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THE EFFECT OF COVID-19 LOCKDOWN REGULATIONS ON ART INITIATION AMONG PEOPLE LIVING WITH HIV IN JOHANNESBURG, GAUTENG PROVINCE, SOUTH AFRICA.

BY

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A mini dissertation submitted in fulfilment of the requirement for the degree:

Master of Public Health

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FACULTY OF HEALTH SCIENCES

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DECLARATION

I, **NALEDI NKADIMENG,** declare that this proposal entitled ***"The effect of covid-19 lockdown regulations on art initiation among people living with HIV in Johannesburg, Gauteng province, South Africa"*** is my original work in design and execution. I have not previously, in its entirety or part, submitted it at any other university for a degree. All referenced material contained therein has been duly acknowledged and referenced accordingly. This research proposal is submitted in fulfilment of the Faculty of Health Sciences, University of Venda's requirements for the Master of Public Health degree.

NKADIMENG N Date:

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DEDICATION

This study is dedicated to my late mother, Boitumelo Veronica Molale, for loving and always encouraging me to pursue my dreams. My husband for supporting me every step of the way, and my kids. My brother, who is constantly encouraging me to apply for another degree, once said, "We don't rest till we are professors."

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- To the Department of Health and clinic managers for allowing me to collect data to make this research feasible.
- To my close friends and family for love and support.

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LIST OF ACRONYMS AND ABBREVIATIONS

AIDS	:	Acquired Immunodeficiency Syndrome
ART	:	Anti-Retroviral Therapy/ Treatment
ARVs	:	Anti-Retroviral Drugs
COVID-19	:	Corona Virus Disease 2019
DSD	:	Decentralised/Differentiated Service Delivery
HIV	:	Human Immunodeficiency Virus
HREC	:	Health Research Ethics Committee
PHC	:	Primary Health care
PLHIV	:	People Living with HIV/AIDS
PrEP	:	Pre -Exposure Prophylaxis
UNAIDS	:	United Nations Acquired Immunodeficiency Syndrome
WHO	:	World Health Organisation
SPSS	:	Statistical Package for the Social Sciences

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ABSTRACT

Background: The COVID-19 pandemic has profoundly impacted healthcare delivery globally, disrupting services critical to managing chronic conditions like HIV. In South Africa, the burden of HIV, combined with the pandemic's restrictions, presented unique challenges for People Living with HIV (PLHIV). Lockdown regulations, designed to curb the virus's spread, inadvertently hindered access to healthcare services, including Antiretroviral Therapy (ART) initiation. ART is vital for reducing HIV-related morbidity and mortality and achieving global goals like the UNAIDS 90-90-90 targets. This study investigates the effects of lockdown regulations on ART initiation rates in Johannesburg, highlighting the pandemic's implications for HIV management in a resource-limited setting.

Objectives: The study aimed to:

- Assess ART initiation rates before, during, and after COVID-19 lockdown regulations in Johannesburg's Region D, Soweto.
- Examine the barriers that hindered ART initiation during the lockdown period.
- Provide recommendations for healthcare policy and planning to address service disruptions during pandemics or similar crises.

Methods: This quantitative study utilized a retrospective chart review design to evaluate ART initiation trends across eight healthcare facilities in Region D, Soweto. Facilities were selected using simple random sampling to ensure representativeness. Data spanning 2019 (pre-lockdown), 2020–2021 (lockdown period), and 2022 (post-lockdown) were extracted from the Department of Health's databases (DHIS and Tier.net). A self-designed checklist captured key metrics, including demographic data and ART initiation rates. Data analysis involved descriptive and inferential statistics using SPSS Version 29, with visual presentations in charts and tables. Ethical approvals were secured from the University of Venda and relevant health authorities.

Results: The findings revealed a significant decline in ART initiation rates during the COVID-19 lockdown period. Community Health Centres (CHCs) reported a 40% decrease in ART initiation compared to a 20% reduction in primary healthcare clinics. Patient retention rates during the lockdown also varied, with CHCs achieving only 55% retention compared to 75% in clinics. Key barriers identified included restricted mobility due to stringent lockdown measures, fear of exposure to COVID-19, and the reallocation of healthcare resources to pandemic management. Despite these challenges, post-lockdown recovery efforts gradually improved ART initiation and retention.

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Conclusions: The COVID-19 pandemic disrupted ART initiation and highlighted systemic vulnerabilities in HIV service delivery. While necessary to contain the pandemic, lockdown regulations underscored the need for resilient healthcare systems capable of maintaining essential services during crises. This study recommends leveraging technology-based solutions such as telemedicine, scaling up community-based testing, and improving healthcare resource allocation to mitigate the impact of similar disruptions in the future. Ensuring accessibility and continuity of HIV care during pandemics is critical to maintaining progress toward global HIV eradication goals.

Significance of the Study: The study provides critical insights into how lockdown regulations affected ART initiation in a high-HIV-burden setting. By addressing gaps in HIV service delivery during emergencies, the findings can inform public health strategies, strengthen resilience in healthcare systems, and safeguard the health of vulnerable populations during future pandemics.

Recommendations: To enhance the response to healthcare crises, it is essential to strengthen policies that prioritize vital services, ensuring that the initiation of antiretroviral therapy (ART) and overall HIV care experience minimal disruption during emergencies. In this context, expanding telemedicine services can play a crucial role by facilitating remote consultations and effective management of ART. By incorporating telehealth, healthcare providers can continue supporting patients without requiring physical visits, which is particularly important during restrictive mobility. Additionally, increasing community-based testing and treatment outreach programs will help address the challenges of lockdowns and social distancing measures. These initiatives can ensure that individuals can still access essential services without travelling long distances. It is also vital to allocate adequate resources for HIV services during emergencies. This strategic planning will prevent interruptions in care that could jeopardize the health of those living with HIV. Finally, targeted public awareness campaigns should be implemented to reduce fear and stigma surrounding HIV, promoting a proactive approach to healthcare-seeking behaviour even during pandemics. By educating communities about their options and the importance of continued care, we can foster a supportive environment that encourages individuals to seek the help they need.

Keywords: COVID-19, HIV management, ART initiation, lockdown regulations, healthcare resilience, patient retention, public health.

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PREFACE

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

The outline of the dissertation is as follows:

Section A: Mini-dissertation overview

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

Section B: Manuscript

This section contains two manuscripts titled:

- Evaluating the Impact and Challenges of Coronavirus Disease 2019 Lockdown Regulations in Antiretroviral Treatment Initiation and Human Immunodeficiency Virus Management: Artificial Intelligence Tools Aided Systematic Review.
- The Ripple Effect of COVID-19: How Lockdown Regulations Shaped ART Initiation Among People Living with HIV in Johannesburg

Section C: Conclusion, Recommendations and Dissertation Limitations.

Section C presents the study conclusions, recommendations and limitations.

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SECTION ONE:

OVERVIEW OF THE STUDY

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1. INTRODUCTION

1.1 Background

The global landscape underwent a seismic transformation with the advent of the COVID-19 pandemic, causing significant loss of life worldwide. To curtail the virus's rampant transmission, stringent measures, such as lockdown regulations, were imposed across the globe, necessitating the adoption of practices like social distancing and mandatory mask-wearing in public spaces. The magnitude of the pandemic's toll was underscored by the daily escalation of new COVID-19 cases and a distressingly high death count. The World Health Organization (WHO) reported an alarming tally of approximately 6,836,825 COVID-19-related fatalities in 2022 (WHO, 2022), affecting even those individuals with compromised immune systems.

Moreover, People Living with HIV (PLHIV) face an elevated risk, constituting a substantial quarter of the global population, comprising approximately 38.4 million individuals (UNAIDS, 2021). Despite the widespread prevalence of PLWH, attention veered away from HIV for two years, temporarily sidelining the pursuit of the goals set for 2020. Implementing Antiretroviral Therapy (ART) services encountered impediments due to the stringent lockdown measures, culminating in a staggering 70% reduction in ART initiations compared to the previous year (Benade et al., 2022). This decline in ART initiation heightened individuals' vulnerability to opportunistic infections and, notably, to the lethal COVID-19 virus, leading to a surge in mortality rates.

Research conducted in the United States unveiled the disruptive repercussions of COVID-19 on HIV services, manifested in diminished testing rates among men who have sex with men. These challenges hindered both testing and the initiation of ART. The decline in ART initiation, Pre-exposure Prophylaxis (PrEP) uptake, and treatment adherence corresponded

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with an upswing in HIV-related fatalities and COVID-19-related deaths (Mitchell et al., 2021). Meanwhile, Africa, a continent grappling with developmental constraints, fragile healthcare infrastructures, and the burden of diseases such as HIV, TB, and non-communicable chronic ailments, was beset by COVID-19-induced disruptions that hampered progress towards healthcare enhancement and the realization of objectives aimed at combating communicable and non-communicable diseases (Formenti et al., 2022).

This disruption reverberated through disease management, and while comprehensive data on HIV/COVID-19 co-infection or mortality rates in other Sub-Saharan African countries remains scant, South Africa bore witness to around 2,352 COVID-19 cases among PLHIV by June 2020 (Semo et al., 2023). HIV, a stigmatized ailment, often dissuades individuals from seeking timely care or disclosing their status. This issue was further exacerbated during the pandemic due to decreased testing rates during the stringent Level 5 lockdown imposed from March 2020 to May 1st, 2020 (Department of Cooperative Governance and Traditional Affairs, 2020).

During the lockdown, people were forced to stay at home, the use of public transport was restricted, but it operated only for essential workers, and nonessential companies and schools were closed. Essential services were the only ones operating under strict social distancing and the use of masks in public places and when travelling, they should have a permit letter (Orr et al., 2023).

The lockdown posed many challenges, forcing individuals to return to economically disadvantaged households or grapple with job losses. The heightened risk of transmission due to undisclosed HIV status posed a threat to family members. Additionally, individuals already on ART often defaulted to avoid revealing their status (Campbell et al., 2022). However, the lockdown inadvertently fostered stronger family bonds due to increased time spent together. Initiatives that encouraged candid HIV conversations within families aimed to counter stigma

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and enhance HIV awareness. Evidence suggests improved disease understanding was linked to better treatment adherence (Campbell et al., 2022). Several countries successfully employed self-testing kits and online resources for counselling and peer support to sustain ART services (Uwishema et al., 2022).

In the context of Africa, a developing continent grappling with multifaceted challenges, including poverty and limited healthcare access, the sudden and extensive disruption caused by the COVID-19 pandemic threatened progress towards the protection of human rights, including healthcare access and the attainment of UNAIDS goals (commonly referred to as the "90-90-90" goals), which aim to diagnose, treat, and achieve viral suppression for 90% of PLHIV by 2030 (UNAIDS, 2019). The pandemic laid bare the heightened vulnerability of PLHIV, exemplified by the fact that 16% of COVID-19 patients in South Africa were also PLHIV (Brown et al., 2021). The already intricate task of managing HIV in South Africa was further exacerbated by the pandemic, impelling the progress toward achieving the 90-90-90 goals (Jardim et al., 2022).

The pandemic's impact extended to ART initiation rates, exacerbating staffing challenges in healthcare facilities and leaving vulnerable groups of PLHIV without the necessary support (Benade et al., 2022). While the introduction of differentiated service delivery (DSD) by UNAIDS as a COVID-19 response held promise for PLHIV already on ART, its effectiveness for those not on ART remained less explored (Grimsrud & Wilkinson, 2021).

Jewel et al. (2020) discussed that COVID-19 disruption would cause an increased mortality rate for PLHIV in SSA if services are stopped due to social distancing for about 3 months. United Nations (UN) implementing no movement across countries has impacted the supply of medication, condoms, and equipment. Reduced supply impacted drug availability to commence DSD for those already on ART.

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Intervention to mitigate COVID-19 can lead to an increased mortality rate for PLHIV. Social distancing was implemented since COVID-19 was found on air and surfaces. Additionally, it benefited PLHIV as there was less contact with different sexual partners, which curbed the spread. However, we need to ensure enough medication is rolled out during every pandemic to prevent increased mortality rates that might cause another pandemic.

In South Africa, new HIV guidelines were introduced, adapting to the pandemic and outlining DSD eligibility criteria months after the onset of the Level 5 lockdown (Dorward et al., 2021). While various avenues for HIV care exist, Primary Health Care facilities (PHC) predominantly serve as the locus for initial HIV care. Additionally, media entertainment emerged as a potent tool for HIV education and prevention, while accessible distribution of PrEP and HIV self-testing kits played a pivotal role (Birdthistle et al., 2022). Given the technologically savvy nature of upcoming generations, incorporating technology-based approaches could further mitigate HIV transmission and facilitate accessible ART initiation.

Before the pandemic, the prevalence of HIV testing and ART initiation remained steady. However, lockdown regulations led to declining HIV testing and ART initiation. A study conducted in KwaZulu-Natal revealed lower HIV testing rates during lockdown, coupled with a diminished rate of ART initiation (Dorward et al., 2021). Urban areas bore the brunt of this decline, driven by internal migration patterns and socioeconomic factors.

The impact of lockdown measures on ART initiation during the pandemic was palpable. Vital for mitigating virus transmission, HIV testing and awareness of one's status are aligned with UNAIDS 90-90-90 targets. Nevertheless, the stringent lockdown measures from March to May significantly reduced HIV testing and ART initiation rates (Orr et al., 2023). Despite the operational status of healthcare facilities, limited access to public transport impeded

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community members' ability to access healthcare services, particularly in regions where clinics were concentrated in central locations.

As lockdown measures were eased, a resurgence in ART initiation and ongoing HIV care was witnessed. The resumption of temporarily suspended services bolstered this during the lockdown and the revival of community-based testing sites (Brazier et al., 2022). Thus, the dependence on Primary Health Care facilities (PHC) for HIV care and treatment initiation in South Africa is apparent, emphasizing the need for sustained efforts to address socioeconomic barriers to access. The intricate interplay of COVID-19 disruptions and preexisting challenges underscores the complexity of managing HIV. Tackling these challenges and harnessing technology for education and healthcare access could pave the way for a more comprehensive response to the HIV epidemic.

1.2 Problem Statement

On March 21, 2020, South Africa implemented its first level 5 lockdown, imposing stringent movement restrictions and allowing only essential services to operate. This paradigm shifts to the "new normal" significantly impacted various sectors, with the healthcare domain, particularly HIV management, experiencing substantial repercussions. This shift disrupted the progression toward achieving the ambitious 95-95-95 goals (95% of the population knowing their HIV status, 95% of those diagnosed initiating ART, and 95% of those on treatment achieving viral suppression) set to be attained by 2030. HIV testing and immediate initiation are pivotal in curtailing the spread of HIV infection, aligning with the objectives outlined by the South African government and other stakeholders to eradicate HIV. Given that South Africa is a prominent nation in sub-Saharan Africa with substantial statistics of People Living with HIV (PLHIV), any impediment to ART initiation could lead to a surge in HIV transmission rates (StatsSA, 2021). PLHIV are inherently more susceptible to contracting various diseases due to compromised immune systems, particularly those who have not yet initiated ART. The

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onset of strict lockdown regulations instilled fear among individuals, thereby resulting in a reluctance to undergo testing and initiation procedures at healthcare facilities.

Notably, a study by Benade et al. (2022) highlighted a significant reduction in ART initiation during 2020 compared to 2019. This reduction, amounting to 28% in contrast to the preceding year, was observed explicitly in KwaZulu-Natal (KZN). However, limited information exists regarding the impact of lockdown regulations on testing and initiation in the City of Johannesburg. In light of this knowledge gap, the present research aimed to assess the repercussions of COVID-19 lockdown regulations on ART initiation for newly diagnosed PLHIV within the City of Johannesburg. By comprehensively examining this scenario, the research contributed valuable insights into the intricate dynamics and provided recommendations to enhance HIV management strategies during unprecedented disruptions.

1.3 Significance of the study

The research is significant due to the observed decline in the rate of antiretroviral therapy (ART) initiation since the initiation of lockdown regulations compared to the period before these regulations were enforced. The years spanning 2016 to 2019 marked a period of increased testing and treatment, resulting in a notable reduction in HIV transmission rates and related mortality. This trend underscored the efficacy of comprehensive testing and treatment strategies in mitigating the impact of HIV infections. However, the unforeseen onset of the COVID-19 pandemic disrupted the carefully established framework for HIV management, leading to a reduced rate of ART initiations. This disruption was not accounted for when planning HIV ART initiation and management strategies. The empirical study conducted in a specific province, which highlighted the diminished number of ART initiations (Dorward et al., 2021), underscores the gravity of this issue. The imperativeness of having the study conducted yielded insights specific to a society characterized by diverse cultures. Investigating the unique effects of the pandemic on ART initiation within this context may enable the

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formulation of strategic plans that account for cultural diversity. By doing so, future mitigation plans can be developed to encompass the needs and sensitivities of different cultural communities.

The results of this research may serve as a crucial resource for public health practitioners, offering valuable data to shape effective mitigation plans for potential future pandemics. The findings may inform strategies to safeguard community members and effectively manage HIV amidst challenging circumstances. By addressing the challenges highlighted in the study, public health professionals can contribute to the protection of vulnerable populations and the sustained management of HIV infections, ultimately working towards the broader goal of improved public health outcomes.

1.4 Purpose of Study

- To identify the effect of COVID-19 lockdown regulations on ART initiations in the City of Johannesburg, Gauteng Province, South Africa.

1.4.1 OBJECTIVES

- To determine the rate of ART initiation before, during and after COVID-19 lockdown regulations in the City of Johannesburg, Gauteng Province, South Africa.
- To differentiate the rate of ART initiations before, during and after COVID-19 lockdown regulations in the City of Johannesburg, Gauteng Province, South Africa.
- To establish the negative effect of COVID-19 lockdown regulations on ART initiations in the City of Johannesburg, Gauteng Province, South Africa.

1.5 Definition of terms

Effects: The term "effects" is defined as the end product of an action and serves as a noun that signifies an outcome (University of Calgary, 2023). In the context of this study, "effects" refers to the outcomes resulting from the COVID-19 lockdown regulations on the rate of ART initiations.

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Coronavirus disease (COVID-19) lockdown: This term pertains to an infectious disease caused by the SARS-CoV-2 virus (WHO, 2019). Within the scope of this study, "COVID-19 lockdown" refers to the pandemic disease that originated in 2019 but gained efficacy in South Africa in March 2020.

ART initiation: The process of commencing antiretroviral therapy (ART) for individuals who have recently tested positive for HIV. In the context of the study, “ART initiation” refers to the commencement of ART for people living with HIV before, during and after COVID-19 lockdown regulation.

Lockdown: As defined by the government of South Africa, "lockdown" signifies the restriction of personal movement during the period in which the regulation is enforced, limiting the movement of individuals (Government notice, 2020).

People living with HIV: Following the Centers for Disease Control and Prevention, "people living with HIV" refers to individuals who have tested positive for HIV, possess the virus, and cannot eliminate it from their system throughout their lifetime (CDC, 2023).

2. RESEARCH METHODOLOGY

The study implemented a quantitative approach, which is suitable for the study since the researcher wants to quantify data to formulate evidence and reveal patterns in research. Quantitative research is essential for generating knowledge in health sciences and providing evidence for health-related practice, education and management. It attempts to quantify, collect, and analyse numerical data (Botma et al., 2022)

2.1 Research Design

The study employed a Retrospective Chart Review design. A Retrospective Chart Review is a form of clinical research investigation where data is exclusively gathered from medical records or alternative patient databases. Consequently, there is no involvement or engagement with

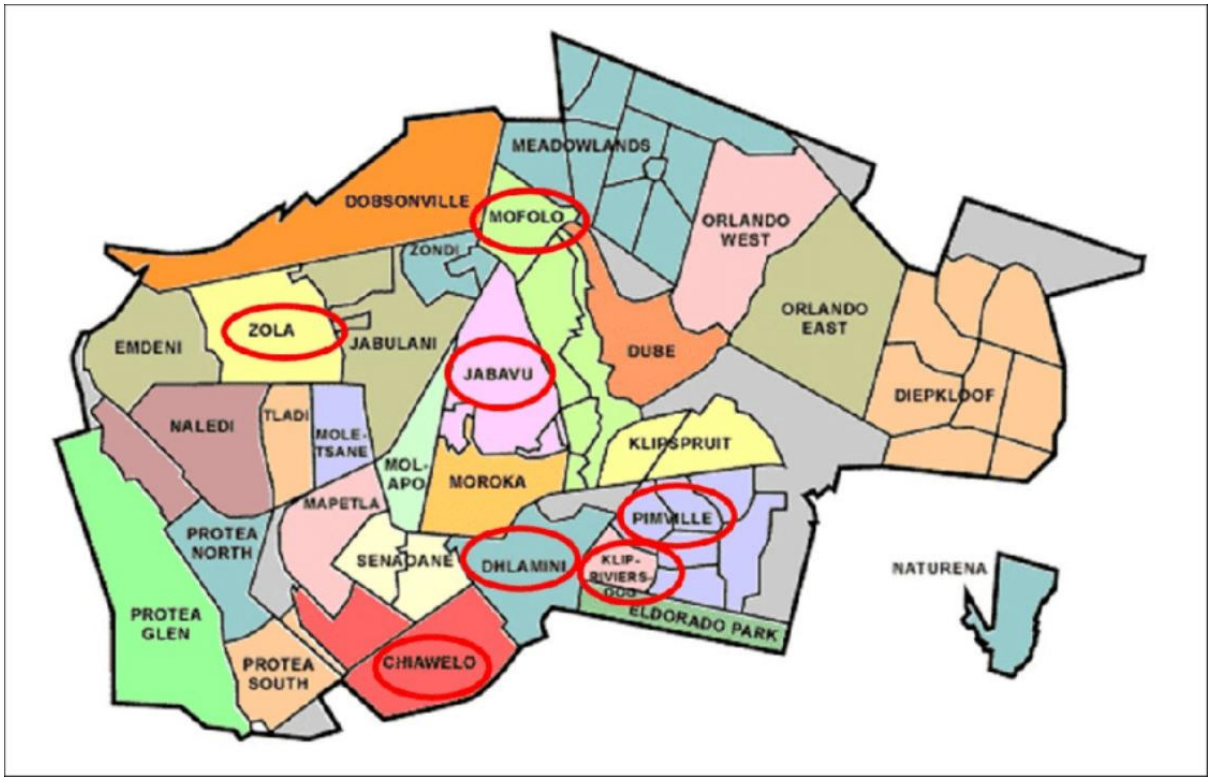
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research participants or direct interaction with them (Vassar & Holzmann, 2013). The data set entailing all PLHIV tested and initiated before, during and after COVID-19 lockdown regulation was extracted from the Department of Health Information System and Tier.net (James et al., 2022).

The researcher chose the research design to determine the rate of ART initiations before, during and after COVID-19 lockdown regulations. This design was suitable for the study for the purpose of using secondary data to achieve set objectives.

The researcher chose the research design to determine the rate of ART initiations before, during and after COVID-19 lockdown regulations. This design was suitable for the study as it used secondary data to achieve set objectives.

2.2. Study setting Please lable the Figure below.



The study was conducted in a township called Soweto, classified under the city of Johannesburg, which is a South-Western township. It comprises 32 townships, making it the largest township in South Africa. It represents different cultures and tribes (Protea Glen. 2023).

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Soweto is divided into 11 regions named with alphabets from A- J. The study focused on Region D, which comprises 28 clinics, including mobile, that render ART services for children, adolescents, adults, and pregnant people. Clinics names are as follows: Siphumlile, Nokuphila, Bophelong, Itereling local and provincial clinic, Zola local and provincial clinic. Klipspruit West, Senaoane, Mobile Clinic Slovo Park, Chiawelo local and provincial clinic, Protea South, Mobile Protea Glen, Tladi main clinic, Mobile Naledi ext 11, Mofolo South local and provincial clinic. Nancefield Hostel Mobile Clinic, Mobile Slovoville, Mobile Kliptown, Jabavu Clinic, Eldorado Park ext 2, Eldorado Park ext 9, Michael Maponya, Diepkloof, Orlando East, Meadowlands Zone 2, Sinqobile, Shanty, Elias Motsoaledi, Noordgesig. The area is multi-cultural, for example Zulu, Sotho, Venda, and Tsonga-speaking people throughout region D. The townships are classified as low-middle class income communities with a population of 1058,978. Region D faces poverty due to large informal settlements, high unemployment, and low education levels.

2.3 Study Population and Sampling Procedure

2.3.1 Study Population

The study population encompasses the entire group of individuals under investigation to fulfil the study objectives and serve the research purpose (Brink et al., 2018). Soweto Region D, the largest township in SOWETO, has a population of 1,335,297 permanent residents and 28 primary healthcare clinics. This study focused on PLHIV hailing from clinics around Soweto data sets, specifically for those who retrieved their HIV diagnosis during the COVID-19 pandemic but could not commence antiretroviral therapy (ART) due to the constraints imposed by lockdown regulations.

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According to statistics from the City of Johannesburg on 29 November 2020, there were about 756,751 PLHIV by June 2020 compared to 743,063 in 2019. The researcher focused on statistics available in the DIHS database for newly diagnosed PLHIV before, during and after COVID-19 lockdown regulations and newly initiated PLHIV, which are captured under the element of ART adult naïve start in a month.

2.3.2 Sample and Sampling

Sample technique

The sample refers to a subset drawn from the larger population, meticulously selected by the researcher to represent the study's interests. In the context of Soweto's population of PLHIV, the researcher emphasised newly diagnosed individuals and their corresponding ART initiation records during the lockdown period. A multistage sampling procedure was followed. The first sampling technique adopted for this study was simple random sampling. The researcher created a sample frame and randomly chose the sample using elements on the sample frame (Botma et al., 2022). The sample frame included clinics in Region D rendering HIV services, especially initiating newly diagnosed PLHIV from age 15 to 79 years, gender of males and females. The fishbowl technique was used to choose specific clinics where data will be collected. Eight healthcare facilities were selected randomly, comprising four community health centres, and primary health clinics were chosen to represent Region D from 28 clinics.

Stratified random sampling was used to sample data available at the clinic. A stratified random sample is a sampling technique that uses either a random sampling method or a systematic to assign participants or objects to each stratum. There were three strata for region D. The first were newly initiated PLHIV from ages 15-79, both males and females, not pregnant and not having TB before COVID-19, from 1st January 2019 to 31 December 2019. The second strata (during COVID-19) were from 1st January- 31st December 2020 and 1st January- 31 December

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2021. Then, after the COVID-19 lockdown, regulations were eased from 1st January 2022 to 31 December 2022, when travelling regulations were eased.

The advantage of simple random sampling is limited bias, whereby the researcher does not know which clinic names were chosen from the fishbowl, as the sampling was performed by a neutral person in front of the supervisor.

Sample size

The sample size was determined after the correct number of PLHIV was extracted from the database.

2.3.3 Inclusion and Exclusion Criteria

Inclusion criteria encompass all data collected for individuals newly diagnosed with HIV a year before COVID-19 lockdown regulation, during and after COVID-19 lockdown regulations. Conversely, individuals diagnosed with HIV before 2019 before implementing COVID-19 lockdown regulations were excluded from the study. Data extracted for re-initiation before, during and after COVID-19 lockdown regulations were also not included in the study.

2.4 Measurement instrument (data collection tool)

A checklist was used to extract the needed information from data sets provided by the Department of Health-District Health Information System and Tier.net. A self-designed checklist, which included the facility code for anonymity purposes, demographic data and number of initiations according to gender, was used.

2.5 Pretest

In this research context, the pretesting of the Self-Developed Checklist served as a crucial step in the methodological preparation of the study. The Self-Developed Checklist was subjected to a preliminary examination in a controlled setting to evaluate its functionality, clarity, and effectiveness as a data collection instrument (Botma et al., 2022). This process involved

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administering the checklist on a smaller scale (5 Facilities not sampled for this study), typically within a limited sample size, to identify potential shortcomings, ambiguities, or practical issues with the tool. The findings from this pre-test were used to refine and improve the checklist, ensuring that it accurately captured the required data and aligned with the research objectives. This pretesting phase contributed to the overall validity and reliability of the research methodology, enhancing the likelihood of obtaining meaningful and accurate results in the main study.

2.6 Plan for data collection

The researcher applied to the National Health Research Database, which is an electronic repository of health research studies conducted in South Africa. The National Health Research Committee use this database to track trends in research priority areas (NDoH, 2024). A formal letter was drafted and sent to the Department of Health, and an ethical clearance letter from the University of Venda to request permission to access and collect data from their system. A similar procedure was followed to seek approval from the sub-district manager as a directive from the NHRD committee. The data were gathered from The District Health Information System (DHIS) and the tier.net. Data collection was conducted using a self-developed and customized checklist. The researcher scheduled appointments with District managers from local government and Provincial clinics, who provided the necessary data for collection using the checklist. All information obtained from these departments was securely stored on an external drive within the researcher's locked study room.

2.7 Plan for management and analysis

The researcher captured all the data from a self-developed checklist in the Excel program and then translated it to the SPSS version 27. Data cleaning and formatting led to descriptive and inferential analysis. Descriptive analysis included determining the rate of ART initiation before, during and after COVID-19 lockdown regulations. The inferential data analysis

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included running a *t*-test to compare the rate of ART initiations before, during and after COVID-19 lockdown regulations and Cramer's V, which established the effect size of COVID-19 lockdown regulations on ART initiations. The researcher then presented data in a comprehensible visual format using graphs and tables (Botma et al., 2022).

2.8 Ethical consideration

The proposal was submitted to the Department of Public Health, Faculty Higher Degrees Committee for approval. The proposal also sought ethical clearance from the University of Venda Human and Clinical Trial Research Ethics Committee. The researcher applied to the National Health Research Database to seek permission to access data from the Department of Health Gauteng province and Tier.net. An approval letter was provided with details of managers to contact for access to DHIS and Tier.net. The researcher ensured strict privacy and confidentiality measures, limiting data access to only the researcher, supervisor, and co-supervisor.

2.9 Delimitation and limitations of the study

The study was delimited to utilizing existing data sets and records, and it does not involve direct data collection from individuals living with HIV. The study's sample was delimited to the available records at the time of data collection, which may not have represented the entire population of interest. The findings of this study were delimited in terms of their generalizability. They could not be broadly applied to populations beyond the specific context studied. However, they were expected to provide insights that can inform similar research in the future. The study's delimitation included restricting data access to readily available records, which may have limited the depth and specificity of the information that can be analysed.

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2.10 Plan for dissemination and implementation of results

The study findings were shared through a scholarly article to contribute to existing knowledge. Additionally, the results were sent to the National Health Research Committee, accompanied by recommendations.

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REFERENCES

Benade, M., Long, L., Rosen, S., Meyer-Rath, G., Tucker, J., & Miot, J. (2022). Reduction in initiations of HIV in South Africa during Covid pandemic. BMC Health Services Research 22:428 https://doi.org/10.1186/s12913-022-07714-y .

Birdthistle, I., Mulwa, S., Sarrassat, S., Baker, V., Khanyile, D., O'Donnell, D., ... & Cousens, S. (2022). Effects of a multimedia campaign on HIV self-testing and PrEP outcomes among young people in South Africa: a mixed-methods impact evaluation of 'MTV Shuga Down South'. *BMJ global health*, *7*(4), e007641.

Bloomfield, J., Fisher, M.J. (2019). Quantitative research designs. JARNA; 22(2):27-30. https://doi.org/10.33235/jarna.22.2.27-30

Botma, Y., Greeff, M., Makhado, L., Mulaudzi, F.M. (2022). Research in health sciences. 2nd edition. Cape Town, South Africa. Pearson.

Brazier, E., Ajeh, R., Maruri, F., Musick, B., Freeman, A., Wester, C. W., ... & Nasah, J. (2022). Service delivery challenges in HIV care during the first year of the COVID-19 pandemic: results from a site assessment survey across the global IeDEA consortium. *Journal of the International AIDS Society*, *25*(12), e26036.

Brink, H., van der Walt., C., & van Rensburg, G. (2018). Fundamentals of research methodology for health care professionals. 4th edition. Cape Town, South Africa. Juta.

Brown, L. B., Spinelli, M. A., & Gandhi, M. (2021). The interplay between HIV and COVID-19: summary of data and responses to date. Curr Opin. HIV AIDS 16(1): 63–73. https://doi:10.1097/COH.0000000000000659.

Campbell, C. K., Dubé, K., Sauceda, J. A., Ndukwe, S., & Saberi, P. (2022). Antiretroviral therapy experience, satisfaction, and preferences among a diverse sample of young adults living with HIV. *Aids Care*, *34*(9), 1212-1218.

Centers for Disease Control and Prevention. Newly diagnosed with HIV. 2023. https://www.cdc.gov/hiv/basics/livingwithhiv/newly-diagnosed.html

© University of Venda

Coronavirus: President Ramaphosa announces a 21- day lockdown. 2020. https://www.parliament.gov.za/storage/app/media/Publications/InSession/2020-09/final.pdf

Department of Cooperative Governance and Traditional Affairs. (2020). Final- lockdown-regulations. Gauteng, South Africa. Available from: https://www.cogta.gov.za/cgta_2016/wp-content/uploads/2020/03/Final-lockdown-regulations-1.pdf Accessed August 10

Dorward, J., Khubone, T., Gate, K., Ngobese, H., Sookrajh, Y., Mkhize, S., ... & Garrett, N. (2021). The impact of the COVID-19 lockdown on HIV care in 65 South African primary care clinics: an interrupted time series analysis. *The Lancet HIV*, *8*(3), e158-e165.

Embi, P. J., Levy, M. E., Naleway, A. L., Patel, P., Gaglani, M., Natarajan, K., ... & DeSilva, M. B. (2021). Effectiveness of 2-dose vaccination with mRNA COVID-19 vaccines against COVID-19–associated hospitalizations among immunocompromised adults—nine states, January–September 2021. *Morbidity and Mortality Weekly Report*, *70*(44), 1553.

Formenti, B., Gregori, N., Crosato, V., Marchese, V., Tomasoni, L. R., & Castelli, F. (2022). The impact of COVID-19 on communicable and non-communicable diseases in Africa: a narrative review. *Le Infezioni in Medicina*, *30*(1), 30.

Feldman, C. (2020). Potential impact of SARS-CoV-2 infection in HIV-positive patients in South Africa. *Wits Journal of Clinical Medicine*, *2*(Si1), 19-24.

Grimsrud, A., Wilkinson, L. (2021). Acceleration of differentiated service delivery for HIV treatment in sub-Saharan Africa during COVID-19. Journal of the International AIDS Society. 24e25704 https://onlinelibrary.wiley.com/doi/10.1002/jia2.25704

Ikwegbue, P. C., Enaifoghe, A. O., Maduku, H., & Agwuna, L. U. (2021). The Challenges of the COVID-19 Pandemic and South Africa's Response. *African Renaissance*, *18*(1), 271.

© University of Venda

James, T. G., McKee, M. M., Miller, M. D., Sullivan, M. K., Coady, K. A., Varnes, J. R., ... & Cheong, J. (2022). Emergency department utilization among deaf and hard-of-hearing patients: A retrospective chart review. *Disability and Health Journal*, *15*(3), 101327

Jardim, C. G. R., Zamani, R., & Akrami, M. (2020). Maintaining HIV care during the COVID-19 pandemic. Internation journal, Environ. Res. Public health. E308- E309 https://doi.org/10.3390/ijerph191911899

Jewel, B. L., Smith, J. A., & Hallet, T. B. (2020). Understanding the impact of interruptions to HIV services during the COVID-19 pandemic: a modelling study.

Joint United Nations Programme on HIV/AIDS. (2023). Global HIV & AIDS statistics- Fact sheet. Joint United Nations Programme on HIV/AIDS (UNAIDS), Geneva, Switzerland. Available from: https://www.unaids.org/en/resources/fact-sheet Accessed December 10, 2023

Map of SOWETO. https://www.researchgate.net/figure/Map-of-Soweto-townships-Source_fig1_319230197

Mitchell, K. M., Dimitrov, D., Silhol, R., Geidelberg, L., Moore, M., Liu, A., ... & Boily, M. C. (2021). The potential effect of COVID-19-related disruptions on HIV incidence and HIV-related mortality among men who have sex with men in the USA: a modelling study. *The Lancet HIV*, *8*(4), e206-e215.

National Health Research Ethics Council (2024). South African Ethics in Health Research Guidelines: Principles, Processes and Structures, 3rd ed. National Department of Health of the Republic of South Africa. Pretoria: NDoH. 137p. ISBN 978-0-621-52027-9.

Orr, N. M., Hajiyiannis, H., & Motuba, T. (2023). COVID-19 impact on newly initiated and restarted antiretroviral treatment patients in the Eastern Cape, South Africa. *African Journal of Primary Health Care & Family Medicine*, *15*(1), 3811.

Protea Glen. (2023). SOWETO different townships comparison. Johannesburg, South Africa. Available from: https://www.proteaglen.co.za/how-many-townships-are-under-soweto/ Accessed on 2023 June, 06

© University of Venda

Region D Home. City of Johannesburg regions. Available from: https://joburg.org.za/about_/regions/Pages/Region%20D%20-%20Greater%20Soweto/about-us.as Accessed on 2023 December, 4.

Semo, B. W., Ezeokafor, N. A., Oyawola, B., & Mugo, C. (2023). Effect of Multi-Month Dispensing on Viral Suppression for Newly Enrolled Adolescents and Adults in Northern Nigeria. *HIV/AIDS-Research and Palliative Care*, 697-704.

South African history online. (2023). Soweto Region D History, Johannesburg. Johannesburg, South Africa. Available from: https://www.sahistory.org.za/place/soweto-johannesburg Accessed on 2023 June, 06

United Nations. (2023). #Envision2030 Goal 3: Good Health and Well-being Enable. Manhattan, New York. Available from: https://un.org/development/desa/dissabilities/envision2030.html Accessed on 2023 July, 18

University of Calgary, 2023. Definition of effect and affect. Calgary, Canada. Available from: https://www.ucalgary.ca/live-uc-ucalgary-site/sites/default/files/teams/9/affect-effect-grammar-series.pdf Date accessed 2023 April, 10

Uwishema, O., Frederiksen, K. S., Correia, I. F. S., Mahmoud, A., Onyeaka, H., & Dost, B. (2022). The impact of COVID-19 on patients with neurological disorders and their access to healthcare in Africa.

Vassar, M., Holzmann, M., The retrospective chart review: important methodological considerations. J Educ Eval Health Prof. 2013 Nov 30;10:12. doi: 10.3352/jeehp.2013.10.12. PMID: 24324853; PMCID: PMC3853868.

World Health Organisation. (2019). Coronavirus disease (COVID-19) Dashboard. Geneva, Switzerland. Available from: https://www.who.int/emergencies/diseases/novel-coronavirus-2019 Accessed 2024 January, 20

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SECTION TWO:

MANUSCRIPTS/ARTICLES

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2.1 MANUSCRIPT 1: SUBMITTED TO HIV & AIDS REVIEW. INTERNATIONAL JOURNAL OF HIV-RELATED PROBLEMS (UNDER REVIEW)

Manuscript topic: Evaluating the impact and challenges of COVID-19 lockdown regulations in HIV management and Antiretroviral treatment initiation: Artificial Intelligence Tools Aided Systematic Review

Author Guidelines Followed:

https://www.termedia.pl/Journal/HIV_AIDS_Review_International_Journal_of_HIV_Related_Problems-106/For-authors

Manuscript Objective:

- **To evaluate COVID-19 lockdown regulations' impact on HIV management and ART initiation.**
- **To investigate the challenges of COVID-19 lockdown regulations on HIV management and ART initiations.**

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Evaluating the impact and challenges of COVID-19 lockdown regulations in HIV management and Antiretroviral treatment initiation: Artificial Intelligence Tools Aided Systematic Review

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Abstract

The COVID-19 pandemic had a significant impact on the healthcare system, leading to unprecedented challenges for People Living with Human Immunodeficiency Virus (PLHIV). The care and distribution of Antiretroviral Therapy (ART) for HIV were affected. This review aims to evaluate the impact COVID-19 had on HIV management and ART initiation with the help of AI tools. The systematic review followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses protocol) as a guideline. Databases such as Google Scholar, EBSCOhost, ScienceDirect, and PubMed were used with the help of AI tools to enhance the literature search. 17,341 articles were identified across the databases, with 19 retrieved for full-text access. Ultimately, 07 articles were included in the review. The results showed that COVID-19 lockdown regulations had primarily negative impacts on ART initiation and mixed impacts, highlighting both positive and negative effects. The COVID-19 pandemic and lockdown regulations negatively affected HIV services in South African primary healthcare settings. This disruption impeded progress toward the goal of eradicating the HIV epidemic by 2030. Integrating AI and the Ubuntu philosophy can offer innovative, community-focused solutions, emphasizing collective responsibility and interconnectedness in managing HIV during future pandemics.

Keywords: AI tools, ART initiations, Challenges, Impact, COVID-19, HIV management, lockdown regulations

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Introduction

The global healthcare systems have been significantly impacted by the COVID-19 pandemic, particularly in the management of HIV and the distribution of antiretroviral therapy (ART). Several studies, including those by Mhango et al. (2020), Kaswa (2021), Benade et al. (2022), and Winwood et al. (2021) have highlighted the challenges faced in this area. In South Africa, government-imposed lockdown measures aimed at controlling the spread of COVID-19 have disrupted the regular provision of HIV services and the initiation of antiretroviral treatment (ART), as observed by (Staden et al. (2022), Nyasulu and Pandya (2020), and Winwood et al. (2021). These disruptions have created significant obstacles for individuals living with HIV, making it more challenging for them to access necessary care and services. The restrictions have led to delays in starting treatment, interruptions in ongoing care, and reduced access to essential health resources, further compounding the difficulties faced by this vulnerable population during an already challenging period.

Heretofore the COVID-19 outbreak, South Africa's (SA) healthcare system was already grappling with the high burden of HIV, with over 7 million people living with the virus (Nyasulu & Pandya, 2020; Armbruster et al., 2020; Quilantang et al., 2020; Winwood et al., 2021; Staden et al., 2022). The COVID-19 pandemic has further strained the system, as resources and attention have been diverted to address the immediate health crisis (Nyasulu & Pandya, 2020). The lockdown regulations, which included stay-at-home orders, physical distancing, and restricted movement, have had significant consequences for people living with HIV (PLHIV) in accessing essential services (Kaswa, 2021; Mhango et al., 2020; Closson et al., 2020; Linnemayr et al., 2021; Staden et al., 2022; Nyasulu & Pandya, 2020; Nyoni & Okumu, 2020).

Evidence suggests that the COVID-19 pandemic has led to disruptions in HIV testing, treatment adherence, and the initiation of antiretroviral therapy (ART) in South Africa (Winwood et al., 2021). The closure of HIV clinics, reduced availability of transport,

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and fear of contracting the virus have all contributed to a decline in the utilization of HIV services, particularly among adolescents and young adults living with HIV (Van Wyk & Mayman, 2022; Maurice, 2014; Nglazi et al., 2012). Moreover, the financial implications of the pandemic have further exacerbated the challenges faced by individuals living with HIV, as job losses and economic instability have made it more difficult for them to access and afford healthcare.

Tshimula et al. (2024) and Abdulkareem and Petersen (2021) have shown that Artificial intelligence (AI) and machine learning have improved public health. AI tools aided in processing large volumes of datasets to fast-track early disease detection, prevention and surveillance by showing results relevant to the stipulated challenges, which optimize specialized prevention and treatment plans for comprehensive populations. Summarized data expedites the process of determining outbreaks for fast response and management. Integrating artificial intelligence into research methodology has created opportunities and ways to address healthcare challenges in resource-limited environments. Using AI tools, especially for systematic review, can enhance the processing of large volumes of data and literature synthesis (Okeibunor et al., 2023).

This systematic review utilizes AI tools to provide a comprehensive overview of the barriers and challenges faced in HIV treatment during the COVID-19 pandemic. The objectives of this review are to (1) identify key barriers to HIV treatment amid the COVID-19 pandemic, and (2) evaluate the impact of COVID-19 on healthcare access for people living with HIV.

Review question

- What is the impact of COVID-19 lockdown regulation on ART initiations and HIV treatment care?
- What challenges did COVID-19 lockdown regulations have on HIV treatment care and ART initiations?

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Methods

The authors employed a systematic review method, which is used to identify relevant research, critically appraise data, and analyse findings in a transparent and reproducible way (Snyder, 2019). The systematic research method was conducted to evaluate the impact COVID-19 lockdown regulations had on HIV management and ART initiations and identify challenges PLHIV had due to COVID-19 lockdown regulations. PRISMA (Preferred Reporting Items for Systematic Review and Meta-Analysis protocol) was followed.

Selection strategy

The screening process began by reviewing article titles and abstracts to select those that met the inclusion criteria to address the study's primary aim and those that were excluded from the study, along with the reasons provided (see Fig 1) (Ngcobo et al., 2022). Search terms such as "ART initiations, Challenges, Impact, COVID-19, HIV treatment, lockdown regulations" were used to select articles published between 2020 and 2024. Databases including Google Scholar, Mendeley, EBSCOhost, ScienceDirect, and PubMed were utilized. AI tools such as Scholar GPT, Grammarly Gen I, and Jenni App were employed to enhance the efficiency of literature search and data extraction.

Eligibility criteria

Reviewers focused on reciting articles, books and journals published from 2020 - 2024. All needed to be written in English, which the researcher is conversant with and does not need a translation. The topic/abstract and conclusion selected should mention the impact COVID-19 lockdown regulations had on HIV management and ART initiations and how PLHIV from all ages were affected. South Africa will be a country of context with all nine (09) provinces included. Studies conducted using quantitative and qualitative data, mixed methods, longitudinal studies,

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experimental, case studies, peer review and open letters were included. Articles done on continuous HIV care, treatment failure and HIV adherence were excluded.

1) *Inclusion criteria*

The criteria for newly initiated people living with HIV (PLHIV) include individuals of any gender and all age groups. It focuses explicitly on newly diagnosed PLHIV within defined key populations. In addition, the research must be conducted in South Africa and consist of English-written articles. The studies should examine the impact of COVID-19 lockdown regulations on HIV treatment, and all approved study designs are acceptable for consideration.

2) *Exclusion*

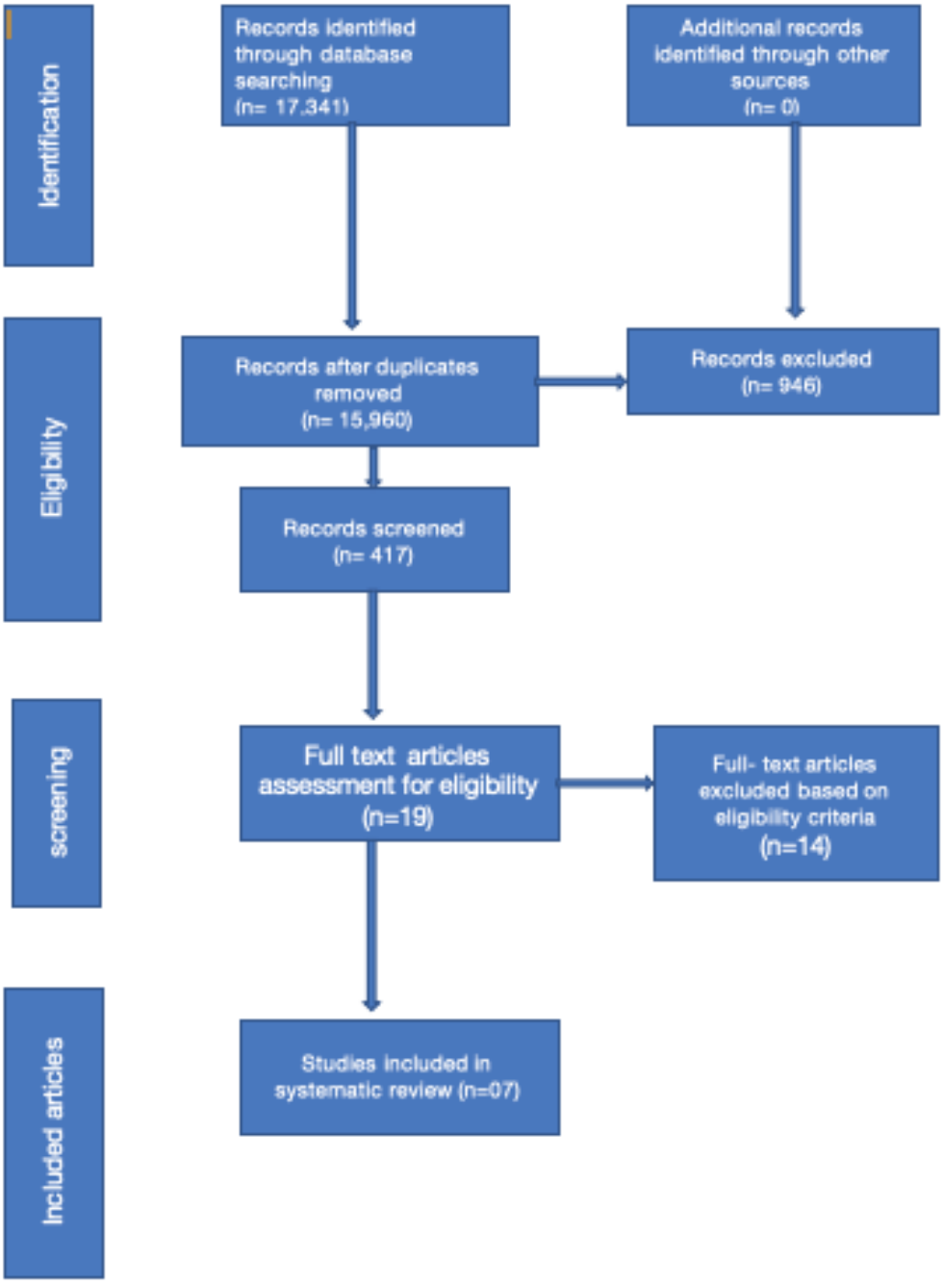
The PLHIV who were already receiving antiretroviral therapy (ART) before the onset of the COVID-19 pandemic was excluded from this review. Specifically, individuals who have experienced late or missed appointments for their ART, which refers to those who initiated treatment but subsequently stopped. Additionally, the criteria encompass individuals whose treatment has been interrupted for various reasons and those focusing on areas other than South Africa.

Selection of sources of evidence

The authors' initial step was to pilot the review paper's title to check the study's feasibility. The title piloted was "Investigating the effect of COVID-19 lockdown regulations on HIV care", with results of 17200; only five articles were selected on how best that topic relates to the pilot topic. Then, abstracts were screened for inclusion and exclusion criteria. The pilot review showed that the study is feasible and can be conducted. Moreover, context needs to be included to refine the search further. The author then refined the topic to (Investigate the impact and challenges of COVID-19 lockdown regulations on HIV management care and ART initiations in South Africa, Systematic review). Data sources included in the study were chosen by screening the abstract, discussion, and conclusion, then downloading full-text

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studies to ensure that the results answer the aim of the review article. Duplicated data from other search engines were excluded manually after the search was done from the various search engines. The Prisma flow diagram was then used to present the study's results (see Figure 1).



Source: Adapted from the 2009 PRISMA flow diagram

FIGURE 1: PRISMA flow diagram describing the inclusion process of the integrative literature review

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Articles searched from different databases were 17,341 articles. The four databases were Google Scholar, EBSCOhost, Science Direct and PubMed. A total of 15690 articles were duplicates extracted from different journals. Nine hundred sixty-four articles were excluded as the topic and abstract focused on the COVID-19 pandemic without specifying the relation of how the COVID-19 pandemic affected HIV treatment care and initiation. Furthermore, others were based in Africa and sub-Saharan Africa, including South Africa, whereas the study is only focused on the South African context. Nineteen (19) articles were retrieved for full-text access and eligibility assessment. Thereafter, 07 articles were finally included in the study.

Critical appraisal

The Critical Appraisal Skills Programme (CASP) was used to evaluate the quality, reliability, and relevance of the articles considered in the study. Studies are assessed based on quality measures specific to the research question, related topic, study design, methodology, analysis and reporting of different types of systematic reviews (Al-Jundi & Sakka, 2017). The CASP critical appraisal checklist, divided into three (03) sections, was employed in the study to assess the quality and trustworthiness of the results to be published. Each article appraised was scored according to several "yes", "no", and "can't tell responses"; scoring was from 0-10 as the tool consisted of 10 questions. Articles with five (05) or more yes answers were evaluated as they already have 50% quality, reliability and relevance (Table 1).

Table 1: Critical appraisal table

Author and year	Study design	Study appraisal
Orr et al. (2023).	Mixed method approach	90%
Jardim et al. (2022)	Systematic review	100%
Van Staden et al. (2022)	Systematic review	60%
Karim et al. (2022).	Review study	70%
Benade et al. (2022).	Analytic study	100%

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Johnson et al. (2023).	Policy review	70%
Dorward et al. (2021).	Interrupted time series	100%

Characteristics of included studies

The author formulated a table to describe the characteristics of all selected articles for inclusion, with data extracted to review their validity systematically. The characteristics in the table are author and date, study aim, location, data source, type of HIV services reported, and conclusion. All the included characteristics assisted the researcher in systematically summarising the data used in the analysis.

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Table 2: Characteristics of the include studies

Author & date	Aim of the study	location	Data source	Type of HIV service reported	Conclusion	Study design
Orr et al. (2023)	Impact of COVID-19 and related restrictions on district-level numbers of newly diagnosed PLWH and defaulting ART patients	Buffalo City Municipality, Eastern Cape. SA	African Journal of Primary Health care & Family medicine	ART initiations and restarted on ART	Programme in identifying diagnosed people living with HIV and retaining those who are newly initiated and are profoundly affected by COVID-19. Although the disruptions lesson was to improve communication during the pandemic and people seeing the importance of taking treatment, even bringing lost to follow to be re-started on treatment	Mixed method approach
Jardim et al. (2022).	To evaluate the impact of the pandemic on accessing HIV services in South Africa	09 provinces	International Journal of Environmental Research and Public Health	HIV services-HIV	The review has found an association between the pandemic and services rendered at the PHC level. There was a decrease in HIV testing and initiation for those tested at public PHCs. The decrease can be attributed to	Systematic review

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					lockdown restrictions, staff shortages at the facility, and scarcity of resources. Barriers to accessing health care were created, which resulted in few HIV tests and no positive tests. A recommendation was made for other studies to be conducted to know how KZN managed to be resilient and continue with services this will for future pandemics.	
van Staden et al. (2022)	To examine the direct and indirect effects of the pandemic on health care resources, access to HIV services, and availability of support structures to assess their impact on HIV care for ALHIV.	09 provinces	Journal of the International AIDS Society	HIV services for ALHIV	The healthcare system felt direct and indirect consequences due to COVID-19, which hindered achieving the 95-95-95 goals set by UNAIDS. ALHIV are a vulnerable group that needs continued care to live long and healthily. It is important to review HIV testing, initiation and retention in care, especially in a context where there is less frequent engagement with health services due to the multi-	Systematic review

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					month ART dispensing approach.	
Karim et al. (2022).	To describe how mitigation measures against COVID-19 have impacted HIV/TB research in SA	09 provinces	Current HIV/AIDS reports	HIV testing and linkage to care	COVID-19 emergence should strengthen community testing and linkage to care for HIV and TB.	Review
Benade et al. (2022)	To analyse DHIS data in order to measure the initiation rate	09 provinces	BMC Health Service research.	HIV ART initiation for all provinces during COVID-19.	Data does not reflect if reduced initiation reflects COVID-19 morbidity, fear of COVID-19 transmission, or reduced health systems capacity to provide services.	Analytic study
Johnson et al. (2023).	Modelling the impact of HIV in SA's provinces:2023 update.	09 provinces	Centre for Infectious Disease	HIV prevention, test and treat, retention and viral suppression. Reaching UNAIDS 95-95-95 targets.	Update to previous Thembisa provincial models. Progress is made regarding up-scaling access to HIV prevention and treatment services in SA. There has been increased diagnosis and viral suppression, but it has not reached the target set by UNAIDS. Renewed efforts are needed to reach set goals, and strategies used by provinces like KZN are	Policy review.

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					needed to work towards reaching 95-95-95 targets.	
Dorward et al. (2021)	To measure the impact of the 2020 national COVID-19 lockdown ON HIV testing and treatment in Kwa Zulu Natal, South Africa	Kwa Zulu Natal	The Lancet HIV	HIV testing and treatment during COVID-19 lockdown	Engagement of people in HIV care in South African primary care clinics through testing and treatment initiation was severely impacted by the COVID-19 lockdown, with a gradual recovery towards pre-lockdown levels as restrictions eased. There were no large changes in ART collection visits.	Interrupted time series

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Analysis and Results

The review examined studies from South Africa, representing all nine provinces and employing various research designs. It focused on the effects of the COVID-19 lockdown on antiretroviral therapy (ART) initiation, drawing data from seven articles. The thematic analysis revealed both positive and negative impacts of the lockdown. Of the seven studies, five reported adverse effects on ART initiation, one noted both direct and indirect impacts, and one found no significant association between the lockdown and ART initiation rates. Researchers identified common challenges faced by people living with HIV (PLHIV) and developed three key themes to understand better these impacts: access to healthcare services, resource allocation, and telemedicine services.

- **Access to health care services**

The COVID-19 pandemic disrupted healthcare services, and the closure of clinics for everyone to cater for those infected by the pandemic affected people negatively. Government official's communication was instilling fear in the communities, especially PLHIV, because their immune system is suppressed, and they are prone to be infected by COVID-19 (Mhango et al., 2020; Kaswa, 2021; Benade et al., 2022; Winwood et al., 2021). Lack of knowledge contributes to poor health outcomes for most teenagers, particularly girls being at risk of teenage pregnancy and other sexual diseases. Adolescent Youth-friendly services rendered at healthcare facilities ensure that knowledge is cascaded in a manner acceptable to teenagers. AYFS was implemented to provide ubuntu care, respect and support for youth to live a healthy lifestyle (Toska et al., 2024). Despite the benefits of AYFS, the COVID-19 pandemic instilled fear in most youth about attending healthcare facilities (Naicker, 2022).

- **Resource allocation**

In SA, communities were used to go physically to the clinic to get tested and get treatment. However, the COVID-19 pandemic brought about changes wherein only

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those who are sick should attend the clinic, mainly those with signs and symptoms of COVID-19. The rate of ART initiation decreased compared to the previous year due to a lack of information about other ways to get services without visiting the clinic. Availability of resources like access to free condoms was restricted as they could not access the clinic, fear requesting them as they seemed to be private and were placed in clinic toilets or inside consulting rooms (Pillay et al., 2021).

South Africa's grappling economy was further exacerbated by COVID-19, where health resources were mainly allocated to curb the pandemic. HIV treatment at facilities was stocked out, contributing to treatment interruption in most facilities (Toska et al., 2024).

- **Telemedicine/telehealth services**

The long-standing telemedicine- medicine, which was not used before, emerged to assist in non-contact consultation to adhere to the lockdown regulations set by the government of South Africa. The virtual consultation assisted in counselling and alleviating stress for the newly tested HIV-positive clients. Additionally, some people feel comfortable remaining anonymous, so using AI tools like virtual consultations benefits them (Garett & Young (2023). However, those who do not have access to knowledge of telemedicine or do not have the liberty of data and technology would miss the opportunity to be treated in the comfort of their own home.

Discussion

The systematic review conducted on the impact of COVID-19 lockdown regulations revealed significant negative repercussions on the initiation of Antiretroviral Therapy (ART) across South Africa. While one might assume that the restrictions imposed during the lockdown were the primary barrier to starting treatment, one particular study provided a nuanced perspective, suggesting that it was actually the pervasive

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fear surrounding the pandemic that played a more critical role in hindering ART initiation.

This fear stemmed largely from the way information about COVID-19 was communicated to the public. Many individuals found themselves overwhelmed by the constant, often alarming news updates and public health messaging. As a result, anxiety and apprehension grew regarding not only the virus itself but also the safety of seeking medical care during such turbulent times. The review highlighted that this fear led to significant disruptions in HIV services, with many potential patients hesitating to engage with healthcare providers or access necessary testing and treatment.

In light of these findings, the review underscored the urgent need for a comprehensive strategy aimed at ensuring accessible HIV testing and initiation during future pandemics or similar crises. It is imperative for policymakers and government authorities to proactively adopt measures that can mitigate the effects of fear and misinformation.

Proposed strategies may include the implementation of telehealth services, which allow individuals to receive medical advice and support remotely, thereby reducing their exposure to potential health risks. Additionally, community-based testing and treatment initiatives can serve as effective alternatives, bringing services directly into the communities where they are most needed. Such programs not only improve access to initial HIV care and counselling but also help build trust between healthcare providers and the communities they serve.

Implementing these strategies enables governments to ensure that essential healthcare services remain available and accessible, even during times of crisis. Such proactive measures ultimately facilitate improved health outcomes for individuals living with HIV.

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Implications

South Africans faced significant challenges during the strict lockdown regulations, which included travel restrictions and curfews. These challenges contributed to a reduction in HIV testing and ART initiations. While HIV test kits were available in pharmacies, most South Africans were unaware of this option. Therefore, it is crucial to educate communities about alternative ways to access testing and where to seek initial treatment to prevent underemployed existing HIV care services. Policymakers should establish systems that provide treatment and counselling for newly diagnosed individuals, ensuring adherence to ART. In the future, virtual and telehealth services should be implemented, allowing healthcare to be delivered without physical contact. It is essential to educate the public about these alternative methods, including self-testing and virtual care, to maintain the continuity of HIV services during pandemics or other situations requiring lockdowns.

Conclusions

The systematic review revealed that the decline in ART initiation had multiple factors influencing it, other than the lockdown regulations. The method of reporting cases should be transparent in a way that it does not insinuate fear to the public; enforcing restrictions should not hinder access to HIV services. Therefore, proper infrastructure is a necessity to ensure that HIV testing and ART initiation services are rendered amid pandemics. Furthermore, policymakers can consider telemedicine and virtual consultation as future methods to ensure ART initiations. Virtual and telehealth services are cost-effective compared to building clinics and community health care; continuous care is required for HIV services, which is imperative in eradicating the epidemic.

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Conflict of interest

The authors have no conflict of interest to declare.

References

Abdool Karim, Q., & Baxter, C. (2022). COVID-19: Impact on the HIV and tuberculosis response, service delivery, and research in South Africa. *Current HIV/AIDS Reports*, *19*(1), 46-53.

Al-Jundi, A., & Sakka, S. (2017). Critical appraisal of clinical research. *Journal of clinical and diagnostic research: JCDR*, *11*(5), JE01.

Armbruster, M., Fields, E. L., Campbell, N., Griffith, D. C., Kouoh, A. M., Knott-Grasso, M. A., ... & Agwu, A. L. (2020). Addressing health inequities exacerbated by COVID-19 among youth with HIV: expanding our toolkit. *Journal of Adolescent Health*, *67*(2), 290-295. https://doi.org/10.1016/j.jadohealth.2020.05.021

Abdulkareem, M., & Petersen, S. E. (2021). The promise of AI in detection, diagnosis, and epidemiology for combating COVID-19: beyond the hype. *Frontiers in Artificial Intelligence*, 4, 652669.

Benade, M., Long, L., Rosen, S., Meyer-Rath, G., Tucker, J. M., & Miot, J. (2022). Reduction in initiations of HIV treatment in South Africa during the COVID pandemic. *BMC health services research*, *22*(1), 428.

Closson, K., Lee, M., Gibbs, A., & Kaida, A. (2020). When home is not a safe place: impacts of social distancing directives on women living with HIV. *AIDS and Behavior*, *24*, 3017-3019. https://doi.org/10.1007/s10461-020-02941-y

© University of Venda

Dorward, J., Khubone, T., Gate, K., Ngobese, H., Sookrajh, Y., Mkhize, S., ... & Garrett, N. (2021). The impact of the COVID-19 lockdown on HIV care in 65 South African primary care clinics: an interrupted time series analysis. *The lancet HIV*, *8*(3), e158-e165.

Garett, R., & Young, S. D. (2023). Potential application of conversational agents in HIV testing uptake among high-risk populations. *Journal of Public Health*, 45(1), 189–192.

Jardim, C. G. R., Zamani, R., & Akrami, M. (2022). Evaluating the impact of the COVID-19 pandemic on accessing HIV services in South Africa: a systematic review. *International journal of environmental research and public health*, *19*(19), 11899.

Johnson, L. F., & Dorrington, R. E. (2023). Modelling the impact of HIV in South Africa's provinces: 2021 update. *Centre for infectious Disease Epidemiology and Research working paper*.

Kaswa, R. (2021). The impact of the COVID-19 pandemic on accessing HIV care: A case report. *South African Family Practice*, *63*(4). https://doi.org/10.4102/safp.v63i1.5344

Linnemayr, S., Jennings Mayo-Wilson, L., Saya, U., Wagner, Z., MacCarthy, S., Walukaga, S., ... & Karamagi, Y. (2021). HIV care experiences during the COVID-19 pandemic: mixed-methods telephone interviews with clinic-enrolled HIV-infected adults in Uganda. *AIDS and Behavior*, *25*, 28-39.

Maurice, J. (2014). South Africa's battle against HIV/AIDS gains momentum. *The Lancet*, *383*(9928), 1535-1536.

Mhango, M., Chitungo, I., & Dzinamarira, T. (2020). COVID-19 lockdowns: impact on facility-based HIV testing and the case for the scaling up of home-based testing

© University of Venda

services in sub-Saharan Africa. *AIDS and Behavior*, *24*, 3014-3016. https://doi.org/10.1007/s10461-020-02939-6

Naicker, R. (2022). *Access and utilization of adolescent youth-friendly services in primary health care clinics in Ekurhuleni South District, Gauteng Province* (Doctoral dissertation).

Ngcobo, S., Makhado, L., & Sehularo, L. (2022). HIV care and support services offered in mobile health clinics: a systematic review. *HIV & AIDS Review. International Journal of HIV-Related Problems*, 21(3), 191–207.

Nglazi, M. D., Kranzer, K., Holele, P., Kaplan, R., Mark, D., Jaspan, H., ... & Bekker, L. G. (2012). Treatment outcomes in HIV-infected adolescents attending a community-based antiretroviral therapy clinic in South Africa. *BMC Infectious Diseases*, *12*, 1-7. https://doi.org/10.1186/1471-2334-12-21

Nyasulu, J., & Pandya, H. (2020). The effects of coronavirus disease 2019 pandemic on the South African health system: A call to maintain essential health services. *African Journal of Primary Health Care and Family Medicine*, *12*(1), 1-5. https://doi.org/10.4102/phcfm.v12i1.2480

Nyoni, T., & Okumu, M. (2020). COVID-19-Compliant Strategies for Supporting Treatment Adherence Among People Living with HIV in Sub-Saharan Africa. https://doi.org/10.1007/s10461-020-02888-0

Okeibunor, J. C., Jaca, A., Iwu-Jaja, C. J., Idemili-Aronu, N., Ba, H., Zantsi, Z. P., ... & Makubalo, L. (2023). The use of artificial intelligence for delivery of essential health services across WHO regions: a scoping review. *Frontiers in Public Health*, *11*, 1102185.

Orr, N. M., Hajiyiannis, H., & Motuba, T. (2023). COVID-19 impact on newly initiated and restarted antiretroviral treatment patients in the Eastern Cape, South Africa. *African Journal of Primary Health Care & Family Medicine*, *15*(1), 3811.

© University of Venda

Pillay, L., Amoah, I. D., Deepnarain, N., Pillay, K., Awolusi, O. O., Kumari, S., & Bux, F. (2021). Monitoring changes in COVID-19 infection using wastewater-based epidemiology: A South African perspective. *Science of The Total Environment*, *786*, 147273.

Quilantang, M I., Bermudez, A N C., & Operario, D. (2020). Reimagining the Future of HIV Service Implementation in the Philippines Based on Lessons from COVID-19. https://doi.org/10.1007/s10461-020-02934-x

Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research*, *104*, 333-339.

Staden, Q V., Laurenzi, C A., & Toska, E. (2022). Two years after lockdown: Reviewing the effects of COVID-19 on health services and support for adolescents living with HIV in South Africa. *International AIDS Society*, 25(4). https://doi.org/10.1002/jia2.25904

Toska, E., Zhou, S., Laurenzi, C. A., Saal, W., Rudgard, W., Wittesaele, C., ... & Cluver, L. (2024). Healthcare provisions associated with multiple HIV-related outcomes among adolescent girls and young women living with HIV in South Africa: a cross-sectional study. *Journal of the International AIDS Society*, *27*(2), e26212.

Tshimula, J. M., Kalengayi, M., Makenga, D., Lilonge, D., Asumani, M., Madiya, D., ... & Kasoro, N. M. (2024). Artificial Intelligence for Public Health Surveillance in Africa: Applications and Opportunities. *arXiv preprint arXiv:2408.02575*.

Winwood, J J., Fitzgerald, L., Gardiner, B., Hannan, K., Howard, C., & Mutch, A. (2021). Exploring the Social Impacts of the COVID-19 Pandemic on People Living with HIV (PLHIV): A Scoping Review. *Springer Science+Business Media*, 25(12), 4125-4140. https://doi.org/10.1007/s10461-021-03300-1

© University of Venda

Van Wyk, B., & Mayman, Y. (2022). Impact of COVID-19 pandemic in adolescents on HIV treatment. *Pan African Medical Journal*, *42*(1).

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2.2 MANUSCRIPT 2: SUBMITTED TO HIV & AIDS REVIEW. INTERNATIONAL JOURNAL OF HIV-RELATED PROBLEMS (UNDER REVIEW)

Manuscript topic: The Ripple Effect of COVID-19: How Lockdown Regulations Shaped ART Initiation Among People Living with HIV in Johannesburg

Author Guidelines Followed:

https://www.termedia.pl/Journal/HIV_AIDS_Review_International_Journal_of_HIV_Related_Problems-106/For-authors

Manuscript Objective:

- **To examine the effect of COVID-19 lockdown regulations on Antiretroviral treatment initiation among people living with HIV in Johannesburg.**

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The Ripple Effect of COVID-19: How Lockdown Regulations Shaped ART Initiation Among People Living with HIV in Johannesburg

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Abstract

Background: The COVID-19 pandemic has had a profound impact on healthcare systems worldwide, with particularly concerning implications for people living with HIV. South Africa, one of the African countries most severely affected by the HIV epidemic, implemented strict lockdowns to curb the spread of the virus.

Objective: This study examines the effects of lockdown regulations on the initiation of antiretroviral therapy among people living with HIV in Johannesburg.

Methods: This study employed a quantitative retrospective chart review design to analyse ART initiation trends among PLHIV in Soweto before, during, and after COVID-19 lockdowns, utilizing data from medical records across selected clinics in Region D. A chart review checklist was used to collect data, and descriptive analysis was employed in this study.

Results: The study revealed that community health centres (CHCs) experienced a 40% drop in ART initiation during the COVID-19 lockdowns, compared to a 20% decrease in clinics. Additionally, while clinics maintained a 75% patient retention rate, CHCs saw only a 55% retention rate, highlighting significant disparities in healthcare access and outcomes between these facilities amid the pandemic.

Conclusion: The COVID-19 pandemic has the potential to undermine the progress made in the global HIV response. Understanding the impact of lockdown measures on ART initiation in Johannesburg can inform targeted interventions to ensure that the pandemic does not undo the hard-won gains in the fight against HIV.

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Keywords: COVID-19, HIV, Antiretroviral therapy (ART), Lockdown measures, Healthcare disparities, Patient retention.

Introduction

The COVID-19 pandemic has unleashed an unprecedented global health crisis, impacting various aspects of life, including healthcare delivery worldwide. In South Africa, the government's response, which included strict lockdown measures, has profoundly affected the provision of essential health services. One of the most critical areas impacted is the initiation of antiretroviral therapy (ART) for people living with HIV, a population that already faced significant barriers to care even before the pandemic (West et al., 2021).

Prior to COVID-19, South Africa had made significant advancements in its HIV response, characterized by increased access to antiretroviral treatment and a notable decline in mortality rates among individuals living with the virus (Benade et al., 2022; Lilian et al., 2020; Davey et al., 2020). However, the disruptions caused by the pandemic and the accompanying lockdown measures raised urgent concerns about potential setbacks in HIV care. The diversion of healthcare resources to address the pandemic, alongside restrictions that limited movement and access to healthcare facilities, created significant barriers for many individuals seeking ART (Brown et al., 2021; Onoya et al., 2021; Ratshihume, 2018; Hatefi et al., 2020).

Research has long shown that individuals living with HIV in South Africa face numerous challenges in engaging with ART, including stigma, pill fatigue, and socioeconomic factors such as food insecurity and transportation costs (Stern et al., 2017; Tweya et al., 2018). The additional stresses brought on by the COVID-19 pandemic, compounded by factors like job loss and social isolation, have the potential to exacerbate these barriers, ultimately affecting ART initiation rates (Brown et al., 2021; West et al., 2021; Jones et al., 2021; Waterfield et al., 2021).

With Johannesburg situated at the epicentre of both the HIV epidemic and the COVID-19 pandemic in South Africa, understanding the ripple effects of lockdown regulations on ART initiation is particularly crucial. This study aimed to determine and describe how the pandemic and the subsequent lockdown regulation have shaped the initiation of antiretroviral therapy among those living with HIV in Johannesburg, addressing the complex interplay of health, social, and economic factors during this challenging time. By illuminating

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these challenges, we can better understand the ongoing implications of the pandemic on a vulnerable population and inform future health interventions.

Research Design and Methods

Study Approach

This study utilised a quantitative approach, a methodological choice well-suited for quantifying data, formulating evidence, and identifying patterns. Quantitative research is fundamental in health sciences, offering robust practice, education, and management insights. By collecting and analysing numerical data, this approach provided evidence to address the study objectives (Botma et al., 2022).

Research Design

The study adopted a Retrospective Chart Review design, which relies exclusively on data collected from medical records and patient databases without direct participant engagement (Vassar & Holzmann, 2013). Data about people living with HIV (PLHIV) who were diagnosed and initiated on ART before, during, and after COVID-19 lockdown regulations were extracted from the Department of Health Information System (DHIS) and Tier.net (James et al., 2022). This design was chosen to analyse secondary data systematically to determine ART initiation trends across different COVID-19 regulatory phases.

Study Setting

The study was conducted in Region D of Soweto, part of Johannesburg, South Africa. Soweto is the largest township in the country, comprising 32 sub-townships with a multicultural population of approximately 1,058,978 residents. The area has significant socioeconomic challenges, including poverty, high unemployment, and low education levels. Region D encompasses 28 clinics offering ART services, including mobile units. For this study, a representative sample of clinics from Region D was selected. The area serves diverse linguistic and ethnic groups, including Zulu, Sotho, Venda, and Tsonga speakers.

Study Population and Sampling Procedure

Study Population

The study population consisted of PLHIV within Region D of Soweto, particularly those diagnosed during the COVID-19 pandemic but unable to initiate ART due to lockdown

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constraints. Data from DHIS provided statistics on HIV diagnoses and ART initiations from 2019 to 2022, focusing on newly diagnosed individuals aged 15–79 years.

Sampling Technique

The study utilised a multistage sampling approach involving:

Simple Random Sampling

Clinics providing ART services were randomly selected using the fishbowl technique. Fourteen clinics were chosen from the total of 28 clinics in Region D.

Stratified Total Population Sampling

Data was stratified into three periods:

- Pre-COVID-19 (January 2019– December 2019).
- During COVID-19 (January 2020–December 2020 and January 2021- December 2021)
- Post-COVID-19 (January 2022–December 2022).

This sampling approach ensured the representation of both genders and excluded individuals with specific conditions (e.g., TB) to align with study objectives.

Sample Size

The sample size was determined by extracting the number of newly diagnosed PLHIV from DHIS and Tier.net within the specified periods.

Inclusion and Exclusion Criteria

Inclusion criteria included data for newly diagnosed PLHIV before, during, and after COVID-19 lockdown regulations. Exclusion criteria were data on re-initiation cases and individuals diagnosed before 2019.

Measurement Instrument

A self-designed checklist was developed to collect data from DHIS and Tier.net. The checklist included demographic data, facility codes (for anonymity), and ART initiation statistics. It was refined through a pretest to ensure clarity and accuracy.

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Pretest

The checklist was pretested in five facilities not included in the study to identify ambiguities and ensure functionality. Adjustments were made to enhance reliability and validity.

Ethical Considerations

Ethical approval was obtained from the University of Venda Human and Clinical Trial Research Ethics Committee and relevant health authorities. Strict confidentiality measures ensured that only the researcher, supervisor, and co-supervisor accessed the data. Anonymized facility codes protected patient identities, and data security protocols safeguarded all collected information.

Data Collection

The researcher obtained ethical approval and permissions from relevant authorities, including the National Health Research Database (NHRD) and the Gauteng Department of Health. Data was collected using a checklist and stored on an encrypted external drive. The researcher accessed the DHIS to examine HIV indicators and used Tier.net to determine the total number of individuals who were newly initiated on ART. The data was calculated by summing the total number of different age groups that tested positive for HIV, resulting in an annual total. A similar process was followed to count the number of individuals newly initiated on ART each month. Additionally, the totals for each year were organized in a spreadsheet.

Data Analysis

Data was captured in Excel and analysed using SPSS version 29. This study conducted a descriptive analysis of data obtained from the District Health Information System (DHIS) spanning from 2019 to 2022, with a specific focus on HIV indicators such as the incidence of positive HIV tests across age groups (15 years to 50 years and above) and the initiation of Antiretroviral Therapy (ART) in adults by month. Facilities were stratified into three-time frames: Stratum One (January to December 2019), Stratum Two (January 2020 to December 2021), and Stratum Three (January to December 2022), encompassing a total of 10 clinics. The analysis involved aggregating the monthly totals of individuals testing positive for HIV, which were then summed annually to provide grand totals for each facility. Baseline data from 2019 served as a pre-COVID-19 benchmark, enabling comparisons with subsequent years. A specific formula was utilized to assess the impact of the COVID-19 pandemic on ART

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initiation rates relative to previous years. Additionally, the overall data was examined to calculate the rate of ART initiation for each facility. This research is aligned with the 90-90-90 goals proposed by Nyasulu et al. (2021) for eradicating the HIV epidemic by 2020. Facilities were evaluated in the context of these goals, with Table 1 and Table 2 highlighting facilities in red for not meeting targets and in green for achieving them.

Results

Demographic Characteristics

The study included four community health centres and four primary health clinics from Region D in Soweto, comparing eight healthcare facilities.

HIV-Positive Totals for CHCs

The number of HIV-positive cases recorded at the selected facilities (CHC A, CHC B, CHC C, and CHC D) demonstrated significant fluctuations over the four years, reflecting the impact of COVID-19 lockdown regulations on HIV testing services. In 2019, CHC A reported a notably high total of 3459 HIV-positive cases, substantially exceeding the figures from the other clinics. CHC B recorded 1,615 cases, CHC C 811 cases, and CHC D 1,541 cases. These totals likely reflect the scale and capacity of services offered at these facilities, particularly CHC A. During 2020, coinciding with the implementation of strict COVID-19 lockdown measures, the number of HIV-positive cases dropped drastically. CHC A significantly decreased to 2,663 cases, a dramatic 93% reduction. Similar declines were observed across other clinics, with CHC B reporting 913 cases, CHC C 552 cases, and CHC D 876 cases. These reductions likely reflect disruptions in HIV testing services and reduced access to healthcare facilities during the pandemic. In 2021, as restrictions began to ease, there were modest recoveries in HIV-positive totals at most facilities. However, figures remained below 2019 levels, with CHC A reporting 938 cases, CHC B 678 cases, CHC C 554 cases, and CHC D 836 cases. By 2022, the totals stabilized further, with CHC A at 843 cases, CHC B at 718 cases, CHC C at 563 cases, and CHC D at 763 cases. This stabilization suggests a gradual recovery of testing services post-pandemic.

ART Initiation Totals in CHCs

The trend in ART initiations closely mirrored that of HIV-positive cases, highlighting the interconnectedness of testing and treatment services. In 2019, ART initiations were highest at

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CHC A (1,472) and CHC D (1,405), followed by CHC B (1,353) and CHC C (1,070). These figures reflect robust ART initiation programs across all facilities before the pandemic. In 2020, ART initiations declined significantly due to the lockdown. CHC A reduced to 1,139 initiations, while CHC D dropped to 752, representing a 46% decrease. Similarly, CHC B initiated 901 individuals on ART, and CHC C initiated 675. These reductions align with the declines in HIV-positive totals, indicating challenges in linking individuals to care during the pandemic. In 2021, ART initiation numbers began to recover, though they remained below pre-pandemic levels. CHC A initiated 884 individuals, CHC B (n= 655), CHC C (n= 563), and CHC D (n= 740). 2022 ART initiation numbers stabilized, with CHC A at 821, CHC B at 703, CHC C at 506, and CHC D at 658. While these figures reflect recovery efforts, the inability to return to pre-pandemic levels suggests lingering challenges.

ART Initiation Rates in CHCs

The ART initiation rates, calculated as the percentage of HIV-positive individuals initiated on ART, varied across facilities and periods. In 2019, the initiation rates ranged from 43% at CHC A to 132% at CHC C, with CHC B and CHC D achieving 84% and 91%, respectively. The high rates at CHC C suggest an effective linkage-to-care program, while CHC A lagged. In 2020, despite reductions in ART initiation totals, initiation rates improved in some clinics. CHC B achieved 99%, and CHC C rose to 122%, reflecting efforts to prioritize treatment for those diagnosed during the pandemic. Conversely, CHC A and CHC D experienced minimal changes, maintaining rates of 43% and 86%, respectively.

By 2021, initiation rates continued to improve across most facilities. CHC A achieved 94%, CHC B reached 97%, and CHC C recorded 102%. CHC D maintained a stable rate of 89%. For 2022, the rates stabilized further, with CHC B and CHC A achieving 97% and 98%, respectively. CHC C experienced a slight decline to 90%, while CHC D remained consistent at 86%. These trends highlight substantial improvements in linking diagnosed individuals to care, particularly in the later stages of the pandemic. The COVID-19 pandemic significantly disrupted HIV testing and ART initiation services in Soweto clinics, leading to a decline in both HIV-positive cases and ART starts during the 2020 lockdown. Recovery was observed in 2021 and 2022, with most facilities improved and stabilized initiation rates. However, these rates have not yet returned to pre-pandemic levels, revealing ongoing challenges. The

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findings highlight the need for continued efforts to enhance testing and treatment programs and address systemic healthcare access barriers.

Table 1: CHCs ART Initiation for 2019, 2020, 2021 and 2022

Year	Community Health Centres	HIV-Positive Totals	ART Adult Naive Start ART	ART Initiation Rate (%)
2019	CHC A	3459	1472	43%
	CHC B	1615	1353	84%
	CHC C	811	1070	132%
	CHC D	1541	1405	91%
2020	CHC A	2663	1139	43%
	CHC B	913	901	99%
	CHC C	552	675	122%
	CHC D	876	752	86%
2021	CHC A	938	884	94%
	CHC B	678	655	97%
	CHC C	554	563	102%
	CHC D	836	740	89%
2022	CHC A	843	821	97%
	CHC B	718	703	98%
	CHC C	563	506	90%
	CHC D	763	658	86%

HIV Positive Totals, ART Initiation Totals, and ART Initiation Rates in Clinics (2019-2022)

HIV-Positive Totals for Clinics

The number of HIV-positive cases varied significantly across four clinics, Clinic A, Clinic B, Clinic C, and Clinic D, from 2019 to 2022. In 2019, Clinic A reported 773 HIV-positive cases, while Clinic B recorded 794 cases. Clinics C and D had comparatively fewer cases, reporting 240 and 642, respectively. In 2020, the number of HIV-positive cases at Clinic A sharply declined to 53, likely due to reduced testing during the COVID-19 lockdown. Similarly, Clinic

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D decreased to 354 cases, while Clinic B reported a slight increase to 821 cases. Clinic C's total rose to 270. By 2021, a rebound in cases was observed across all clinics: Clinic A reported 474 cases, Clinic B 544, Clinic C 352, and Clinic D 271. In 2022, the total number of HIV-positive cases stabilized. Clinic B (452) and Clinic C (296) experienced modest declines, while Clinic A (402) and Clinic D (289) remained consistent.

ART Initiation Totals in Clinics

The initiation of antiretroviral therapy (ART) reflected the trends in HIV-positive cases but also highlighted differences in clinics' ability to link individuals to care. In 2019, Clinic B initiated ART for 844 individuals, surpassing its total number of HIV-positive cases, which indicates strong service delivery. Clinic C also exceeded its HIV-positive total by initiating ART for 298 individuals. In contrast, Clinic A and D initiated ART for 198 and 282 individuals. In 2020, despite a significant drop in HIV-positive cases at Clinic A, ART initiation remained stable at 197, suggesting that the clinic prioritized ART-naïve individuals diagnosed earlier. Clinic B initiated ART for 839 individuals, maintaining its strong performance. Clinic C initiated ART for 283 individuals, while Clinic D initiated ART for 231. In 2021, ART initiation numbers at Clinic B (535) and Clinic C (340) remained high, reflecting robust recovery efforts following lockdowns. However, Clinic A initiated ART for only 113 individuals, and Clinic D reported 180 ART initiations. By 2022, Clinic B continued to perform well, with 448 ART starts, followed by Clinic C (271), Clinic D (180), and Clinic A (165). This indicates a gradual recovery, but persistent challenges remained at Clinics A and D.

ART Initiation Rates in Clinics

Initiation rates for Antiretroviral Therapy (ART) illustrate the effectiveness of clinics in connecting diagnosed individuals to care. Clinic B consistently achieved outstanding rates, starting at 106% in 2019 and maintaining rates exceeding 98% throughout the study period. Clinic C also performed well, with initiation rates at 124% in 2019, gradually declining to 92% by 2022. This decline suggests the need to address potential emerging barriers. In contrast, Clinic A experienced significant fluctuations. It reported a low % initiation rate of 26% in 2019, dramatically increasing to 372% in 2020. However, this was followed by a substantial drop to 24% in 2021. By 2022, the rate improved slightly to 41%, yet it remained suboptimal, indicating inconsistencies in service delivery. Clinic D struggled with initiation rates, starting at 44% in

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2019, peaking at 66% in 2021, and then declining to 62% in 2022. These consistently low rates highlight systemic barriers, including limited resources, logistical inefficiencies, and challenges in patient follow-up. The analysis reveals disparities in clinic performance regarding the management of HIV-positive cases and ART initiation.

Table 2: PHCs ART Initiation for 2019, 2020, 2021 and 2022

Year	Clinic	HIV positive Totals	ART adult naive start ART	ART Initiation rate
2019	Clinic A	773	198	26%
	Clinic B	794	844	106%
	Clinic C	240	298	124%
	Clinic D	642	282	44%
2020	Clinic A	53	197	372%
	Clinic B	821	839	102%
	Clinic C	270	283	105%
	Clinic D	354	231	65%
2021	Clinic A	474	113	24%
	Clinic B	544	535	98%
	Clinic C	352	340	97%
	Clinic D	271	180	66%
2022	Clinic A	402	165	41%
	Clinic B	452	448	99%
	Clinic C	296	271	92%
	Clinic D	289	180	62%

Overall ART Initiations and HIV Diagnoses in CHCs

ART initiations in CHCs demonstrated a consistent decline over the four years, decreasing from 6,342 in 2019 to 3,301 in 2022, a nearly 48% reduction. Concurrently, the number of individuals diagnosed as HIV-positive declined more steeply, from 8,993 in 2019 to 3,741 in 2022, a 58% reduction. The narrowing gap between HIV-positive diagnoses and ART initiations suggests an improvement in ART initiation rates relative to diagnosed cases. While

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this reflects enhanced programmatic efforts to link diagnosed individuals to care, the overall decline raises concerns about systemic factors, including potential reductions in HIV testing coverage, service accessibility, or a genuine decrease in the population served.

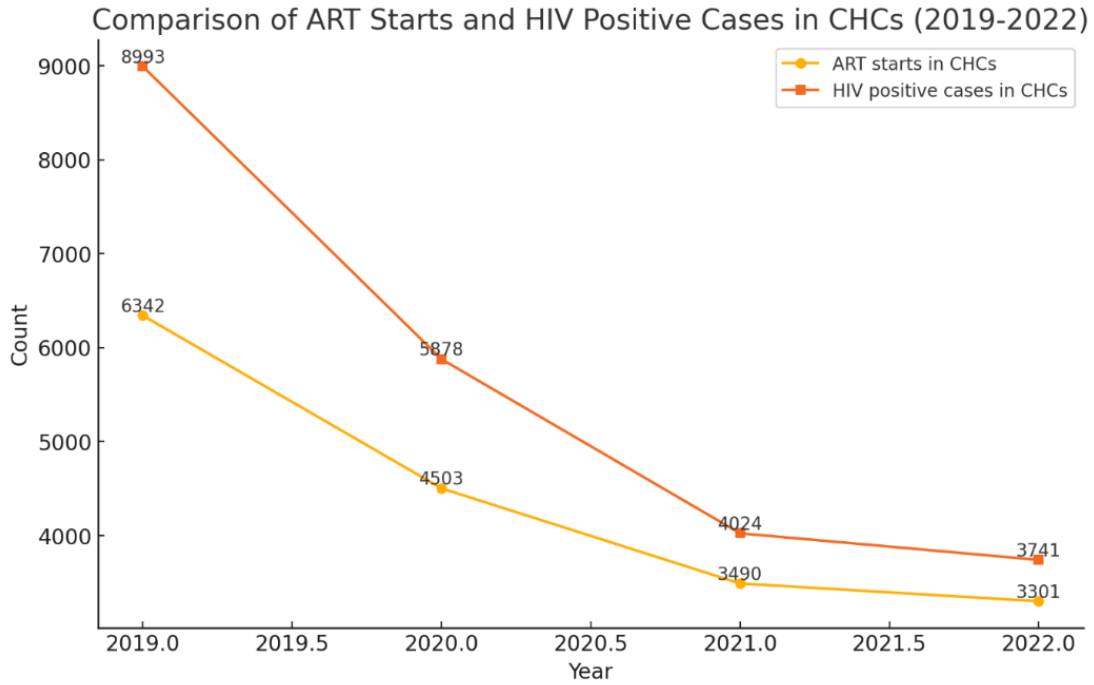


Figure 1: Comparison of ART initiation and HIV Positive Cases in CHCs (2019-2022)

ART Initiations and HIV Diagnoses in Clinics

Clinics followed a similar downward trajectory, with ART initiations decreasing from 2,887 in 2019 to 1,706 in 2022, reflecting a 41% decline. Diagnosed HIV-positive cases also decreased substantially, from 4,305 in 2019 to 1,706 in 2022, marking a 60% reduction. Notably, by 2022, clinics achieved parity in ART initiations and HIV diagnoses, suggesting robust linkages to care within these facilities. While clinics experienced a slightly smaller reduction in ART starts than CHCs, their proportional improvement in linking diagnosed individuals to treatment is commendable. This narrowing gap may reflect targeted interventions to optimize the care continuum within clinics.

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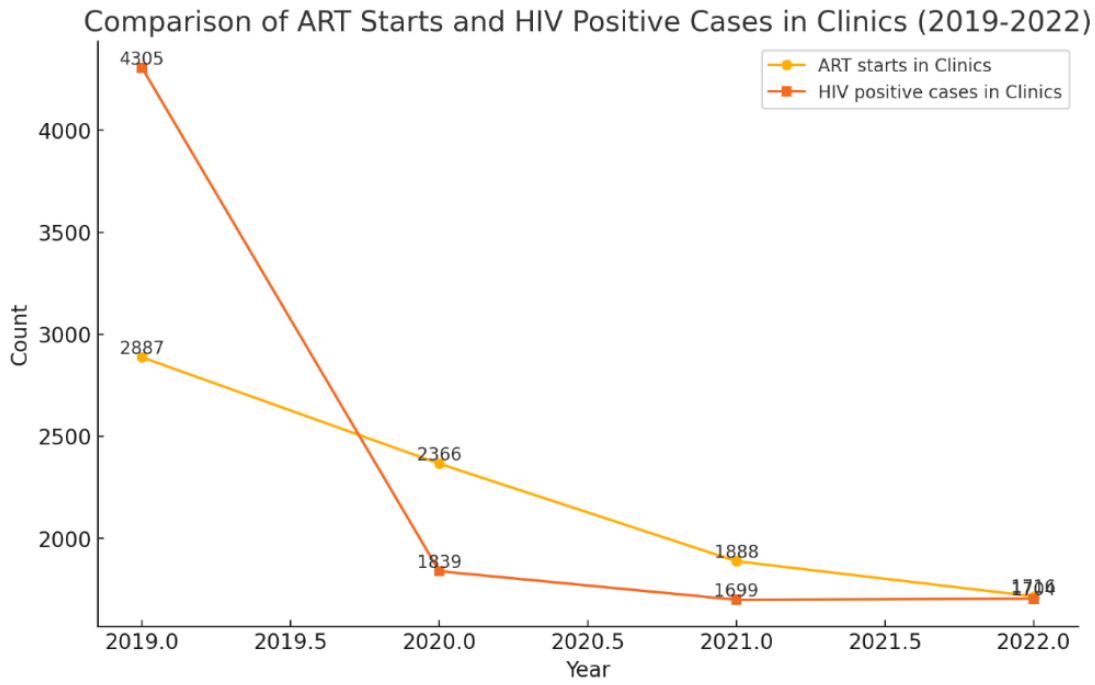


Figure 2: Comparison of ART initiation and HIV Positive Cases in Primary Health Clinics (2019-2022)

Discussion

The analysis reveals the profound impact of the COVID-19 pandemic and related lockdown measures on HIV service delivery in Johannesburg, South Africa. Evidence indicates a notable decline in both ART (antiretroviral therapy) initiations and HIV diagnoses across Community Health Centres and Primary Health Clinics, pointing to significant disruptions in healthcare access and utilization during this period (Benade et al., 2022). Existing literature supports these findings, documenting widespread challenges to HIV testing, patient linkage to care, and ART initiation throughout sub-Saharan Africa, attributed mainly to factors such as reduced clinic operating hours, patient hesitancy to seek care, and the reallocation of healthcare resources toward COVID-19 responses (Benade et al., 2022; Pley et al., 2021; Wagner et al., 2021; Zakumumpa et al., 2021). The analysis provides a detailed overview of the varying performance levels of different clinics within the public health system, shedding light on the complex challenges they face. Clinics B and C have shown commendable resilience by maintaining high rates of ART (Antiretroviral Therapy) initiation. This achievement can be attributed to their effective service adaptations, including streamlined processes and integration of innovative practices to meet patient needs better. Additionally, these clinics have implemented proactive patient engagement strategies, such as regular

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follow-ups and community outreach, which have likely contributed to their success in supporting patients at the start of their treatment journey (Bekker et al., 2013; Nyasulu & Pandya, 2020).

In contrast, Clinics A and Clinic D paint a different picture. These facilities have struggled with inconsistent and low rates of ART initiation, highlighting the ongoing barriers in the healthcare landscape. Some of these challenges are tied to limited resources, which can affect staffing levels, the availability of medications, and the overall infrastructure necessary to provide adequate care. Additionally, logistical inefficiencies, such as appointment scheduling and patient processing delays, further complicate the situation. Lastly, difficulties in patient follow-up, whether due to transportation issues, lack of awareness about the importance of continuing treatment, or communication barriers, have all contributed to the suboptimal performance of these clinics (Campbell et al., 2022; Holtzman et al., 2022). This comparison underscores the need for targeted interventions to address the specific challenges faced by clinics with lower performance while also recognising and learning from the successful strategies employed by those excelling in ART initiation rates. By doing so, the public health system can work towards reducing healthcare access disparities and improving patient outcomes. The findings from recent studies highlight an urgent need for targeted interventions to strengthen the HIV care continuum, especially in underperforming healthcare facilities. These facilities often struggle with resource limitations, staff shortages, and inadequate infrastructure, which hinder care quality.

To address these challenges, several strategies can be implemented. Enhanced patient tracing involves actively following up with patients who have disengaged from care, potentially using mobile health applications or enlisting community health workers to rebuild trust and communication. Increased community engagement is also essential, as partnerships with local organizations can reduce stigma and improve awareness of available services, empowering individuals to advocate for their health. Optimizing service delivery models is crucial, particularly during disruptions like the COVID-19 pandemic. Incorporating telehealth options ensures continuity of care while maintaining patient safety. It is also vital to keep essential services like testing and medication accessible, particularly in underserved areas. Comprehensive research is necessary to identify the specific drivers behind trends in HIV care

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and to inform evidence-based policies. Understanding the factors affecting patient behaviour and healthcare access will allow tailored interventions. Longitudinal studies during and after public health emergencies can provide insights into the long-term impact on HIV outcomes (Stern et al., 2017; Kaplan et al., 2017; Holtzman et al., 2022).

By focusing on patient tracing, community engagement, service model optimization, and ongoing research, healthcare systems can enhance resilience in the HIV care continuum and better prepare for future public health challenges. This multifaceted approach aims to improve HIV outcomes while creating a sustainable framework for managing infectious diseases.

Conclusion

The COVID-19 pandemic has profoundly disrupted HIV service delivery in Johannesburg, South Africa, leading to a decline in both antiretroviral therapy (ART) initiations and HIV diagnoses. The varying performance of healthcare facilities highlights the multifaceted challenges of the public health system. While some clinics have shown resilience and adaptability, others struggle with significant barriers, including resource limitations and logistical inefficiencies. To address these disparities, it is imperative to implement targeted interventions that strengthen the HIV care continuum, particularly in underperforming facilities. Strategies such as enhanced patient tracking, improved community engagement, and optimized service delivery models are essential for mitigating the pandemic's adverse effects on HIV care. Ultimately, further research is critical to unravel the specific factors contributing to these trends, enabling the formulation of evidence-based policies aimed at improving HIV outcomes during public health crises. This focused approach will be vital for ensuring equitable access to care and achieving better health results for those affected by HIV.

Acknowledgement

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Conflict of interest

The authors have no conflict of interest to declare.

References

Bekker, L., Venter, F., Cohen, K., Goemare, E., Cutsem, G. V., Boulle, A., & Wood, R. (2013). Provision of Antiretroviral Therapy in South Africa: The Nuts and Bolts [Review of Provision of Antiretroviral Therapy in South Africa: The Nuts and Bolts]. Antiviral Therapy, 19(3), 105. SAGE Publishing. https://doi.org/10.3851/imp2905

Benade, M., Long, L., Rosen, S., Meyer-Rath, G., Tucker, J.-M., & Miot, J. (2022). Reduction in initiations of HIV treatment in South Africa during the COVID pandemic. BMC Health Services Research (Vol. 22, Issue 1). BioMed Central. https://doi.org/10.1186/s12913-022-07714-y

Brown, L., Martin, E. G., Knudsen, H. K., Gotham, H. J., & Garner, B. R. (2021). Resilience-Focused HIV Care to Promote Psychological Well-Being During COVID-19 and Other Catastrophes. Frontiers in Public Health (Vol. 9). Frontiers Media. https://doi.org/10.3389/fpubh.2021.705573

Campbell, L., Masquillier, C., Knight, L., Delport, A., Sematlane, N., Dube, L. T., & Wouters, E. (2022). Stay-at-Home: The Impact of the COVID-19 Lockdown on Household Functioning and ART Adherence for People Living with HIV in Three Sub-districts of Cape Town, South Africa. AIDS and Behavior (Vol. 26, Issue 6, p. 1905). Springer Science+Business Media. https://doi.org/10.1007/s10461-021-03541-0

Chang, L. W., Mbabali, I., Hutton, H. E., Amico, K. R., Kong, X., Mulamba, J., Anok, A., Ssekasanvu, J., Long, A., Thomas, A. G., Thomas, K., Bugos, E., Pollard, R., Wickle, K. V., Kennedy, C. E., Nalugoda, F., Serwadda, D., Bollinger, R. C., Quinn, T. C., … Nakigozi, G. (2021). Novel community health worker strategy for HIV service engagement in a hyperendemic community in Rakai, Uganda: A pragmatic, cluster-randomized trial. PLoS Medicine (Vol. 18, Issue 1). Public Library of Science. https://doi.org/10.1371/journal.pmed.1003475

Clouse, K., Vermund, S. H., Maskew, M., Lurie, M. N., MacLeod, W., Malete, G., Carmona, S., Sherman, G., & Fox, M. P. (2017). Mobility and Clinic Switching Among Postpartum Women Considered Lost to HIV Care in South Africa. JAIDS Journal of Acquired Immune Deficiency Syndromes (Vol. 74, Issue 4, p. 383). Lippincott Williams & Wilkins. https://doi.org/10.1097/qai.0000000000001284

Davey, D. J., Kehoe, K., Serrao, C., Prins, M., Mkhize, N. S., Hlophe, K., Sejake, S., & Malone, T. (2020). Same-day antiretroviral therapy is associated with increased loss to follow-up in South African public health facilities: a prospective cohort study of patients diagnosed with HIV. Journal of the International AIDS Society (Vol. 23, Issue 6). International AIDS Society. https://doi.org/10.1002/jia2.25529

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Davey, D. J., Kehoe, K., Serrao, C., Prins, M., Mkhize, N. S., Hlophe, K., Sejake, S., & Malone, T. (2020). Same-day antiretroviral therapy is associated with increased loss to follow-up in South African public health facilities: a prospective cohort study of patients diagnosed with HIV. Journal of the International AIDS Society (Vol. 23, Issue 6). International AIDS Society. https://doi.org/10.1002/jia2.25529

Geng, E., Glidden, D. V., Bwana, M., Musinguzi, N., Emenyonu, N., Muyindike, W., Christopoulos, K., Neilands, T. B., Yiannoutsos, C. T., Deeks, S. G., Bangsberg, D. R., & Martin, J. N. (2011). Retention in Care and Connection to Care among HIV-Infected Patients on Antiretroviral Therapy in Africa: Estimation via a Sampling-Based Approach. PLoS ONE (Vol. 6, Issue 7). Public Library of Science. https://doi.org/10.1371/journal.pone.0021797

Hannaford, A., Moll, A. P., Madondo, T., Khoza, B., & Shenoi, S. (2020). Mobility and structural barriers in rural South Africa contribute to loss to follow up from HIV care. AIDS Care (Vol. 33, Issue 11, p. 1436). Taylor & Francis. https://doi.org/10.1080/09540121.2020.1808567

Hatefi, S., Smith, F., Abou-El-Hossein, K., & Alizargar, J. (2020). COVID-19 in South Africa: lockdown strategy and its effects on public health and other contagious diseases. Public Health (Vol. 185, p. 159). Elsevier BV. https://doi.org/10.1016/j.puhe.2020.06.033

Hogan, A. B., Jewell, B. L., Sherrard-Smith, E., Vesga, J. F., Watson, O. J., Whittaker, C., Hamlet, A., Smith, J., Winskill, P., Verity, R., Baguelin, M., Lees, J. A., Whittles, L. K., Ainslie, K. E. C., Bhatt, S., Boonyasiri, A., Brazeau, N. F., Cattarino, L., Cooper, L., … Hallett, T. B. (2020). Potential impact of the COVID-19 pandemic on HIV, tuberculosis, and malaria in low-income and middle-income countries: a modelling study. The Lancet Global Health (Vol. 8, Issue 9). Elsevier BV. https://doi.org/10.1016/s2214-109x(20)30288-6

Holtzman, C. W., Godfrey, C., Lawal, I., Raizes, E., Ake, J. A., Tefera, F., Okutoyi, S., & Siberry, G. K. (2022). PEPFAR's Role in Protecting and Leveraging HIV Services in the COVID-19 Response in Africa [Review of PEPFAR's Role in Protecting and Leveraging HIV Services in the COVID-19 Response in Africa]. Current HIV/AIDS Reports, 19(1), 26. Springer Science+Business Media. https://doi.org/10.1007/s11904-021-00587-6

James, A., Dalal, J., Kousi, T., Vivacqua, D., Câmara, D. C. P., Dos Reis, I. C., ... & Abbate, J. L. (2022). An in-depth statistical analysis of the COVID-19 pandemic's initial spread in the WHO African region. *BMJ global health*, *7*(4).

Jones, D. L., Morgan, K. E., Martínez, P. C. N., Rodriguez, V. J., Vazquez, A., Raccamarich, P., & Alcaide, M. L. (2021). COVID-19 Burden and Risk Among People With HIV. JAIDS Journal of Acquired Immune Deficiency Syndromes (Vol. 87, Issue 2, p. 869). Lippincott Williams & Wilkins. https://doi.org/10.1097/qai.0000000000002656

Kaplan, S. R., Oosthuizen, C., Stinson, K., Little, F., Euvrard, J., Schomaker, M., Osler, M., Hilderbrand, K., Boulle, A., & Meintjes, G. (2017). Contemporary disengagement from

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antiretroviral therapy in Khayelitsha, South Africa: A cohort study. PLoS Medicine (Vol. 14, Issue 11). Public Library of Science. https://doi.org/10.1371/journal.pmed.1002407

Lilian, R. R., Rees, K., McIntyre, J., Struthers, H., & Peters, R. P. H. (2020). Same-day antiretroviral therapy initiation for HIV-infected adults in South Africa: Analysis of routine data. PLoS ONE (Vol. 15, Issue 1). Public Library of Science. https://doi.org/10.1371/journal.pone.0227572

Nyasulu, J. C. Y., & Pandya, H. (2020). The effects of coronavirus disease 2019 pandemic on the South African health system: A call to maintain essential health services. African Journal of Primary Health Care & Family Medicine (Vol. 12, Issue 1). AOSIS. https://doi.org/10.4102/phcfm.v12i1.2480

Onoya, D., Hendrickson, C., Sineke, T., Maskew, M., Long, L., Bor, J., & Fox, M. P. (2021). Attrition in HIV care following HIV diagnosis: a comparison of the pre-UTT and UTT eras in South Africa. Journal of the International AIDS Society (Vol. 24, Issue 2). International AIDS Society. https://doi.org/10.1002/jia2.25652

Pley, C., McNaughton, A., Matthews, P. C., & Lourenço, J. (2021). The global impact of the COVID-19 pandemic on the prevention, diagnosis and treatment of hepatitis B virus (HBV) infection [Review of The global impact of the COVID-19 pandemic on the prevention, diagnosis and treatment of hepatitis B virus (HBV) infection]. BMJ Global Health, 6(1). BMJ. https://doi.org/10.1136/bmjgh-2020-004275

Ratshihume, P. T. (2018). *Factors Contributing to Clients Defaulting Anti-Retroviral Treatment at Matoks Capricorn District, Limpopo Province*. (University of Venda Dissertation)

Stern, E., Colvin, C. J., Gxabagxaba, N., Schutz, C., Burton, R., & Meintjes, G. (2017). Conceptions of agency and constraint for HIV-positive patients and healthcare workers to support long-term engagement with antiretroviral therapy care in Khayelitsha, South Africa. African Journal of AIDS Research (Vol. 16, Issue 1, p. 19). Taylor & Francis. https://doi.org/10.2989/16085906.2017.1285795

Tweya, H., Oboho, I., Gugsa, S., Phiri, S., Rambiki, E., Banda, R., Mwafilaso, J., Munthali, C., Gupta, S., Bateganya, M., & Maida, A. (2018). Loss to follow-up before and after initiation of antiretroviral therapy in HIV facilities in Lilongwe, Malawi. PLoS ONE (Vol. 13, Issue 1). Public Library of Science. https://doi.org/10.1371/journal.pone.0188488

Vrazo, A. C., Golin, R., Fernando, N. B., Killam, W. P., Sharifi, S., Phelps, B. R., Gleason, M. M., Wolf, H. T., Siberry, G. K., & Srivastava, M. (2020). Adapting HIV services for pregnant and breastfeeding women, infants, children, adolescents and families in resource-constrained settings during the COVID-19 pandemic. Journal of the International AIDS Society (Vol. 23, Issue 9). International AIDS Society. https://doi.org/10.1002/jia2.25622

© University of Venda

Wagner, Z., Mukasa, B., Nakakande, J., Stecher, C., Saya, U., & Linnemayr, S. (2021). Impact of the COVID-19 Pandemic on Use of HIV Care, Antiretroviral Therapy Adherence, and Viral Suppression: An Observational Cohort Study From Uganda. JAIDS Journal of Acquired Immune Deficiency Syndromes (Vol. 88, Issue 5, p. 448). Lippincott Williams & Wilkins. https://doi.org/10.1097/qai.0000000000002811

Waterfield, K. C., Shah, G. H., Etheredge, G. D., & Ikhile, O. (2021). Consequences of COVID-19 crisis for persons with HIV: the impact of social determinants of health. BMC Public Health (Vol. 21, Issue 1). BioMed Central. https://doi.org/10.1186/s12889-021-10296-9

West, N. S., Ddaaki, W., Nakyanjo, N., Isabirye, D., Nakubulwa, R., Nalugoda, F., Kagaayi, J., & Kennedy, C. E. (2021). "A Double Stress": The Mental Health Impacts of the COVID-19 Pandemic Among People Living with HIV in Rakai, Uganda. AIDS and Behavior (Vol. 26, Issue 1, p. 261). Springer Science+Business Media. https://doi.org/10.1007/s10461-021-03379-6

Zakumumpa, H., Tumwine, C., Milliam, K., & Spicer, N. (2021). Dispensing antiretrovirals during Covid-19 lockdown: re-discovering community-based ART delivery models in Uganda. BMC Health Services Research (Vol. 21, Issue 1). BioMed Central. https://doi.org/10.1186/s12913-021-06607-w

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SECTION THREE

CONCLUSION, LIMITATION AND RECOMMENDATIONS

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Introduction

This section presents the conclusions drawn from the research, along with recommendations for future practice and policy. It also addresses the limitations encountered during the study and provides a comprehensive summary of the mini dissertation. By synthesising the findings, this section aims to highlight the key insights gained from the investigation into the impact of lockdown regulations on ART initiations in Johannesburg, Gauteng, and to suggest pathways for improving ART accessibility in similar contexts moving forward.

Conclusions

Manuscripts Conclusions

This section entails the general conclusion of the mini dissertation, which will summarize the conclusions of the manuscript studies “Evaluating the Impact and Challenges of Coronavirus Disease 2019 Lockdown Regulations in Human Immune Virus Management and Antiretroviral Treatment Initiation: Artificial Intelligence Tools Aided Systematic Review” and “The Ripple Effect of COVID-19: How Lockdown Regulations Shaped ART Initiation Among People Living with HIV in Johannesburg”. Both are shedding light on how COVID-19 lockdown regulations impacted ART initiation. The discussion will also cover the study's limitations and recommendations for future research.

Manuscript 1: Evaluating the impact and challenges of Coronavirus disease 2019 lockdown regulations in Human Immune Virus management and Antiretroviral treatment initiation: Artificial Intelligence Tools Aided Systematic Review

The systematic review revealed that the decline in ART initiation had multiple factors influencing it, other than the lockdown regulations. The method of reporting cases should be transparent in a way that it does not insinuate fear to the public; enforcing restrictions should not hinder access to HIV services. Therefore, proper infrastructure is a necessity to ensure that HIV testing and ART initiation services are rendered amid pandemics. Furthermore, policymakers can consider telemedicine and virtual consultation as future methods to ensure ART initiations. Virtual and telehealth services are cost-effective compared to building clinics and community health care; continuous care is required for HIV services, which is imperative in eradicating the epidemic.

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Manuscript 2: The Ripple Effect of COVID-19: How Lockdown Regulations Shaped ART Initiation Among People Living with HIV in Johannesburg

The COVID-19 pandemic has profoundly disrupted HIV service delivery in Johannesburg, South Africa, leading to a decline in both antiretroviral therapy (ART) initiations and HIV diagnoses. The varying performance of healthcare facilities highlights the multifaceted challenges of the public health system. While some clinics have shown resilience and adaptability, others struggle with significant barriers, including resource limitations and logistical inefficiencies. To address these disparities, it is imperative to implement targeted interventions that strengthen the HIV care continuum, particularly in underperforming facilities. Strategies such as enhanced patient tracking, improved community engagement, and optimized service delivery models are essential for mitigating the pandemic's adverse effects on HIV care. Ultimately, further research is critical to unravel the specific factors contributing to these trends, enabling the formulation of evidence-based policies aimed at improving HIV outcomes during public health crises. This focused approach will be vital for ensuring equitable access to care and achieving better health results for those affected by HIV.

General conclusion

In conclusion, this mini-dissertation highlights the significant impact of COVID-19 lockdown measures on the initiation of Antiretroviral Therapy (ART) in Region D, Soweto. The study reveals that various factors, including fear induced by media reporting and restrictive laws, severely limited access to HIV services. Furthermore, the suspension of mobile clinics, which struggled to meet social distancing guidelines, exacerbated the challenges faced by individuals seeking treatment. To enhance the resilience of HIV services during future public health crises, it is critical for policymakers to ensure continuous access to HIV testing and treatment. The findings suggest that if such access had been maintained, progress towards eradicating the pandemic could have been further advanced. Moving forward, building robust healthcare infrastructure, expanding telemedicine, and facilitating virtual consultations are essential steps to support ART initiation and ensure the success of universal test-and-treat (UTT) initiatives. Integrating telehealth services into the healthcare system can provide cost-effective and accessible options for ongoing HIV care. Additionally, policymakers must evaluate the implications of their strategies on other health crises to create a balanced and comprehensive response. This multifaceted approach will not only improve HIV service delivery but also strengthen the overall healthcare system in the face of future challenges.

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Recommendations of the Study

To improve HIV management and increase the initiation of antiretroviral therapy (ART), several key recommendations should be considered. First, it is essential to implement continuous in-service training programs for all healthcare personnel. This training will ensure that staff understand the importance of accurate record keeping and data capturing, which are crucial for monitoring client progress and improving health outcomes.

Another significant recommendation is to upgrade the District Health Information System (DHIS) to enable real-time capture of client identification numbers across all facilities, including Community Health Centers (CHCs) and clinics. By enhancing this capability, healthcare providers can more effectively track clients who test positive for HIV and initiate ART in various locations.

Additionally, developing protocols that encourage consistent use of client identification data during registration is vital. This approach will help mitigate the issues associated with multiple registrations under different names, thereby reducing the likelihood of clients defaulting from other facilities.

It is also necessary to address the challenges surrounding the implementation of the universal test and treat strategy that was introduced in 2017. By evaluating current practices and identifying barriers, healthcare systems can ensure that ART initiation is executed more effectively.

Lastly, establishing a system for ongoing support and monitoring for professional nurses and healthcare workers is important. This support will equip them to initiate ART promptly and provide necessary follow-up care. By following these recommendations, healthcare facilities can enhance HIV management and improve the overall health outcomes for clients.

Limitations of the study

The study has several limitations that should be noted. Firstly, the data collection was restricted to clinics and Community Health Centers (CHCs), excluding hospitals, which may impact the comprehensiveness of the findings. Additionally, the reported data specifically focuses on HIV testing and initiation at clinics and CHCs, which may not encompass the broader healthcare needs and services available in other types of facilities.

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Summary of the mini- Dissertation

This mini-dissertation explores the impact of COVID-19 lockdown regulations on the initiation of antiretroviral therapy (ART) in Soweto, Johannesburg. The findings reveal a significant decline in both HIV testing and ART initiation during the pandemic, underscoring the adverse effects of the health crisis on essential healthcare services. Despite these challenges, the study highlights that government officials learned the necessity of ensuring access to HIV testing and initiation services while implementing such policies. Furthermore, the research emphasises the importance of developing adequate infrastructure that can effectively respond to healthcare needs during future pandemics. This study serves as a vital reminder of the need for a resilient healthcare system capable of sustaining critical services during crises.

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ANNEXURES

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ANNEXURE 1: ETHICAL CERTIFICATE

ETHICS APPROVAL CERTIFICATE

RESEARCH AND INNOVATION
OFFICE OF THE DIRECTOR

NAME OF RESEARCHER/INVESTIGATOR:

Mrs N Nkadimeng

STUDENT NO: 23026751

PROJECT TITLE: THE EFFECT OF COVID-19 LOCKDOWN REGULATIONS ON ART INITIATION AMONG PEOPLE LIVING WITH HIV IN JOHANNESBURG, GAUTENG PROVINCE, SOUTH AFRICA

ETHICAL CLEARANCE NO: FHS/24/PH/14

SUPERVISORS/ CO-RESEARCHERS/ CO-INVESTIGATORS

NAME	INSTITUTION & DEPARTMENT	ROLE
Prof L Makhado	University of Venda	Supervisor
Dr Netshisaulu OP	University of Johannesburg	Co-supervisor
Ms N Nkadimeng	University of Venda	Investigator-Student

Type: No Risk
Risk: straightforward research without ethical problems
Approval Period: July 2024 to July 2025

The Research Ethics Committee (REC) hereby approves your project as indicated above.

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

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

ISSUED BY:
UNIVERSITY OF VENDA, RESEARCH ETHICS COMMITTEE
Date Considered: 23 July 2024

Name of the FHSHCTREC Chairperson of the Committee: Prof NS Mashau

Signature: _____

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ANNEXURE 2: PERMISSION TO CONDUCT STUDY

GAUTENG PROVINCE
HEALTH
REPUBLIC OF SOUTH AFRICA

Joburg
a world class African city

Research Committee of Johannesburg Health District

Enquiries: Prof S. Moosa | researchjoburg@gmail.com

DATE: 09 September 2024

ATT: Mrs Naledi Nkadimeng

EMAIL: naledineo.nm@gmail.com

Dear Sir/Madam

STUDY TITLE: THE EFFECT OF COVID-19 LOCKDOWN REGULATIONS ON ART INITIATION AMONG PEOPLE LIVING WITH HIV IN JOHANNESBURG, GAUTENG PROVINCE, SOUTH AFRICA.

NHRD REF. NO.: GP_202408_022

OFFICIAL APPROVAL

The District Research Committee has reviewed your application. This letter serves as a final approval letter for this study.

The following conditions must be observed:

- The facilities in which the research will be conducted are listed below
- These facilities will be visited from: **2024/09/09 to 2025/07/23**
- Participants' rights and confidentiality will be maintained all the time.
- Neither the District nor the facility will incur any additional cost for this study.
- No resources (Financial, material and human resources) from the above facilities will be used for the study.
- The study will comply with Publicly Financed Research and Development Act, 2008 (Act 51 of 2008) and its related Regulations.
- You will submit a copy (electronic and hard copy) of your final report. In addition, you will submit an annual progress report to the District Research Committee.
- If this is academic research then your supervisor and the University will ensure that these reports are being submitted timeously to the District Research Committee.
- The District must be acknowledged in all the reports/publications generated from the research and a copy of these reports/publications must be submitted to the District Research Committee.
- You will liaise with the manager/s listed below as relevant before initiating the study.

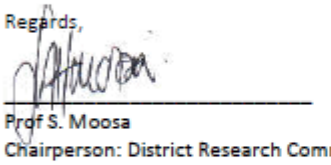
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We reserve our right to withdraw our approval, if you breach any of the conditions mentioned above. Please feel free to contact us, if you have any further queries.

On behalf of the District Research Committee, we would like to thank you for choosing our District to conduct such an important study.

Regards,



Prof S. Moosa
Chairperson: District Research Committee
Johannesburg Health District
As delegated by Mrs M.L. Morewane, Chief Director, Johannesburg Health District, and Mr. Frans Moseane, Acting ED Health, City of Johannesburg

List of Facilities Approved

- Bophelong (Region 2) Clinic
- **Chiawelo CHC**
- Diepkloof LA Clinic
- Diepkloof Prov Clinic
- Diepsloot South Clinic
- Eldorado Park Ext 2 Clinic
- Eldorado Park Ext 9 Clinic
- Elias Motsoaledi Clinic
- **Itireleng CHC**
- Jabavu/Vusabantu Clinic
- Klipspruit West Clinic
- Kliptown Clinic
- Meadowlands Zone 2 Prov Clinic
- **Mofolo CHC**
- Mofolo South Clinic
- Mpumelelo Clinic
- Nokuphila Clinic
- Noordgesig Prov Clinic
- Orlando Prov Clinic
- Protea Glen Clinic
- Protea South Clinic
- Senaoane Clinic
- Shanty Clinic
- Sinethemba Clinic
- Sinqobile Clinic
- Thembelihle Clinic
- Tladi LA Clinic

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- Tladi Prov Clinic
- Zola CHC

List of Managers

Sub District/ Hospiital	Sub District Manager/ Area Manager	Contact No.	Cell phone	Email
D	Ms Maria Mazibuko	011 674 1200	082 781 9919	Maria.Mazibuko@gauteng.gov.za
G	Mr Peter Mathole	011 213 9603	072 483 6839	Peter.Mathole@gauteng.gov.za
CoJ Admin	Mr Frans Moseane	011 407 – 7513 / 011 407 - 7535		FransMos@joburg.org.za
CoJ Research	Dr Keshni Arthur	011 4076395	(060) 548-0940	KeshniA@joburg.org.za

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ANNEXURE 3: REQUEST LETTER

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Private bag X5050
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0950

Jabulani Civic Centre
Region D Department of Health Sub district
1 Koma Road
Jabulani
1868

Date: 23 September 2024

Dear Ms Mazibuko and Mr Mathole (DoH sub district managers for Region D & G)

Re: <u>Request for Permission to conduct research study.</u>

I trust this message finds you in good health.

I, Naledi Nkadimeng (student number: 2306751), am writing to seek permission to conduct my study titled "*The effects of COVID-19 lockdown regulations on ART initiation among People Living with HIV in Johannesburg, Gauteng Province. South Africa*".

The main purpose of the study is to identify the effects of COVID-19 lockdown regulations on ART initiation in the city of Johannesburg. The set primary objective to meet study purpose is to determine the rate of ART initiations before, during and after COVID-19 lockdown regulations in the city of Johannesburg. I want to emphasize that all necessary ethical protocols will be strictly observed in ensuring correct handling of secondary data from DHIS system.

I kindly request your favorable consideration of this request. Your support in granting permission for this request will be greatly appreciated.

Thank you for your attention to this matter.

_____

Yours sincerely
Naledi Nkadimeng.

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ANNEXURE 4

RESEARCH ETHICS COMMITTEE
UNIVEN Informed Consent
Appendix B LETTER OF INFORMATION

Title of the Research Study: The effect of COVID-19 lockdown regulations on ART initiations for PLWH in city of Johannesburg, Gauteng province, South Africa.

Principal Investigator/s/ researcher : Naledi Nkadimeng, BNSC

Co-Investigator/s/supervisor/s : Supervisor- Prof L. Makhado
Co-supervisor Dr O.P. Netshisaulu

Brief Introduction and Purpose of the Study: COVID-19 had an impact in every aspect of life causing positive and negative disruptions in peoples lives. State of health in the country was crippled during and after the pandemic which left PLWH stranded without any continuous services, thus researcher saw it necessary to conduct study in order to determine the impact COVID-19 and its regulations had in ART initiations. The purpose of the study is to identify the effect of COVID-19 lockdown regulations had on ART initiations in the city of Johannesburg, Gauteng province, South Africa.

Outline of the Procedures: Researcher will use self- formulated checklist to extract secondary data from the DIHS system which will take about 1-2 hours per day, on weekly basis during working hours. District office data information coordinator will assist in giving access to relevant data to extract from the system.

Risks or Discomforts to the Participant: There will be no foreseeable risk or discomfort in the study.

Benefits: Decrypt data will be analyzed therefore department of health will benefit as researcher will give them the results after analysis and research report is done.

Reason/s why the Participant May Be Withdrawn from the Study: facilities that does not have data for PLWH newly initiations on ART before (March 2019- Feb 2020), during (March 2020- Oct 2021) and after (Nov 2021- Oct 2022) COVID-19 lockdown regulations will not be in the study

Remuneration: Participation of research is voluntary and there will be no remuneration

Costs of the Study: There are no cost.

Confidentiality: No names will be attached to data extracted, use of codes will be employed to name facilities to ensure confidentiality. Data will then be saved in hard drive and kept in locked drawer for safety and privacy purposes.

Persons to Contact in the Event of Any Problems or Queries: Supervisor- Prof L. Makhado
Please contact the researcher (0817671311), my supervisor (0845526260). University Research Ethics Committee Secretariat on 015 962 9058 / Vanecia.Khoza@univen.ac.za

Complaints can be reported to the University Research Ethics Committee Secretariat on 015 962 9058 / Vanecia.Khoza@univen.ac.za or Whistle blowing Ethics Hotline Tollfree Telephone number: 0800212755 Email.univenhotline@tipoffs.com

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CONSENT

Statement of Agreement to Participate in the Research Study:

- I hereby confirm that I have been informed by the researcher Naledi Nkadimeng, about the nature, conduct, benefits and risks of this study - Research Ethics Clearance Number: _,
- I have also received, read and understood the above written information (*Participant Letter of Information*) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerized system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

Full Name of Participant	Date	Time	Signature
……	……..	……	…….

I Nkadimeng Naledi herewith confirm that the above participant has been fully Informed about the nature, conduct and risks of the above study.

Full Name of Researcher

Nkadimeng Naledi 21 June 2024
Signature**……**

Full Name of Witness (If applicable)

…… Date **…….**
Signature**……..**

Full Name of Legal Guardian (If applicable)

…… Date**……**
Signature**……**

References:

Department of Health: 2004. *Ethics in Health Research: Principles, Structures and Processes*
http://www.doh.gov.za/docs/factsheets/guidelines/ethnics/
Department of Health. 2006. *South African Good Clinical Practice Guidelines*. 2nd Ed. Available at: http://www.nhrec.org.za/?page_id=14

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ANNEXURE 5: CHECKLIST

Code of health care facility: _____

Checklist for ART initiations (Number of ART initiations)

CLINICS	January	February	March	April	May	June	July	August	September	October	November	December
2019 ART adult naive start ART in month												
2020 ART adult naive start ART in month												
2021 ART adult naive start ART in month												
2022 ART adult naive start ART in month												
2023 ART adult naive start ART in month												
ART adult remain on ART end of period 2019												
ART adult remain on ART end of period 2020												
ART adult remain on ART end of period 2021												
ART adult remain on ART end of period 2022												
ART adult remain on ART end of period 2023												
HIV positive 15-24 years female (excl ANC) 2019												
HIV positive 15-24 years female (excl ANC) 2020												
HIV positive 15-24 years female (excl ANC) 2021												
HIV positive 15-24 years female (excl ANC) 2022												
HIV positive 15-24 years female (excl ANC) 2023												
HIV positive 15-24 years male for years 2019												
HIV positive 15-24 years male for years 2020												
HIV positive 15-24 years male for years 2021												
HIV positive 15-24 years male for years 2022												
HIV positive 15-24 years male for years 2023												
HIV positive 50 years and older 2019												
HIV positive 50 years and older 2020												
HIV positive 50 years												

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and older 2021												
HIV positive 50 years and older 2022												
HIV positive 50 years and older 2023												
HIV pos known but not on ART 2019												
HIV pos known but not on ART 2020												
HIV pos known but not on ART 2021												
HIV pos known but not on ART 2022												
HIV pos known but not on ART 2023												
HIV test 15-24 years female (excl ANC) 2019												
HIV test 15-24 years female (excl ANC) 2020												
HIV test 15-24 years female (excl ANC) 2021												
HIV test 15-24 years female (excl ANC) 2022												
HIV test 15-24 years female (excl ANC) 2023												
HIV test 15-24 years male 2019												
HIV test 15-24 years male 2020												
HIV test 15-24 years male 2021												
HIV test 15-24 years male 2022												
HIV test 15-24 years male 2023												
HIV test 25- 49 years (excl ANC) 2019												
HIV test 25- 49 years (excl ANC) 2020												
HIV test 25- 49 years (excl ANC) 2021												
HIV test 25- 49 years (excl ANC) 2022												
HIV test 25- 49 years (excl ANC) 2023												
HIV test 50 years and older 2019												
HIV test 50 years and older 2020												
HIV test 50 years and older 2021												
HIV test 50 years and older 2022												
HIV test 50 years and older 2023												

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Definition of terms

ART adult naive start ART in month- new adult to start on ART (never been initiated before)
HIV positive 15-24 years female (excl ANC)- HIV positive 15-24 years female excluding those booked for ANC
HIV positive 15-24 years male- HIV positive male 15-24 years
HIV positive 50 years and older- HIV positive 50 years and older
HIV pos known but not on ART- HIV pos known but yet to be initiated on ART
HIV pos screened for TB- HIV pos screened for TB
HIV test 15-24 years female (excl ANC)- HIV test done for 15-24 years female excluding those booked for ANC
HIV test 15-24 years male- HIV test done to15-24 years male
HIV test 25- 49 years (excl ANC)- HIV test done to 25-49 years excluding those booked for ANC
HIV test 50 years and older- HIV test done to 50 years and older

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ANNEXURE 6: EDITING AND PROOFREADING CERTIFICATE



To whom it may concern

Dear Sir/Madam

This is to authenticate that I, Zitha Innocent, have proofread and edited a min dissertation for a Master of Public Health in the Department of Public Health in the Faculty of Health Sciences at the University of Venda entitled ***The effects of COVID-19 lockdown regulations on people living with HIV in Johannesburg, Soweto***

BY

NALEDI NKADIMENG

Student number: **23026751**

I have meticulously and comprehensively inspected this thesis for consistency, coherence, and correctness of language use, ensuring proper register usage and citations. I have suggested several amendments, which were communicated to the student for consideration and implementation. The student has undertaken to effect these amendments before this research project is finally submitted.

Date: **29/01/2025**

BA Hons (English), MA (English), PhD (current studies), Lecturer (English) @ North-West University

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