in general.

2.9. Summary

The literature reviewed illustrates efforts that have been put in place for improved access to antiretroviral treatment for HIV positive patients with the universal test and treat strategy. Before patients are reported as lost to follow-up (LTFU), it should be determined whether patients have passed away or are continuing treatment at other facilities. Measures should be put in place to promote timeous tracing of these patients and linking them back to care. The literature review conducted provides the background that informs the need of the current study to improve the early identification of patients on ART at risk of not being retained on treatment.



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CHAPTER: 3 RESEARCH METHODOLOGY

3.1. Introduction

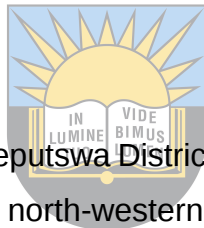
This chapter describes the research design, the research setting, population, sample and sampling procedure, ethical considerations, data collection instruments and procedure, and data analysis.

3.2. Research Design

To improve the identification and monitoring of patients on lost to follow-up in Lejweleputswa District, Free State, this study employed a retrospective, quantitative, and descriptive review of 382 medical records, along with TIER.Net and HPRS reports. In this way, factors contributing to the discrepancy between the fixed dose combination (FDC) Tenofovir/Emtricitabine/Efavirenz (TEE) dispensing data and patients on FDC TEE captured on TIER.Net and Health Patient Registration System (HPRS) were determined.

3.3. Research Setting

The study was conducted in Lejweleputswa District of the Free State Province in South Africa. The district is found in the north-western part of the Free State province. It comprises five local municipalities/sub-districts, namely Masilonyana, Tokologo, Tswelopele, Matjhabeng, and Nala (MoSA, 2021). There are 42 fixed facilities that provide ART services (FSDoH, 2020) within these sub-districts. According Statistics South Africa (2016), the total population of Lejweleputswa District stands at roughly 662 866 people. The number of HIV positive patients still receiving and taking ART in the district by the end of the 2018/2019 financial year was 71 713, the lost to follow up rate of HIV positive patients on ART was reported at 0.47 for the same financial year. A total number of five primary healthcare (PHC) facilities, each representing the sub-districts in the district, were selected as data collection sites. The map of Lejweleputswa District is shown in Figure 3.1 on the next page.



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Figure 3.1: Lejweleputswa District (MoSA, 2022)

Data collection was conducted at five sub-districts and health facilities, namely:

- a) Welkom Clinic in the Matjhabeng sub-district;
- b) Tshwaraganang (Hertzogville) clinic in the Tokologo sub-district;
- c) Albert Luthuli Clinic in the Nala sub-district;
- d) Phahameng Clinic in the Tswelopele sub-district; and
- e) Marantha Clinic in the Masilonyana sub-district.

3.4. Study Population

Medical records of adult patients who received TEE at these five PHC facilities in Lejweleputswa, and who had been on treatment for more than 12 months between January 2018 and January 2019, were included for review in the study.

3.4.1. Inclusion Criteria

Medical records of HIV positive patients 18 years and older on TEE for more than a year were included in the study. Medical records of patients under 18 were excluded due to the different dosing requirements and regular reviews needed for this age category. PHC facilities that are reported to be implementing HPRS and on TIER.Net phase-6 with a qualified pharmacist assistant and NIMART trained professional nurse were included in this study.

3.4.2. Exclusion Criteria

Medical records of HIV positive patients who are pregnant individuals and those on TEE for less than a year or new TEE initiates were excluded in this study due to the close monitoring and regular follow ups that may be required for such patients. Missing (patients on TIER.Net but medical record not found) and incomplete medical records (missing contents/ information within the medical record) were also excluded in this study. Additional exclusions included:

- a) Medical records of HIV positive patients on Centralised Chronic Medicines Dispensing and Distribution (CCMDD).

3.5. Sampling

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Five PHC facilities, each representing one of the five sub-districts in the greater Lejweleputswa District, were selected as data collection sites in this study. The sample size for the study was 382 medical records. Sample size was calculated using Cochran's formula (Adam, 2020) as follows:

$$n_o = \frac{Z^2 pq}{e^2}$$

$$\frac{(1.96^2)(0.47)(1-0.47)}{(0.05)^2}$$

$$(0.05)^2$$

where

- a) e is the desired level of precision (i.e. the margin of error) = 0.05;
- b) p is lost to follow-up rate in Lejweleputswa District = 0.47;
- c) q is $1-p = 0.53$; and
- d) Z value = 1.96.

In order to select a representative sample of medical records, a random sample of medical records of HIV positive patients over 18 years were selected for each data collection site. Patients were identified from the aggregated sub-district HIV electronic data sets of all HIV positive patients (to avoid selecting medical records of patients with other chronic and acute medical conditions since the filling system at the facilities is inclusive of medical records of all patients). Medical records that did not meet the inclusion criteria were substituted with the subsequent one. HPRN of selected patients were used for the purpose of accessing their medical records at the data collection sites.

3.6. Research Instrument/Data Collection Tool

A self-designed data collection tool in the form of a checklist, guided by the objectives of the study, was used to collect data from the manual ART patient medical records. The collection tool took the form of an exported Microsoft Excel spreadsheet containing patient information captured on TIER.Net within the stipulated period of the study. The data collection tool comprises of four sections namely: socio-demographic details of the patients, ART medical records details, Prescription details for the prescribed and dispensed TEE and lastly data management details for the patient medical records based on the capturing of the TEE dispensed on HPRS and TIER.Net information systems (*cf.* Annexure C).

3.6.1. To Assess Completeness of Information Recorded on the ART Medical Records by the Prescriber for TEE Therapy

Data was collected from the patient and clinical sections of the clinical stationery. The information recorded on the ART medical record was considered complete if it had the following information: the patient's name, gender, address, date of birth and employment status, the date of the next clinical visit, the date of next TEE collection,

indication of whether or not the date of next clinical visit was adhered to or not, indication of whether or not the date of TEE collection was adhered to or not.

3.6.2. To Assess Validity of Prescriptions Dispensed by Dispensers for TEE Therapy

Data was collected from the prescription section of the clinical stationery during the period under review. A prescription was considered valid if it had all the following information: details of the patient (name, date of birth/age of a patient, address), details of the prescribed ART (the date of prescribing, the name, dose, quantity of the prescribed TEE, whether or not the multi month repeats for TEE were indicated on the prescription) and the signature of the prescriber/clinician.

3.6.3. To Assess the Capturing Process of ART Medical Records for Patients on TEE Therapy from the Dispensary by the Administrative Clerks on TIER.Net and HPRS

The actual process of capturing medical records data from registry into HPRS and TIER.Net was assessed against the expected process (as indicated in the background section of the study). This data was collected by using the HPRN indicated on the medical record selected for the data collection purpose to access the reasons captured on HPRS for the patient's clinic visit in line with what was captured on the clinical stationery. The patient's unique identifying information was used to gain access into TIER.Net to assess whether the dispensary data was captured and how soon after collection of treatment from the dispensary did the capturing take place. A medical record was considered to be compliant with the expected capturing process if it could be confirmed that it was accessed from HPRS using the HPRN, provided to the patient, in the case of follow up: that the clinician captured the review, updated and signed the clinical notes with all the necessary information and valid prescription and in the case of collection of treatment: that data on the dispensed prescription was updated by the dispenser and captured on TIER.Net by the administrative clerk on the day of dispensing before returning the medical record back to registry for filing.

3.6.4. To Compare the Records of Patients on TEE Therapy Captured on TIER.Net and HPRS Against the Dispensary Dispensing Data for TEE

Data was collected by comparing dispensary data on dispensed TEE on the medical record against data of patients reported and captured as having collected TEE from

the dispensary on TIER.Net and HPRS (in line with the reason for the clinic visit- in which case the expectation is for HPRS to indicate that the reason was collection of treatment). If the dispensary data on dispensed TEE in the medical record was the same as the data captured on TIER.Net for patients who collected TEE from the dispensary and such a collection captured on HPRS, then no data discrepancy between TEE dispensary data and TEE captured on the electronic health information systems would be confirmed. However, if the dispensary data on dispensed TEE in the medical record was not the same as the data captured on TIER.Net for patients who collected TEE from the dispensary and such a collection captured on HPRS then data discrepancy between TEE dispensary data and TEE captured on the electronic health information systems would be confirmed.

3.7. Data Collection Procedure

Data collection was conducted during the months of April and May 2021 and May and June 2022 respectively. Leave days were taken and used to collect data, the researcher was the primary data collector. Each facility was allocated normal working hours 7:30 to 16:00 for data collection. All the selected medical records were reviewed against the variables measured and confirmed by the researcher. Prior appointments were secured through the PHC facility managers with the Administrative officers to make sure that their routine functions were not disrupted and to confirm their availability. All the information/ reports from the electronic systems were obtained through their assistance. Medical records that met the selection criteria were used to extract the data. The researcher kept a record of unique codes that were allocated to each data collection tool used per medical record to maintain confidentiality, make provision for potential need for reviews or further clarity by the researcher, to avoid reselecting the same medical record and to delineate it from other research studies that the files had been used for previously. No personal identifying information was included in the final report. Retrieval of medical records that were required was done on the specific data collection day and returned back for filing as soon as the researcher was done with them. Data collection sheets were kept by the researcher in a lockable cupboard only accessible to the researcher for the duration of the data collection period.

3.8. Data Analysis

Descriptive statistical analysis was applied to summarise the data using frequency counts and percentages. The data was analysed using the Social Package for Social Sciences (SPSS version 24.0).

3.9. Ethical Considerations

The University of Fort Hare Ethics Committee granted permission to conduct the study (ethical clearance number HREC- 1008118-054), as evidenced in Annexure A. The Free State Department of Health granted permission for data collection (Annexure B). There was no direct involvement/interaction between the researcher and participants (patients); data was instead collected from the medical records. A self-designed data collection tool was used to ensure confidentiality and anonymity. The patients unique identifying information including identity number, passport number or asylum seekers number were used to access the medical record through HPRS and capture it on TIER.Net. However, this personal identifying information was not included in the final report but a unique code allocated to each selected medical record that met the criteria instead, and used instead. Selected medical records were each linked to a medical record and allocated a unique code for identification. Retrieval of medical records that were required was done on the specific data collection day and returned back for filing as soon as the researcher was done with them. The data collection tools (sheets) were kept by the researcher in a lockable cupboard only accessible to the researcher for the duration of the data collection period.

3.9.1. Informed Consent

Informed consent was not required in this study. The study was a record review with no direct involvement/interaction between the researcher and patients.

3.9.2. Confidentiality and Anonymity of Participant information

The patients unique identifying information including identity number, passport number or asylum seekers number were used to access the medical record through HPRS and capture it on TIER.Net. However, this personal identifying information was not included in the final report but a unique code allocated to each selected medical record that met the criteria instead, and used instead. The unique code that was allocated to each data collection tool per medical record was also used for the purpose of

maintaining confidentiality, accommodating the potential need for reviews or further clarity by the researcher, not reselecting the same medical record and to delineate it from other research studies that the medical record might have been used for previously.

3.10. Reliability and Validity

The study's validity was ensured by developing a tool (checklist) for data collection through consultations and guidance with the researcher's supervisor and mentor, requesting reviews from fellow research students, and by making use of relevant literature reviews for guidance.

The study reliability was ensured by conducting a pilot study in one of the PHC facilities within the Lejweleputswa District. Twenty patient medical records were used to assess the reliability of the data collection tool. The pilot study observed the eligibility criteria for inclusion and exclusion criteria. The data collection tool was reviewed and amended based on the results from the pilot study. Data obtained from the pilot study was not included in the findings and analysis of the main study.

3.11. Summary

This study employed a retrospective, quantitative, and descriptive review of 382 medical records along with reports from TIER.Net and HPRS. Data was collected in Five PHC facilities found within the five sub-districts in Lejweleputswa District, South Africa. The inclusion and exclusion criteria were clearly defined and reasons thereof provided. Descriptive statistical analysis was applied to summarise and report on the findings. The University of Fort Hare Ethics Committee granted permission to conduct the study. The Free State Department of Health granted permission for data collection. There was no direct involvement/interaction between the researcher and participants (patients); data was instead collected from the medical records. A self-designed data collection tool was used to ensure confidentiality and anonymity. The patients' personal identifying information was not included in the final report.

CHAPTER 4: RESULTS AND DISCUSSION

4.1. Introduction

This chapter presents the analysis and implications of results from data collected. The analysis is conducted based on the objectives of the study. Figures are used to illustrate the results of data obtained.

4.2. Socio-Demographic Details

4.2.1. *Assessment of Socio-Demographic Details of the Patients Who Own the Medical Records That Were Selected for Data Collection*

A total amount of 382 patient medical records were reviewed and used for data collection. All the medical records had the patient name, surname and address indicated. A majority of the medical records belonged to females (79%), with medical records from males comprising of 21%. Unique identifying information in the form of an identity, passport or asylum-seeking numbers was indicated in all the medical records. Forty eight percent of the medical records belonged to patients between the ages of 18 and 49 years and 52% of the medical records belonged to patients between the ages of 50 and above. Eighty percent of the medical records belonged to patients who live within the same area as the health facility. Seventy five percent of the medical records belonged to patients from a rural area and 25% from an urban area. Sixty percent of the medical records belonged to unemployed and 40% to employed patients. A graphic representation is provided in Figure 4.1 on the next page.

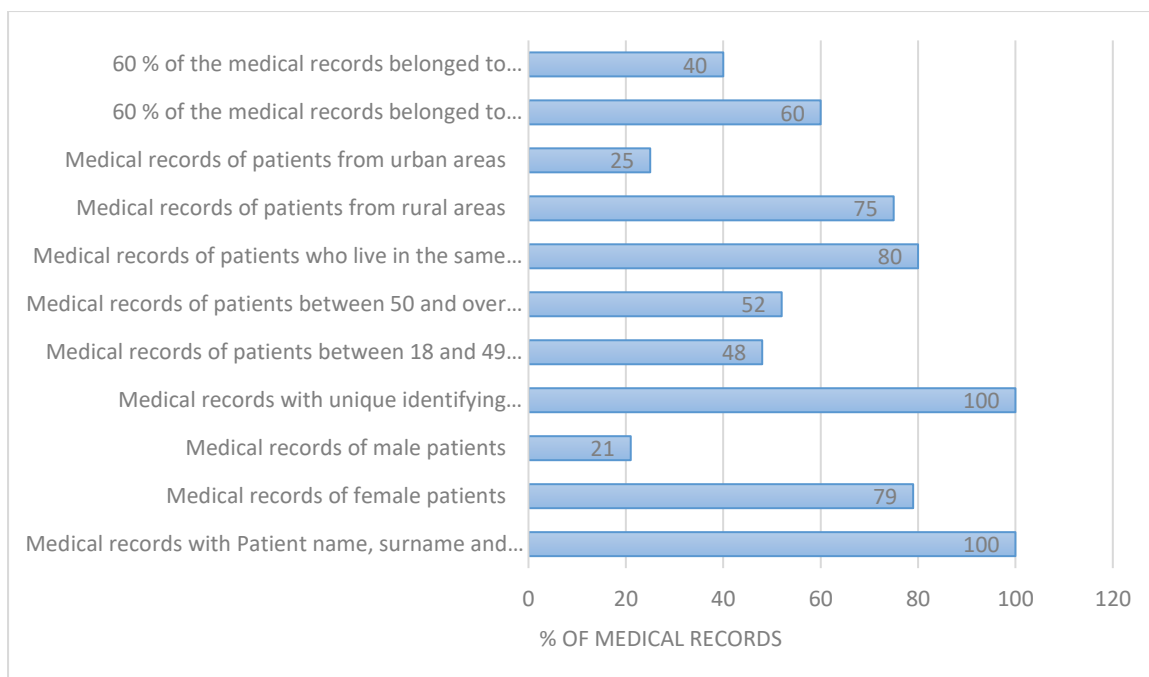


Figure 4.1: Socio-Demographic Details Variables

4.3. ART Medical Record Details

4.3.1. Assessment of the Completeness ART Medical Records by the Prescriber for TEE Therapy

All the medical records had ART (TEE) prescribed and ART start date indicated. The dates for the next clinical visit and TEE collections were indicated in 97% of the medical records; 75% of the patients adhered to their scheduled clinical visits and TEE collections. A graphic representation is provided in Figure 4.2 on the next page.

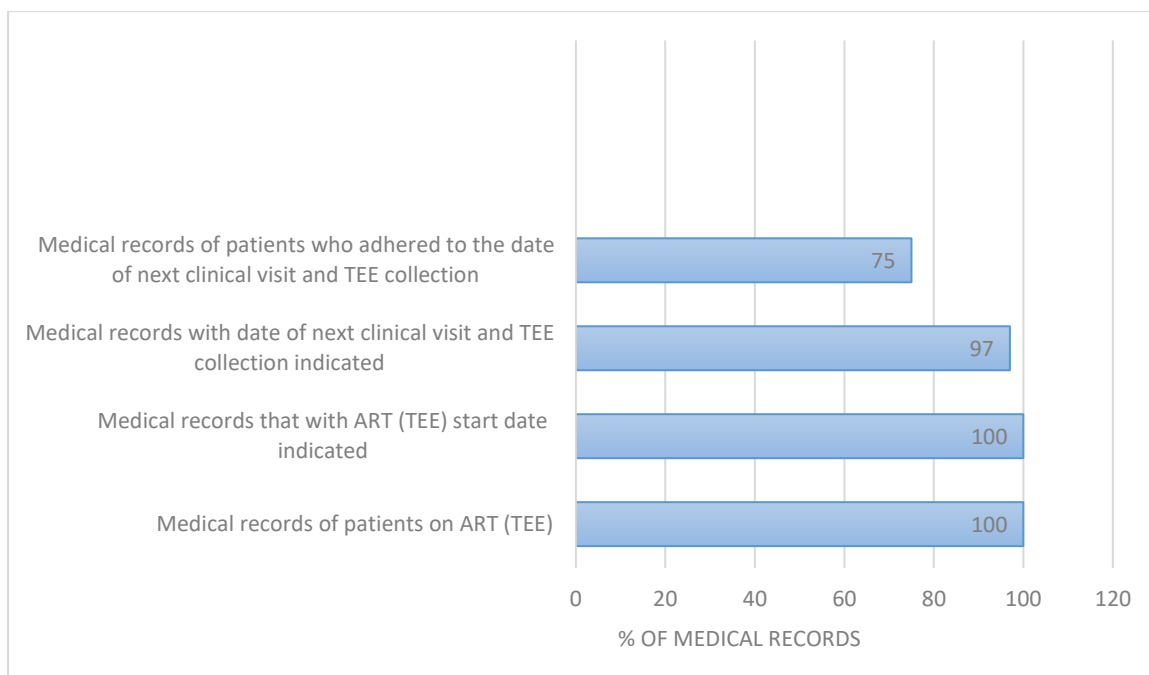


Figure 4.2: ART Medical Records Details Variables

4.4. Prescription Details

4.4.1. Assessment of the Validity of the Prescription Dispensed

The prescribed ART (TEE) was indicated in all the prescriptions with the required details including the name and dosage. The date of prescribing and dispensing respectively were indicated in all the prescriptions. A total amount of 18% of the TEE prescriptions were written as multi month prescriptions by the prescriber. The dispenser dispensed 80% of the TEE prescriptions as multi month prescriptions. Prescribers indicated the quantity of TEE to be dispensed in 73% of the prescriptions. Dispensers correctly dispensed the quantities prescribed in 80% of the prescriptions. Prescribers signed 99% of the TEE prescriptions. Dispensers signed 61% of the prescriptions dispensed. A graphic representation is provided in Figure 4.3 on the next page.

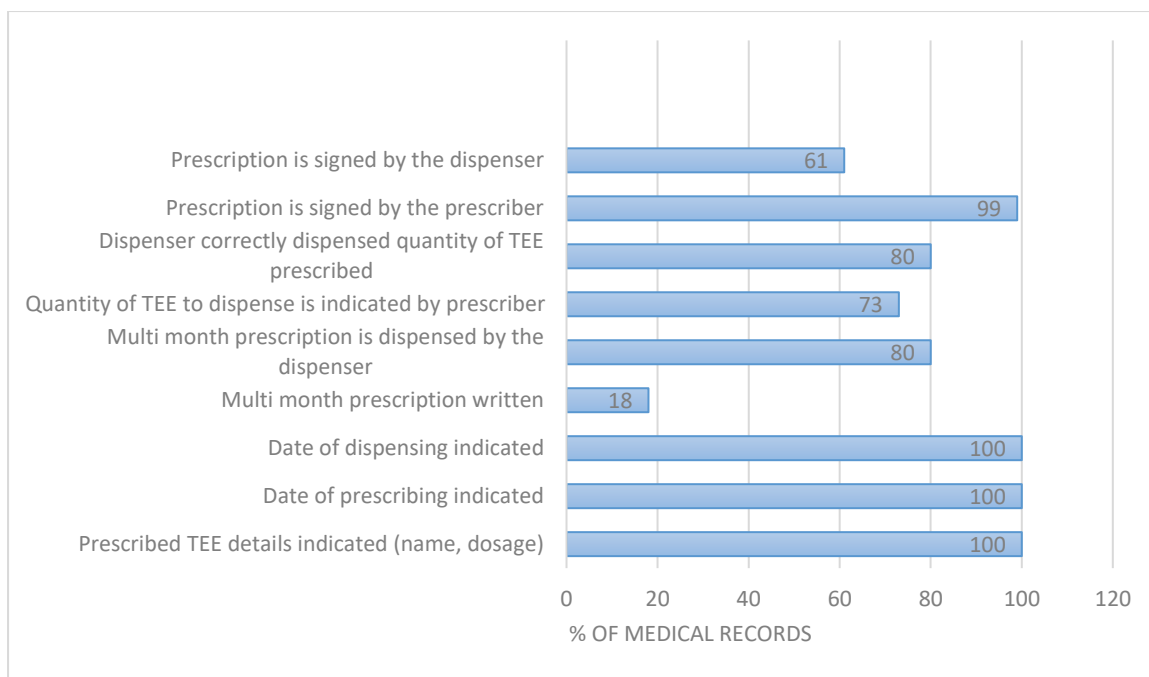


Figure 4.3: Prescription Details Variables

4.5. Data Management of ART Medical Records Details

4.5.1. Assessment of the capturing process of ART medical records from the dispensary by the administrative clerks on TIER.Net and HPRS

4.5.2. Comparison of TEE dispensing data against TEE data captured on TIER.Net and HPRS

Sixty one percent of the TEE dispenses were clearly confirmed (by means of the date, quantity and of signature) by dispensers on the prescriptions. Sixty five percent of the TEE collected from the dispensary was captured on TIER. Net. It could not be determined on none of the medical records whether or not the administrative clerk captured dispensed TEE on the same date of collection from the dispensary on TIER.Net. Subsequently, the actual date of capturing the TEE dispenses on TIER.Net following collection of the treatment from the dispensary could also not be determined. The overall data on TEE dispensed/collected from the dispensary the same was not the same as the data captured on TIER.Net. Thirty five percent of patients reported to have collected their ART according to dispensary data than that reported on TIER.Net. Eighty percent of TEE collected from the dispensary was captured on HPRS. Administrative clerk captured the reason for facility visit as ART collection on the same date of collection from the dispensary on HPRS for 80% of

the medical records. The overall data on TEE dispensed/collected from the dispensary was not the same as the data captured on HPRS. Twenty percent of patients were reported to have collected their ART according to dispensary data than that reported on HPRS. A graphic representation is provided in Figure 4.4 below.

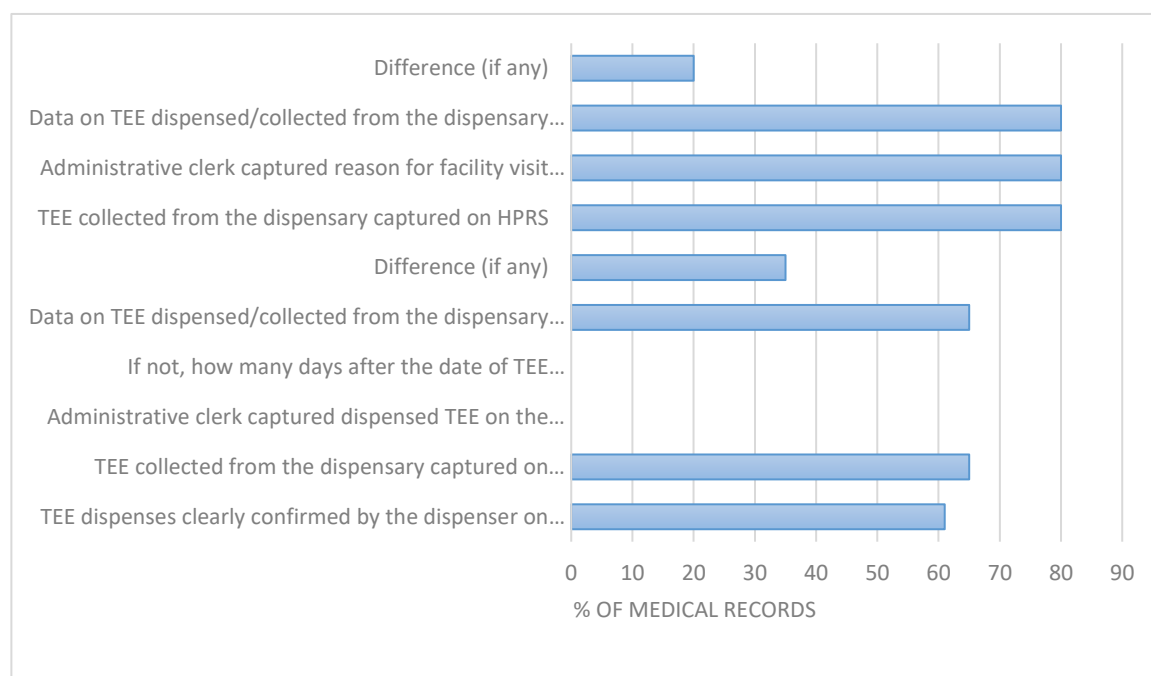


Figure 4.4: Capturing Process of ART Medical Records from the Dispensary by the Administrative Clerks on TIER.Net and HPRS Variables

4.6. Areas of Observation

4.6.1. Assessment Information Connectivity Technology (ICT) infrastructure and requirement

Eighty percent of facilities had an area and computer dedicated for HPRS capturing. None of the facilities had a backup computer for HPRS capturing in cases of theft/breakage. Eighty percent of facilities had an area and computer dedicated for TIER.Net capturing. None of the facilities had a backup computer for TIER.Net and HPRS in cases of theft/breakage. Ninety percent of facilities had at-least two administrative clerks on duty. None of the facilities had access to back up connectivity. A manual capturing process in the form of paper-based head count registers was in place and implemented for 20% of the facilities that did not have a computer dedicated for HPRS capturing. A graphic representation is provided in Figure 4.5 on the next page.

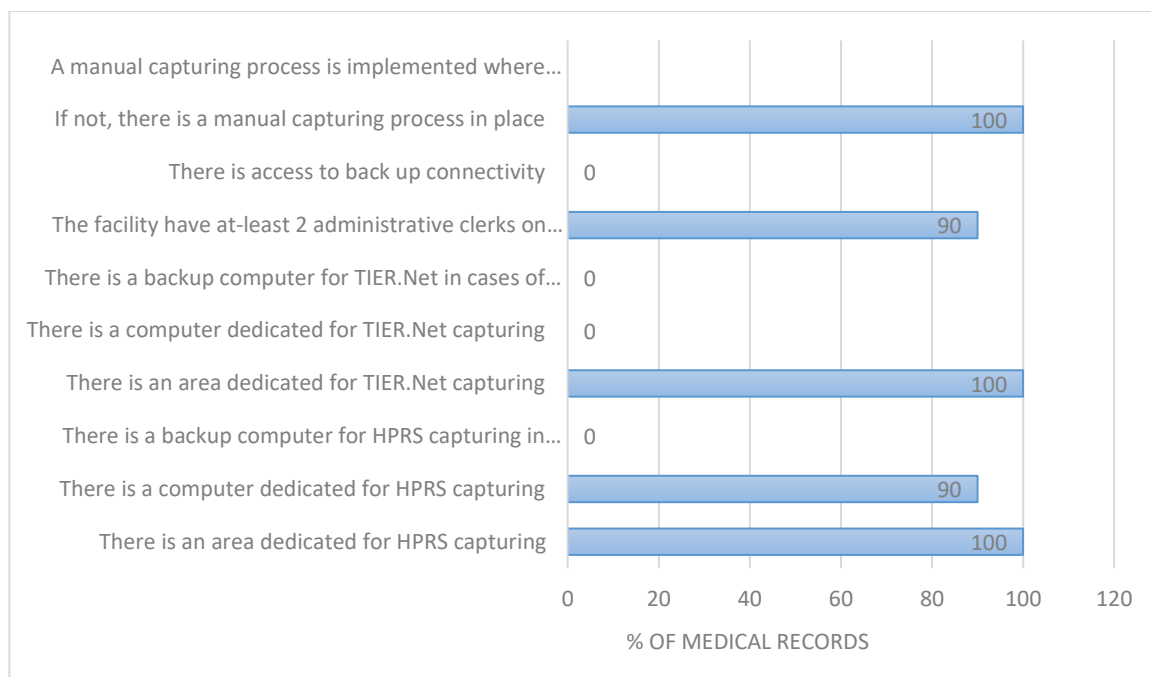


Figure 4.5: Information Connectivity Technology (ICT) infrastructure and requirements Variables

4.7. Discussion and Findings

Objectives of this study were: to assess completeness of information recorded on the ART medical records by the prescriber for TEE therapy, to assess validity of prescriptions dispensed by dispensers for TEE therapy, to assess the capturing process of ART medical records for patients on TEE therapy from the dispensary and by the administration clerks on TIER.Net and HPRS; and to compare the records of patients on TEE captured on TIER.Net and HPRS against the dispensary dispensing data for TEE.

A total amount of 382 patient medical records were reviewed and used for data collection. All the medical records had the patient name, surname and address indicated. A majority of the medical records belonged to females (79%), with medical records from males comprising of 21%. This finding agrees with that of Olanrewaju et al., (2019) who found that men seek health services less salient than females, despite accessibility to healthcare services in communities being the same. A study by Peacock et al., (2008) further added that the healthcare seeking behaviour and access of men towards HIV care related services, like testing, treatment, support services, and other care, was less than that of women. The study indicated how this under-utilisation of HIV services by men undermines prevention and treatment strategies

significantly. According to one of the factors that contributed to the delay or low health seeking behaviour observed in men was the tendency to neglect their symptoms at the early stages of the disease, and to only seek healthcare when the disease was at a much more serious stage (Johansson et al., 2000). However, diagnosis of women happens at earlier age, their education level lower and they had poor conditions of employment which often requires for them to be more dependent on family members as compared to men (Alvarez-Uria et al., 2012). Women are disproportionately affected by HIV in SA, as of 2017, 26% of women were estimated to be living with HIV compared to around 15% of men (Johansson et al., 2000).

Unique identifying information in the form of an identity, passport or asylum-seeking numbers was indicated in all the medical records. Forty eight percent of the medical records belonged to patients between the ages of 18 and 49 years and 52% of the medical records belonged to patients between the ages of 50 and above. According to Johansson et al., (2000) intergenerational relationships between older men, a group with high HIV prevalence, and young women are understood to be driving a cycle of infections – making age a defining risk factor in HIV transmission.

Eighty percent of the medical records belonged to patients who live within the same area as the health facility. According to Bilinski et al., (2017) access of ART services by patients in areas closest to where they live is associated with improved enrolment into the HIV program, reduction of travelling distance and low LTFU. Proximity of ART services and care plays a key role in initiation and adherence to ART in rural areas. A study conducted by Balasundaram et al., (2014) found that patients who lived far from health facilities expressed the most concerns including loss of daily income for the clinic visit day, travelling expenses, difficulty and costs of securing child minders and physical tiredness. However, some patients indicated that they preferred health facilities that are far from where they live due to fear of stigma at the local ART clinics. Twenty five percent of the medical records belonged to patients from a rural area and 25% from an urban area. Sixty percent of the medical records belonged to unemployed and 40% to employed patients. This study agrees with Shisana et al., (2012) who found that people who live in informal areas carry the most risk of contracting HIV and the highest incidence of HIV in comparison to those living in urban areas.

In terms of assessing completeness of information recorded on the ART medical records by the prescriber for TEE therapy assessing the validity of prescriptions dispensed by dispensers for TEE therapy, the findings from medical records that were reviewed for purposes of this confirmed that TEE was indeed prescribed and dispensed across the five data collection sites at Lejweleputswa District. The ART start date was also indicated in all the medical records that were sampled. A concern was raised regarding the suboptimal initiation of eligible patients on ART, with an estimated amount of only 65% of the PLHIV in initiated on ART by June 2019 world-wide (Katuramu et al., 2020). It thus important that information regarding initiation of ART is included and updated within patient medical records as this information enables effective evaluation of the national HIV program, health facility performance monitoring and strengthening of accountability amongst health care professionals (Maskew et al., 2017).

The dates for next clinical visit and TEE collections were indicated in 97% of the medical records reviewed. This is a very important factor for all patients, including patients on ART. It provides a means through which clinical and physiological responses of patients to ART plan may be determined and monitored in line with the treatment through follow ups; adherence of patients to next clinical visits and treatment collection dates creates a platform through which patients may express their opinions and experiences regarding the treatment they are on, affording clinicians the opportunity to identify potential risk factors that may hinder patients from taking their treatment. According to Makunde et al., (2012) all the patients who fail to adhere to scheduled health facility visits and ART collection dates should be identified and traced early, as they are at risk of defaulting on their treatment and becoming lost to follow-up. Rosen and Fox (2011) also indicate that some patients are marked as active in clinical records despite them having discontinued ART.

The study also found that 25% of patients had missed their scheduled/next clinical visits and TEE collection dates. A similar finding is made by Fleishman et al., (2012) who note that 22% of people living with HIV on ART failed to maintain consistent monthly outpatient visits for the collection of ART. Treatment interruptions have a negative impact on individual clinical care and evaluation of the HIV and AIDS programme, as it carries the risk of drug resistance development. It is thus important

to put measures in place to timeously detect and minimise patient lost to follow-up (Van Cutsem et al., 2011). Measures such as utilisation of Pharmacy dispensing data for early identification of patients who were expected to collect their treatment but did not in conjunction with regular capturing/ updating of routinely used health information systems (TIER.Net and HPRS may be useful (Martin et al., 2017).

In terms of assessing validity of prescriptions dispensed by dispensers for TEE therapy, all the prescriptions had the required details including the name and dosage of the prescribed item. The date of prescribing and dispensing were indicated in all prescriptions. Only 18% of prescriptions in this study were prescribed as repeats by prescribers. However, 80% of these prescriptions were dispensed on a repeat basis by the dispenser. The results of the study show that some of the dispensers dispensed items on a repeat basis even though they were not written/prescribed. Pharmacy personnel are mandated to comply with ethical standards and regulations governing the pharmacy profession. Pharmacy personnel who do not comply to these standards and regulations:

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- The logo of the University of Port Harcourt is a circular emblem. It features a yellow sun with rays rising over a blue horizon. Below the sun is an open book with the Latin motto 'IN VIDE' on the left page and 'VIDE' on the right page. The entire emblem is set against a blue background with a yellow border.
- a) Increase the risk of patients experiencing adverse drug reactions;
 - b) Increase the number of patients missing their follow-up visits (in cases where unprescribed/unauthorised multi-month dispenses are made); and
 - c) Contribute to poor clinical monitoring leading to treatment failures, with consequences like increased hospital visits and admissions, and subsequent increased financial implications on the already overburdened health system, and untimely deaths (Defty, 2016).

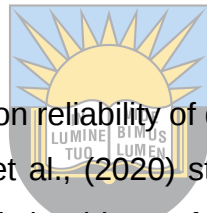
Prescribers indicated the quantity of TEE to be dispensed in 73% of the prescriptions. Dispensers correctly dispensed the quantities prescribed in 80% of the prescriptions. According to South African Good Pharmacy Practice (SAPC, 2004) prescribers are required at all times to indicate the quantity of any prescribed item to dispense. It further stipulates that dispensers may not dispense any quantity unless specified by the prescriber. According to Abdel-Qader et al., (2021) the omission of quantities of prescribed items to dispense on prescriptions also makes it difficult for dispensers to know the quantity to dispense, which might lead to prescription dispensing errors. Dispensing of incorrect quantities to patients is the most common type of prescription-

related error; it is thus important for prescribers to correctly indicate the quantity to be dispensed at all times to prevent such errors. Dispensing of un-prescribed medicines is considered as a dispensing malpractice (Defty, 2016). It affects patients, healthcare providers and clinicians. The significant negative implications on healthcare carried by this malpractice makes is a serious public health concern (Alshammari et al., 2017). It should, however, be noted that findings on the issuing of more than one-month stock of ART by dispensers does not negate the decanting strategies put in place by South Africa to provide patients on chronic medication with more than one month of their medication (Maharaj, 2018), but calls for patients who meet the set criteria to benefit from such strategies.

Ninety nine percent of the TEE prescriptions were signed by the prescriber as confirmation/accountability of the treatment plan for the patient, and to authorise the prescription as required by the GPP regulations (SAPC, 2004). Sixty one percent of the TEE prescriptions dispensed were signed by the dispenser. This means that about 40% of TEE dispensed could not be accounted for or traced back to the dispensary, and is thus not authorised to be dispensed. This unfortunately does not only negatively affect stock control in the dispensaries, but it is also in contravention of the South African HIV management policy, which requires the clear indication and accountability of ART dispensed to patients. This finding agrees with that of Ahmed et al., (2013) who highlighted the importance of clinicians keeping medical records complete, as well as data personnel maintaining proper record keeping for purposes of identifying and monitoring patients at risk of becoming loss to follow-up. According to Makunde et al. (2012), poor recording and accountability of dispensed ART also has the potential to hinder health facilities in reconciling information on the consumption of ART at facility level for future demand and financial planning purposes, and also makes it difficult to manage theft.

In assessing the capturing process of ART medical records for patients on TEE therapy from the dispensary by the administrative clerks on TIER.Net and HPRS, it was found that 61% of the TEE dispenses were clearly confirmed (by means of the date, quantity and of signature) by dispensers on the prescriptions. Sixty five percent of the TEE collected from the dispensary was captured on TIER. Net. However, it could not be determined on any of the medical records whether or not the administrative

clerk captured dispensed TEE on the same date of collection from the dispensary on TIER.Net. Subsequently, the actual date of capturing the TEE dispenses on TIER.Net following collection of the treatment from the dispensary could also not be determined. This is because compared to HPRS, TIER.Net is an electronic database which is not web based (live). It is made up of an electronic register which is off-line and a hybrid which is also predominantly offline. This offline version of TIER.Net is the one that is utilised in public health facilities for the ART program (Iwuji et al., 2021). Meaning that the date on which data is captured may be back-dated to the actual collection date despite the patient being late for collection. This also means that administration clerks may back capture data in cases of power outages, competing priorities and/or absenteeism. It was thus difficult to confidently and reliably use TIER.Net to generate information regarding patients who did not collect their medicines on the expected collection date; it was also not possible to generate a report specific to the number of days elapsed from the expected ART collection date of the patient in relation to the actual TIER.Net capturing.



The finding regarding the concern on reliability of data/reports from TIER.Net made in this study is supported by Etoori et al., (2020) study on TIER.Net misreporting and potential national programme statistics biases following reports from the TIER.Net database, in which 36% of patient outcomes were misclassified by TIER.Net. The lost to follow-up rate was also overestimated, 43% of the transfers out and 40% of the deaths that occurred were also missed by TIER.Net. Etoori et al., (2020) further highlighted the negative implications of misclassification of patient outcomes in TIER.Net on HIV/AIDS programme forecasting, monitoring, and Thirty five percent of patients reported to have collected their ART according to dispensary data than that reported on TIER.Net. This study agrees with Khubone et al., (2020) who found that suboptimal implementation of EHRs can lead to occurrence of errors that carry the risk of negatively affecting integrity and quality of information captured. A number of factors have been identified as impediments to quality data and these include: human resource constraints, limited funds and infrastructure, poor leadership and lack of management. This could have been due to possible delays in capturing of TEE dispenses from the dispensary as and when the patient visits the facility.

Eighty percent of TEE collected from the dispensary was captured on HPRS. Administrative clerk captured the reason for facility visit as ART collection on the same date of collection from the dispensary on HPRS for 80% of the medical records. The overall data on TEE dispensed/collected from the dispensary was not the same as the data captured on HPRS. Twenty percent of patients were reported to have collected their ART according to dispensary data than that reported on HPRS. This was due to the missing 20% data that could not be reconciled with the dispensing data.

Eighty percent of facilities had an area and computer dedicated for HPRS capturing. None of the facilities had a backup computer for HPRS capturing in cases of theft/breakage. Eighty percent of the facilities had an area and computer dedicated for TIER.Net capturing. None of the facilities had a backup computer for TIER.Net and HPRS in cases of theft/breakage. Ninety percent of the facilities had at-least two administrative clerks on duty. None of the facilities had access to back up connectivity. A manual capturing process in the form of paper-based head count registers was in place and implemented for 20% of the facilities that did not have a computer dedicated for HPRS capturing. According to Osler et al., (2014) paper-based systems are likely to remain used in facilities for years to come, especially in small rural clinics and those without stable electricity, as well as new ART services because they allow for immediate implementation of a monitoring system with rapid migration to an electronic register when resources (human, financial, material) become available. This was particularly evident in the current study with the majority of the districts being rural and having resource constraints.

According to Katurura et al., (2018) many African countries struggle to successfully implement their national electronic health registers (EHRs), with Ghana and Malawi experiencing challenges including inconsistent supply and availability of electricity, unwillingness of healthcare workers to use the electronic registers, and poor governmental support. This finding agrees with that (Dornan et al., 2019). Their research found infrastructural constraints, including lack of reliable electricity supply (due to load shedding (intentional power cuts) and electric cable theft) and limited ICT infrastructure and requirements (including human resource capacity), as factors affecting effective implementation of EHRs in Asia. This current study also found

similar challenges which contributed as impediments of efficient utilisation of the two electronic systems (TIER.Net and HPRS).

4.8. Summary

The aim of this study was to determine factors contributing to the discrepancy between the TEE dispensing data, TIER.net and HPRS. The following factors were found: Poor records keeping, unauthorised dispensing of prescriptions, poor data management, delays and non- capturing of ART medical records and infrastructural and human resource challenges that exist in the data management of the patient medical records. There is a need to address these gaps in order to improve reliability of dispensary data, as well as reports from TIER.Net and HPRS, in order to streamline the identification and monitoring of patients at risk of becoming lost to follow-up.



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CHAPTER 5: SUMMARY OF THE STUDY

5.1. Introduction

The key findings, limitations, and conclusion of the study are presented in this chapter. The conclusion is presented based on the study objectives, and recommendations are made based on the findings of the study.

5.2. Summary of the Study

The aim of the study was achieved based on the set of research objectives outlined in Chapter One. Factors contributing to the discrepancy between the TEE dispensing data, TIER.Net and HPRS were found to be

- a) Poor record keeping;
- b) Unauthorised dispensing of prescriptions;
- c) Poor data management and delays and non-capturing of ART medical records; and
- d) Infrastructural and human resource challenges that exist in the data management of the patient medical records.



The study was conducted to determine reasons behind concerns regarding the increase in the amount of TEE ordered and delivered to health facilities by the medical depot and other managers, with no significant contribution on the performance of the province on the total patients remaining on the item as per TIER.Net and DHIS reports observed. Different claims regarding possible irrational use of ART or poor data management and reporting were made in different meeting platforms. The possibility of irrational ART use, which forms a large part of the health budget, was a matter of great concern, hence the reason to determine the cause of this discrepancy.

5.3. Key Findings of the Study

Three hundred and eighty-two patient medical records were reviewed and used for data collection. All the medical records had the patient name, surname and address indicated. Seventy nine percent of the medical records belonged to females, and 21% to males. Unique identifying information was indicated in all the medical records. Forty eight percent of the medical records belonged to patients between the ages of 18 and 49 years and 52% of the medical records belonged to patients between the ages of

50 and above. Eighty percent of the medical records belonged to patients who live within the same area as the health facility. Seventy five percent of the medical records belonged to patients from a rural area and 25% from an urban area. Sixty percent of the medical records belonged to unemployed and 40% to employed patients. TEE was prescribed in 100% of the medical records and the start date indicated. The dates for the next clinical visit and TEE collections were indicated in 97% of the medical records; 75% of the patients adhered to their scheduled clinical visits and TEE collections.

The prescribed ART (TEE) was indicated in all the prescriptions with the required details including the name and dosage. The date of prescribing and dispensing respectively were indicated in all the prescriptions. A total amount of 18% of the TEE prescriptions were written as multi month prescriptions by the prescriber. The dispenser dispensed 80% of the TEE prescriptions as multi month prescriptions. Prescribers indicated the quantity of TEE to be dispensed in 73% of the prescriptions. Dispensers correctly dispensed the quantities prescribed in 80% of the prescriptions. Prescribers signed 99% of the TEE prescriptions. Dispensers signed 61% of the prescriptions dispensed.

Sixty one percent of the TEE dispenses were clearly confirmed (by means of the date, quantity and of signature) by dispensers on the prescriptions. Sixty five percent of the TEE collected from the dispensary was captured on TIER.Net. It could not be determined on none of the medical records whether or not the administrative clerk captured dispensed TEE on the same date of collection from the dispensary on TIER.Net. Subsequently, the actual date of capturing the TEE dispenses on TIER.Net following collection of the treatment from the dispensary could also not be determined. The overall data on TEE dispensed/collected from the dispensary the same was not the same as the data captured on TIER.Net. Thirty five percent of patients reported to have collected their ART according to dispensary data than that reported on TIER.Net. Eighty percent of TEE collected from the dispensary was captured on HPRS. Administrative clerk captured the reason for facility visit as ART collection on the same date of collection from the dispensary on HPRS for 80% of the medical records. The overall data on TEE dispensed/collected from the dispensary was not the same as the data captured on HPRS. Twenty percent of patients were reported to have collected their ART according to dispensary data than that reported on HPRS.

Eighty percent of facilities had an area and computer dedicated for HPRS capturing. None of the facilities had a backup computer for HPRS capturing in cases of theft/breakage. Eighty percent of the facilities had an area and computer dedicated for TIER.Net capturing. None of the facilities had a backup computer for TIER.Net and HPRS in cases of theft/breakage. Ninety percent of the facilities had at-least two administrative clerks on duty. None of the facilities had access to back up connectivity. A manual capturing process in the form of paper-based head count registers was in place and implemented for 20% of the facilities that did not have a computer dedicated for HPRS capturing.

5.4. Strengths and Limitations of the Study

The focus of the study was limited to only five PHC facilities within the Lejweleputswa District, and to 382 medical records, therefore limiting the generalisation of the findings of this study to other districts in the Free State province. In addition, given the retrospective nature of the data, the quality and accuracy of the data collected from the records could not be verified and confirmed; however, missing data and medical records with incomplete data were excluded from the study.

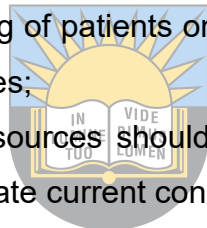
To the best of the researcher's knowledge, no study has previously been conducted on data management discrepancies between the dispensary and TIER.Net on dispensed TEE in Lejweleputswa District, Free State. Thus, the findings of this study provided insight into the factors or challenges contributing to the discrepancy between the TEE dispensing data, TIER.Net, and HPRS. The timeous capturing of TEE dispensed from the dispensary was measured as same-day capturing; there could, however, have been an overestimation on the capturing of TEE dispensed from the dispensary on TIER.Net. This is due to the system not being live and data administrators being able to manipulate or back-date the data of capturing on the system.

5.5. Recommendations

The following recommendations regarding health system operations are suggested:

- a. Refresher training and onsite mentoring should be conducted on record keeping to address incomplete prescriptions and dispensing information on medical records and; non-compliant dispensing of ART at facility level;

- b. Unauthorised dispensing of invalid prescriptions should be prohibited.
- c. Regular supervision on real time capturing and reconciliation of data on HPRS and TIER.Net against medical records should be strengthened.
- d. Functionality of TIER.Net should be reviewed to promote access to real time/ web-based data at any given point in time
- e. Promotion of and education on the utilisation of healthcare services by males should be prioritised; and awareness campaigns should be convened to promote the importance of adherence to ART and develop employment arrangements among both employers and employees that encourage adherence.
- f. Measures such as utilisation of Pharmacy dispensing data for early identification of patients who were expected to collect their treatment but did not in conjunction with regular capturing/ updating of routinely used health information systems (TIER.Net and HPRS) should be put in place for early identification and tracking of patients on ART to mitigate against the risk of high lost to follow-up rates;
- g. Human and material resources should be aided in improving capacity in these areas and to mitigate current constraints; and
- h. Contingency plans for responding to ICT theft, as well as proper leave management, should be put in place



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5.6. Future Research

Future research may explore factors affecting adherence to authorised dispensing of ART prescriptions at PHC facilities in the Free State's Lejweleputswa District. Further, patient perspective on adherence to scheduled clinical visits and ART collection dates could be assessed.

5.7. Conclusion

Majority of the information recorded in medical records that were reviewed were complete, most of the prescriptions that were dispensed were valid, however it was found that poor record and unauthorised dispensing of some prescriptions was evident. The data captured on HPRS and TIER.Net was not the same as the dispensing data. This was attributed to poor data management, delays and non-capturing of medical records on TIER.Net and HPRS and; infrastructural and human

resource challenges that exist in the data management of the patient medical records. There is a need to address these gaps in order to improve reliability of dispensary data, as well as reports from TIER.Net and HPRS, in order to streamline the identification and monitoring of patients at risk of becoming lost to follow-up.



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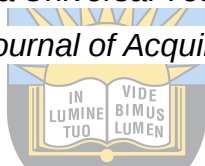
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ANNEXURE A: ETHICAL APPROVAL FROM UFH BREC ETHICAL COMMITTEE



ETHICAL CLEARANCE CERTIFICATE REC-100118-054

Certificate Reference Number: Ref # 2020=12=07=MoatlhodiCM
Project title: Data management and dispensary: Missing link contributing to antiretroviral loss to follow up in Lejweleputswa District, South Africa
Nature of Project: Masters of Public Health
Principal Researcher: Moatlhodi CM
Student Number: 201928125
Supervisor: Prof DT Goon

On behalf of the University of Fort Hare Health Research Ethics Committee (HREC), I hereby give ethical approval in respect of the undertakings contained in the above-mentioned project and research instruments(s). Should any other instruments be used, these require separate authorization. The Researcher may therefore commence with the research as from the date of this certificate, using the reference number indicated above.

Please note that the HREC must be informed immediately of

- Any material change in the conditions or undertakings mentioned in the document
- Any material breaches of ethical undertakings or events that impact upon the ethical conduct of the research

The Principal Researcher must report to the HREC in the prescribed format, where applicable, annually, and at the end of the project, in respect of ethical compliance.



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HEALTH RESEARCH ETHICS COMMITTEE

P.O Box 1054
East London 5200
Tel: +27 (0) 43 704 7368
E-mail: dgoon@ufh.ac.za

The HREC retains the right to

- Withdraw or amend this Ethical Clearance Certificate if
 - Any unethical principles or practices are revealed or suspected
 - relevant information has been withheld or misrepresented
 - regulatory changes of whatsoever nature so require
 - the conditions contained in the Certificate have not been adhered to
- Request access to any information or data at any time during the course or after completion of the project.
- In addition to the need to comply with the highest level of ethical conduct principal investigators must report back annually as an evaluation and monitoring mechanism on the progress being made by the research. Such a report must be sent to HREC monitoring@ufh.ac.za.

The Ethics Committee wishes you well in your research endeavours.

Yours sincerely

Professor DT Goon
Chairperson: HREC
15 December 2020

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ANNEXURE B: ETHICAL APPROVAL FROM FREE STATE DEPARTMENT OF HEALTH



health
Department of
Health
FREE STATE PROVINCE

15 February 2021

Ms CM Moathodi
Dept. of Public Health
UFH

Dear Ms CM Moathodi

Subject: Data management and dispensary: Missing link contributing to antiretroviral loss to follow up in Lejweleputswa District, South Africa.

- Please ensure that you read the whole document. Permission is hereby granted for the above – mentioned research on the following conditions:
- Serious Adverse events to be reported to the Free State department of health and/ or termination of the study
- Ascertain that your data collection exercise neither interferes with the day to day running of **Albert Luthuli Memorial, Marantha., Phahameng (Built), Tshwaraganang (Hertz) & Welkom Clinic** nor the performance of duties by the respondents or health care workers.
- Confidentiality of information will be ensured and please do not obtain information regarding the identity of the participants.
- **Research results and a complete report should be made available to the Free State Department of Health on completion of the study (a hard copy plus a soft copy).**
- Progress report must be presented not later than one year after approval of the project to the Ethics Committee of the University of the Fort Hare and to Free State Department of Health.
- Any amendments, extension or other modifications to the protocol or investigators must be submitted to the Ethics Committee of the University of the Fort Hare and to Free State Department of Health.
- **Conditions stated in your Ethical Approval letter should be adhered to and a final copy of the Ethics Clearance Certificate should be submitted to scheelans@fshealth.gov.za / makenamr@fshealth.gov.za before you commence with the study**
- No financial liability will be placed on the Free State Department of Health
- **Please discuss your study with Institution Manager on commencement for logistical arrangements see 2nd page for contact details.**
- Department of Health to be fully indemnified from any harm that participants and staff experiences in the study
- Researchers will be required to enter in to a formal agreement with the Free State department of health regulating and formalizing the research relationship (document will follow)
- **As part of feedback you will be required to present your study findings/results at the Free State Provincial health research day**

Trust you find the above in order.

Kind Regards

Dr D Motau
HEAD: HEALTH
Date: 16/02/2021

Head : Health
PO Box 227, Bloemfontein, 9300
4th Floor, Executive Suite, Gophelo House, cnr Matland and, Harvey Road, Bloemfontein
Tel: (051) 408 1546 Fax: (051) 408 1556 e-mail: khusem@fshealth.gov.za / chikotvup@fshealth.gov.za

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ANNEXURE C: DATA COLLECTION TOOL



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Data Collection Tool

Does Medical record meet the selection criteria*	YES	NO
--	-----	----

*Only medical records of patients who are (i) over 18 years old, (ii) on TEE (Tenofovir/Efavirenz/Emtricitabine) for at least 1 year, (iii) on treatment at the PHC facility and (iv) be captured on phase 6 TIER.Net and Health Patient Registration System (HPRS)

Unique code number:

Section 1: Socio-Demographic Details

Assessment of the socio-demographic details of the patients who own the medical records that were selected for data collection.

Patient name and surname indicated	YES	NO
Gender		
Unique identifying information (Identity/ Passport/ Asylum seekers number)		
Date of birth/ Age		
Address (same town as health facility, rural or urban)		
Employment status	EMPLOYED	UNEMPLOYED

Section 2: ART Medical records Details

Assessment of the completeness ART medical records by the prescriber for TEE therapy

Date of ART start date is indicated	YES	NO
ART is prescribed	YES	NO

Date of next clinical visit indicated by prescriber	YES	NO
Date of next clinical of next clinical visit adhered to	YES	NO
Date of next TEE collection is indicated by prescriber	YES	NO
Date of next TEE collection adhered to	YES	NO
Section: 3 Prescription Details		
Assessment of the validity of the Prescription dispensed		
Prescribed ART details indicated (name; dosage)	YES	NO
Date of prescribing indicated	YES	NO
Date of dispensing indicated	YES	NO
Multi month prescription written	YES	NO
Multi month prescription is dispensed by the dispenser	YES	NO
Quantity of ART to dispense is indicated by prescriber	YES	NO
Dispenser correctly dispensed quantity of ART prescribed	YES	NO
Prescription is signed by the prescriber	YES	NO
Prescription is signed by the dispenser	YES	NO
Comments:		
Section 4: Data Management of ART Medical records 4.1 Assessment of the capturing process of ART medical records from the dispensary by the administrative clerks on TIER.Net and HPRS; 4.2 Comparism of TEE dispensing data against TEE data captured on TIER.Net and HPRS		
Dispenser clearly confirmed TEE dispenses on the prescription (see dispensing date and signature of dispenser)	YES	NO

TEE collected from the dispensary captured on TIER.Net	YES	NO
Administrative clerk captured dispensed TEE on the same date of collection from the dispensary on TIER.Net.	YES	NO
If not, how many days after the date of TEE collection was capturing on TIER.Net done by the administrative clerk?		
Data on TEE dispensed/collected from the dispensary the same as the data captured on TIER.Net	YES	NO
If not, what is the difference?		
TEE collected from the dispensary captured on HPRS	YES	NO
Administrative clerk captured the reason for facility visit as ART collection on the same date of collection from the dispensary on HPRS for medical records.	YES	NO
Data on TEE dispensed/collected from the dispensary the same as the data captured on HPRS	YES	NO
If not, what is the difference?		
Areas of observation:		
4.3 Assessment Information Connectivity Technology (ICT) infrastructure and requirement		
Is there an area dedicated for HPRS capturing?	YES	NO
Is there a computer dedicated for HPRS capturing?	YES	NO
Is there a backup computer for HPRS capturing in cases of theft/breakage?	YES	NO
Is there an area dedicated for TIER.Net capturing?	YES	NO

Is there a computer dedicated for TIER.Net capturing?	YES	NO
Is there a backup computer for TIER.Net in cases of theft/breakage?	YES	NO
Does the facility have at-least 2 administrative clerks on duty?	YES	NO
Is there access to back up connectivity?	YES	NO
If not, is there a manual capturing process in place?	YES	NO



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ANNEXURE D: EDITING DECLARATION



Proofreading ● Proeflees
Text Editing ● Teksredigerig
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Translation ● Vertaling

HANTA HENNING
0824482726
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DECLARATION: 1 FEBRUARY 2022

Hereby I, Johanna Gertruida (Hanta) Henning, declare that I completed editing of the research dissertation titled *Data Management and Dispensary: Missing Link Contributing to Antiretroviral Loss to Follow-up in Lejweleputswa District* by Charlotte Motshale Moatlhodi (201928125), a research dissertation in partial fulfilment of the master's degree in Public Health requirements in the Faculty of Health Sciences, University of Fort Hare.

Based on the nature of the services performed, the editor cannot be held liable for any of the following:

- i. The accuracy of the material contained in the thesis;
- ii. The accuracy of material as gathered from sources contained in the thesis;
- iii. Any plagiarism that may be present in the thesis;
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- v. Any changes made by the candidate after editing was completed.

A full report of the edited document can be provided upon request.

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ANNEXURE E: TURNITIN DIGITAL RECEIPT AND SIMILARITY REPORT



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Data Management and Dispersary: Missing Link Contributing to
Antenatal Loss to Follow Up in Lepellelephosha District

Charlotte Moshole Moshodi

201920125

Research Dissertation in partial fulfillment of the Master's Degree in Public
Health Requirements in the Faculty of Health Sciences, University of Fort
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Supervisor: Prof D.T. Goom

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