5-14-2024

HIV Preventive Care Services for Pregnant Women in Kenya Before and During the COVID-19 Pandemic

Modesta Vesonder
Walden University

Walden University

College of Health Sciences and Public Policy

This is to certify that the doctoral dissertation by

Modesta Vesonder

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee
Dr. Magdeline Aagard, Committee Chairperson, Public Health Faculty
Dr. Chinaro Kennedy, Committee Member, Public Health Faculty

Chief Academic Officer and Provost
Sue Subocz, Ph.D.

Walden University
2024

Abstract

HIV Preventive Care Services for Pregnant Women in Kenya Before and During the COVID-19 Pandemic

by

Modesta Vesonder

MSN, University of Maryland, 2007

BSN, University of Maryland, 2005

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Health Sciences

Walden University

May 2024

Abstract

The COVID-19 pandemic significantly affected access to prenatal and postnatal care services for pregnant women living with HIV (PWLHIV) in counties in the Central, Eastern, and Rift Valley regions of Kenya. Many PWLHIV in some counties in Kenya faced challenges in accessing treatment services. In urban counties such as those in the Central region, HIV preventive care services were accessed with minimal disruption. Counties in the semi-arid of Eastern and Central regions experienced some disruptions in the provision of HIV preventive care services for PWLHIV. The periods under consideration were before the COVID-19 pandemic (2019) and during the COVID-19 pandemic (2021). This quantitative study endeavored to answer three research questions that examined the extent to which the COVID-19 pandemic affected access to prenatal and postnatal services for PWLHIV in counties in these regions, how a reduction in access to these services affected the maternal-to-child transmission (MTCT) of HIV, and whether there were variations in provision of HIV preventive care services between counties in these regions. Archival data were used. Participants included PWLHIV and excluded non PWLHIV in counties in the three regions. Results of chi-square test showed a difference in access to care services before (85.325%) and during (69.146%) the COVID-19 pandemic, $p = 0.000$, in the three areas of Kenya. There was also an increase in MTCT of HIV. Implications for positive social change include identifying access issues for PWLHIV which may increase awareness and improve care service.

HIV Preventive Care Services for Pregnant Women in Kenya Before and During the COVID-19 Pandemic

by

Modesta Vesonder

MSN, University of Maryland, 2007

BSN, University of Maryland, 2005

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Health Sciences

Walden University

May, 2024

Dedication

This dissertation is dedicated to my late parents, Joseph and Veronique, who taught me the value of hard work. I am where I am because of both of you. I also dedicate this to my family and friends and colleagues for being patient with me. I wouldn't have done it without you. A special thank you to my sons for walking with me through the process, putting a smile on my lips even during challenging times, and allowing me to go through the seasons.

Acknowledgments

I want to acknowledge my family for the support you have given me, especially Saul, Edwin and Austin for putting up with my busy professional and academic schedules. Thank you so much. A special gratitude to my sister, Judith Hunter, and my nephews and niece for supporting me and checking in on me frequently to ensure that I was doing well. To my colleague and long-term friend, Terry Baker, thank you for being there in times of need. For anyone else who made my life easier during this time, I acknowledge you.

I want to sincerely thank my committee chair, Dr. Magdeline Aagard, whose guidance, patience, support, and encouragement enabled me to succeed. Your ability to simplify the complex made the journey easier. I would also like to thank Dr. Kennedy for your support during the latter part of my study.

Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction to the Study

Despite a reduction in the transmission of HIV from mother to child in Kenya, there are unacceptably high rates of morbidity and mortality of infants born to HIV-positive mothers (Mwau et al., 2017). Kenya was divided into eight regions or provinces before a subdivision into counties. The current study focused on a county in each of the following regions: the Eastern region, the Central region, and the Rift Valley region. This quantitative study examined whether the COVID-19 pandemic affected access to prenatal and postnatal services for pregnant women living with HIV (PWLHIV) and, if so, whether a reduction in access to these services affected maternal-to-child transmission (MTCT) of HIV in a county in these regions. The study also examined whether there were differences between the selected counties in terms of access to prenatal and postnatal care services and the effect this may have had on MTCT of HIV before and during the COVID-19 pandemic. The time frame of the study was 2019 and 2021. This research may provide information that if put into practice by health care practitioners could result in an increase in access to HIV preventive care services for PWLHIV leading to a reduction to less than 5% MCTC as recommended by the World Health Organization (WHO, n.d.).

This chapter includes the problem statement and purpose of the study. The research questions, hypotheses, and theoretical framework are also discussed. An overview of the nature of the study is provided as well as the definitions, assumptions, scope of delimitations, limitations, and the significance of the study.

Background

MCTC of HIV is when a mother who is infected with HIV transmits the virus to her baby during pregnancy, labor, childbirth, or breastfeeding (WHO, n.d.). With no intervention, a baby who is born to an HIV-infected mother has a 15% to 45% chance of being infected (WHO, n.d.). With no antiretroviral therapy (ART), half of the children born with HIV die by the time they are two years old, while 80% die by the age of five (WHO, n.d.). Worldwide, approximately 1.3 million women and girls living with HIV become pregnant each year (WHO, n.d.). In Kenya, MTCT is one of the greatest health challenges, with approximately 37,000 to 40,000 infants infected annually (du Plessis, 2014). In 2012, Kenya revised its prevention of mother-to-child transmission (PMTCT) guidelines based on WHO recommendations using a four-pronged approach (du Plessis, 2014). The Kenyan guidelines encouraged women to attend four or more antenatal care (ANC) visits throughout pregnancy. The revised guidelines also focused on ART prophylaxis and early initiation of therapy for all women eligible for treatment regardless of gestational age (du Plessis, 2014). Kenya has made significant investments and expanded the coverage and quality of PMTCT services, leading to an increase in the number of pregnant women receiving ART from 60% in 2013 to 75% in 2015 (Kenya Ministry of Health, 2016a). Improved PMTCT reduced MTCT rates from 16% in 2012 to 8.3% in 2015 (Kenya Ministry of Health, 2016a).

Despite the strides made in PMTCT, Kenya has not achieved a global target of reducing MTCT to 5% or achieving a goal of 90% ART for HIV-positive women (Mwau et al., 2017). The current quantitative study aimed to determine whether PWLHIV were

challenged to receive care or had limited access to care before and during the COVID-19 pandemic in a county in the following regions of Kenya: Eastern, Central, and Rift Valley. This study also aimed to determine whether the COVID-19 pandemic affected access to prenatal and postnatal services for PWLHIV in the counties within the three regions and whether a reduction in access to these services affected the MTCT of HIV in the three regions. This study also determined whether there were differences between the counties in terms of access and transmission rates. The key variables of the study included access to HIV preventive care services, MTCT, and the COVID-19 pandemic. Comparisons of these parameters were made before and during the COVID-19 pandemic across the three counties. Even though MTCT is preventable, 13,000 infants are infected annually in Kenya (Sirengo et al., 2014).

Access to HIV services for pregnant women varies throughout Kenya, but reduced access became more pronounced during the COVID-19 pandemic. Some factors impacted access to health care services during the pandemic without regard to the population served (Ahmed et al., 2020). For example, in Kenya, the number of providers available and the operation of clinics was impaired; many clinics had restricted hours or closed completely during the government-mandated closures (Ahmed et al., 2020). Many women lost their jobs during this time, and others were forced out of work with no pay, which may have impacted their ability to pay for health care services (Ahmed et al., 2020). The inability of providers to meet health care requirements during the pandemic, and social and cultural changes brought about by COVID-19, limited the desire and ability to seek HIV preventive care services for PWLHIV (Ahmed et al., 2022).

The general health problem was that some counties experienced limitations in providing preventive care services to PWLHIV, especially during COVID-19 (Ahmed et al., 2020). The specific health problem was that PWLHIV in the Eastern, Central, and Rift Valley regions experienced varied access to services before and during COVID-19 (Ahmed et al., 2020). The current study endeavored to provide a review of how to maintain access to HIV preventive care services for PWLHIV during a pandemic. Public health workers may use this information to attain the 5% MTCT reduction rates recommended by the WHO. No studies could be found that were conducted on access to HIV preventive care services for PWLHIV comparing rural and urban areas in Kenya including the Central region, Eastern region, and the Rift Valley region before and during the COVID-19 pandemic. This created a gap that the current study addressed.

Problem Statement

The specific research problem that was addressed through this study was to determine whether there was a lack of access to HIV preventive care services for PWLHIV before and during the COVID-19 pandemic in Eastern, Central, and Rift Valley parts of Kenya and whether MTCT of HIV was impacted. This study also evaluated whether there were differences in access to preventive care services between the counties in the Eastern, Central, and Rift Valley regions before and during the pandemic. Bernard et al. (2022) reported that WLHIV encountered challenges in accessing care while PWLHIV faced no challenges during the COVID-19 pandemic in Western Kenya. The study by Bernard et al. only focused on the Western part of Kenya; therefore, results cannot be generalized to other counties. Landrian et al. (2022) examined the effect of the

COVID-19 pandemic on ANC use and found that the COVID-19 pandemic disrupted ANC use among pregnant women, most of whom did not access health care facilities during the pandemic. According to Landrian et al., some pregnant women reported that most health care facilities were closed, too busy, or not accepting patients, and other pregnant women reported that they were scared to access health care facilities because they thought they would contract COVID-19. A thorough analysis of the relevant literature revealed that there were no adequate studies on how the COVID-19 pandemic affected access to preventive care services for PWLHIV in the three counties in the Eastern, Central, and Rift Valley parts of Kenya. Prior studies did not investigate access to HIV preventive care for PWLHIV in the rural and urban areas including the Eastern, Central, and Rift Valley parts of Kenya, thereby creating a research gap that needed to be filled. This study bridged that research gap.

Purpose Statement

The purpose of the study was to determine whether the COVID-19 pandemic affected access to prenatal and postnatal care services for pregnant HIV-positive women in counties in Eastern, Central, and Rift Valley regions in Kenya, and how access to HIV preventive care services impacted the MTCT of HIV before and during the COVID-19 pandemic (2019 and 2021) in Eastern, Central and Rift Valley regions of Kenya. Another purpose was to determine whether access to HIV preventive care services for pregnant HIV-positive women varied between Eastern, Central, and Rift Valley parts of Kenya.

This quantitative study included historical data to address the research questions using a retrospective study design. The Department of Health in Kenya was contacted

with a request for data on the number of PWLHIV who received HIV preventive care services for the years 2019 and 2021 representing the period before and during the COVID-19 pandemic. The Kenya Department of Health collected data from health care facilities in a county in each of the three regions. The study's independent variable was the COVID-19 pandemic while the dependent variables were MTCT of HIV and access to HIV preventive care services. Access to HIV preventive care services between the counties was compared. The target population for this study was PWLHIV and infants exposed to HIV in the Eastern, Central, and Rift Valley parts of Kenya.

Research Questions and Hypotheses

RQ1: Did the COVID-19 pandemic affect access to prenatal and postnatal care services for pregnant HIV-positive women in the Eastern, Central, and Rift Valley parts of Kenya?

H_o1: The COVID-19 pandemic did not affect access to prenatal and postnatal care services for pregnant HIV-positive women in the Eastern, Central, and Rift Valley parts of Kenya.

H_a1: The COVID-19 pandemic affected access to prenatal and postnatal care services for pregnant HIV-positive women in Eastern, Central, and the Rift Valley parts of Kenya.

RQ2: Did access to HIV preventive care services impact the MTCT of HIV during the period before and during the COVID-19 pandemic (2019 and 2021) in Eastern, Central, and the Rift Valley parts of Kenya?

H_o2: Access to HIV preventive care services did not impact MTCT of HIV in Eastern, Central, and the Rift Valley parts of Kenya,

H_a2: Access to HIV preventive services impacted the MTCT of HIV in Eastern, Central, and Rift Valley parts of Kenya.

RQ3: Did access to HIV preventive care services for pregnant HIV-positive women vary between Eastern, Central, and Rift Valley parts of Kenya?

H_o3: Access to HIV preventive care services for PWLHIV did not vary between Eastern, Central, and the Rift Valley parts of Kenya.

H_a3: Access to HIV preventive care services for pregnant HIV-positive women varied between Eastern, Central, and the Rift Valley parts of Kenya.

Conceptual Framework

This study was guided by the theory of access as the conceptual framework. The theory of access was developed by Penchansky and Thomas (1981), who argued that access to health care is the central objective for most health care institutions. This theory seeks to assess the capability of individuals to access basic health care services (Penchansky & Thomas, 1981). Penchansky and Thomas affirmed that access is an imperative issue in health care policy. Penchansky and Thomas also argued that health care access depends not on the availability of health care services but rather on the fit between providers' characteristics and clients' expectations. The access theory was created to understand the barriers to accessing health care (Penchansky & Thomas, 1981). This theory helps in understanding factors that affect access to health care services and

how its application can assist health care practitioners in providing patients with timely and appropriate care (Penchansky & Thomas, 1981).

Penchansky and Thomas (1981) stated that there are five dimensions of care also referred to as the five A's that comprise access to care. These include availability, accessibility, affordability, accommodation, and acceptability. Availability refers to the proximity of the health care services (Penchansky & Thomas, 1981). Health care facilities are deemed available if they are located within reach of the people they serve (Penchansky & Thomas, 1981). Accessibility is how easily consumers can physically enter the provider's facility while affordability refers to how the provider's charges relate to the client's ability and willingness to pay for the services they need (Penchansky & Thomas, 1981). Penchansky and Thomas recognized that the cost of health care services could limit individuals from accessing care. Penchansky and Thomas also cautioned that addressing the affordability of health care services does not guarantee accessibility to health care services. Another dimension is accommodation, which refers to the ability of health care facilities to meet the needs and preferences of individuals (Penchansky & Thomas, 1981).

Myers and Hansen (2019) criticized the theory of access, arguing that accessibility is the sole determinant of health care access. However, some proponents of the theory of access, such as McCullough et al. (2020), argued that accessibility cannot be the only determinant of health care access. McCullough et al. argued that even though accessibility to health care facilities is important, individuals should also be able to afford the cost of healthcare. Penchansky and Thomas's (1981) theory of access was used by

Otieno et al. (2020) in a study on access to primary health care services and associated factors in urban slums in Nairobi, Kenya. The findings were that in the slums of Nairobi, living in a female-headed household seeking care from a public facility, and paying out of pocket for health care were significantly associated with low access to primary care (Otieno et al., 2020). Otieno et al. reported that the economic empowerment of female-headed households was paramount if access to primary care was to be improved.

The theory of access was significant to the current study. The five A's predicted factors that caused a reduction of care during the COVID-19 pandemic. The five A's, which include availability, accessibility, affordability, accommodation, and acceptability, significantly contributed to PWLHIV's inability to receive HIV preventive care services during the COVID-19 pandemic. If access to preventive care services for PWLHIV is realized in counties in the Eastern, Central, and the Rift Valley regions of Kenya, then a reduction of MTCT to less than 5% can be attained. The fit between the provider and the consumer must be attained for access to occur.

Nature of the Study

For this study, quantitative methodology was used. Quantitative methodology is appropriate for comparing outcomes that are measured numerically and to draw statistical conclusions (Creswell & Creswell, 2017). Quantitative methodology could also allow researchers to generalize results from a sample group to a larger group of people (Creswell & Creswell, 2017). In the current study, quantitative data were used to compare measures in the three counties, which addressed the research questions. I used a retrospective comparative research design, which focused on events of the past. In this

design, I analyzed data using existing records (see Johnston et al., 2019). By using records that already existed, I increased the speed of data evaluation and decreased the cost (see Johnston et al., 2019).

The Department of Health in Kenya was contacted to assist in the process of acquiring data. Raw and aggregated data requested included the total number of PWLHIV and the total number of PWLHIV who received HIV preventive care services before and during the COVID-19 pandemic in counties in the selected regions in Kenya. I calculated the proportion of PWLHIV who received care before and during the COVID-19 pandemic to determine women who were eligible to receive care. I needed the total number of PWLHIV and the number of PWLHIV who received services to calculate the proportion of pregnant women who received HIV preventive care services during these periods in a county in each of these three regions. Data came from the Kenya Department of Health. I also wanted to know whether MTCT was impacted and whether this impact varied between regions. To understand the MTCT of HIV, I needed to obtain information on the total number of infants born with HIV and the total number of children born in these counties in the given time frame. This information was requested and was provided by the Kenya Department of Health.

The statistical analysis was carried out using Statistical Package for the Social Sciences (SPSS). The output included the prevalence ratio of women who accessed care before and during the COVID-19 pandemic, odd ratios, and chi-square tests. Descriptive statistics were calculated such as frequency distribution and/or a count and included comparisons between the counties within the three regions before and during the COVID-

19 pandemic (see Vetter, 2017). The data demonstrated which county had a higher prevalence of HIV transmission among the three counties before and during the COVID-19 pandemic. I requested and obtained information on the number of HIV-positive infants who received HIV services and the total number of infants born in each county to get a better estimate of the transmission rate assuming that all infants contracted HIV from their mother. Information on HIV-infected infants was found in medical records when infants were brought to the comprehensive care clinic. HIV in infants is reportable to the Department of Health in Kenya. Infants who are exposed to HIV in Kenya are required to be tested at 6 weeks, 6 months, and 12 months. Data were requested and obtained from the Kenya Department of Health.

Operational Definitions

Antenatal care: Access and use of health care services during pregnancy (WHO, 2022).

COVID-19 pandemic: The period when there was a global outbreak of coronavirus, which is an infectious disease caused by SARS-COV-2 (WHO, 2023).

HIV preventive care services: HIV prevention services that mitigate MTCT during pregnancy (WHO, 2023).

Maternal to child transmission (MTCT): This happens when an infected mother transmits HIV to her baby during pregnancy, delivery, or breastfeeding (Ramosha, 2017).

Prevention of maternal to child transmission (PMTCT): This is a range of services for women of reproductive age living with or at risk of contracting HIV to maintain their health and protect their infant from getting infected with HIV (Tang, 2019).

Assumptions

I made the following assumptions in this study: (a) Prenatal and postnatal services will vary within these counties before and during the COVID-19 pandemic, (b) PWLHIV and WLHIV will have equal access to care within the three given counties, (c) the Department of Health and health care facilities in Kenya will provide data needed for the research, and (d) the sample size will be large enough to be representative of the three selected counties.

Scope and Delimitations

This study was conducted to assess whether access to prenatal and postnatal care and HIV preventive care services for PWLHIV was impacted before and during the COVID-19 pandemic. The study was conducted in counties in the Eastern, Central, and Rift Valley parts of Kenya. These counties were selected because the Central region is more of the city, the Eastern region is more of a suburb, and the Rift Valley region is more rural. The counties in these regions have different socioeconomic statuses. The Central region is more diverse and heterogeneous because people migrate there from other parts of the country. The other two regions are mostly inhabited on a tribal basis. These three counties are representative of the country. PWLHIV of all ages in Eastern, Central, and Rift Valley parts of Kenya and PWLHIV who sought HIV preventive care services were the target population for this study. This information was important and was used to calculate the proportion of women who were eligible to receive preventive care services. The participants were all PWLHIV in these three regions. Infants of PWLHIV were also included in the study.

Limitations

There were several limitations in this retrospective comparative study design. In this design, databases were available but may not have been able to answer all of the research questions due to insufficient clinical data recorded (see Johnston et al., 2019). Using readily available information from data sets meant that I did not have control over the data collection process or what data were available. According to Johnston et al. (2019), charts may not have been in one location, requiring me to engage several clinicians to gain access to required data. This could have been time-consuming and expensive. The number of charts that were extracted to address research questions and my ability to identify these charts could also have been time-consuming (see Johnston et al. 2019). Another limitation was that I might have encountered challenges in obtaining data from Eastern, Central, and Rift Valley parts of Kenya to conduct this study. This was addressed by writing a data request letter to the Kenya Department of Health explaining the reasons for the request to enhance the study's reliability and complete an institutional review board (IRB) application.

Significance of the Study

This study is significant in that it provided insight into the HIV preventive care services provided before and during the COVID-19 pandemic to enable public health practitioners to make necessary changes where there is a need. The study provided a road map of steps to be taken to eradicate or significantly reduce MTCT in these counties. The study also provided a foundation that could be modified and adapted to form a comprehensive education program to be used by health care providers within the entire

country. This study highlighted any challenges that may have been faced by PWLHIV to access services before and during the COVID-19 pandemic. Findings from this study may contribute knowledge to Kenya's public health organizations, practitioners, and the general public concerning an effective way of putting measures in place to ensure that preventive care services are easily accessible to those in need when such events as the COVID-19 pandemic may arise. Findings from this study may be used to create or strengthen HIV preventive services in case similar events occur and to establish programs in communities most affected. The results of this study may be generalized to these regions of Kenya.

Contributions to Health Practice

Health care facilities in the three counties could use this study's findings to change their health treatment practices particularly for PWLHIV to ensure that they get equitable access to HIV medication throughout the regions. The Ministry of Health in Kenya, both on the national and county level, should develop stringent measures to ensure that the national and county health warehouses are adequately stored with HIV medication to mitigate a health crisis in the event of a pandemic.

Implications for Social Change

The implications for positive social change include the potential to introduce strategies to enhance access to HIV preventive services for PWLHIV in Kenya. Health facilities may use this study's findings to deploy strategies that promote access to equitable HIV preventive care services in all counties in Kenya. When access is realized,

MTCT reduction will be attained, thereby alleviating suffering incurred from HIV infections.

Conclusion

The availability of HIV preventive care services for women in counties in the Eastern, Central, and Rift Valley regions of Kenya was an issue before and during the COVID-19 pandemic. It is essential to recognize the challenges while also acknowledging the opportunities for change. By addressing existing obstacles and drawing on the lessons learned during this time, researchers can strive to establish a health care system that is more resilient, inclusive, and tailored to meet the unique needs of PWLHIV in counties in the Eastern, Central, and Rift Valley regions. Collaboration among government entities, health care providers, communities, and nongovernmental organizations will be crucial in achieving an efficient approach to delivering HIV preventive care services. This collaborative effort should aim at ensuring the well-being of both the mother and their newborn.

All studies concerning access to HIV services and its effect on MTCT transmission revealed that access to HIV care plays a positive and significant role in PMTCT of HIV. It is vital to have access to HIV services throughout pregnancy to ensure a healthy experience while also reducing the risk of MTCT of HIV. Some researchers revealed that PWLHIV who had adequate access to HIV medication did not transmit the virus to their children (du Plessis, 2014). Also, the researchers agreed that prophylactic and therapeutic ART medication during pregnancy and postpartum periods reduces

MTCT of HIV (du Plessis, 2014). PWLHIV's strict adherence to ART regimen may lead to a significant reduction in MTCT of HIV.

Chapter 2: Literature Review

The purpose of this study was to determine whether access to HIV preventive care services for PWLHIV was impacted before and during the COVID-19 pandemic in counties in the Eastern, Central, and Rift Valley regions of Kenya and whether this affected MTCT rates. I also sought to understand whether they were differences between the regions. The key variables that were researched were the COVID-19 pandemic, access to preventive care services, and MTCT. Comparisons of these variables were made before and during the COVID-19 pandemic. Even though MTCT is preventable, there were 13,000 newly infected infants in Kenya in 2014 (Sirengo et al., 2014). There were no recent statistics that supported recent infant infections with HIV in Kenya.

In 2019, before the COVID-19 pandemic, 59,304 WLHIV were provided with ART prophylaxis to PMTCT of HIV (Kenya Ministry of Health, 2020). The number of PWLHIV who attended ANC clinics in Kenya was 84.6% in 2020 during COVID-19, which was a drop from 89.5% in 2019 (Bliss & Simoneau, 2022). Newly diagnosed MTCT cases in 2019 before the COVID-19 pandemic were 5,500, and they were 5,200 in 2020 during the COVID-19 pandemic (Bliss & Simoneau, 2022).

The COVID-19 pandemic had a profound impact on access to health care services, including prenatal and postnatal services (Begnel et al., 2022). The COVID-19 pandemic disrupted most health care services, but Bernard et al. (2022) found that access to prenatal and postnatal services was not challenged for vulnerable persons, particularly PWLHIV in Western Kenya. Bernard et al. mentioned that before the onset of the COVID-19 pandemic, access to prenatal and postnatal services was critical for pregnant

women, especially due to increased risks during pregnancy. These studies indicated that the COVID-19 pandemic exacerbated difficulties in accessing health care services for WLHIV but not for PWLHIV.

It is vital to have access to HIV services throughout pregnancy to ensure a healthy experience while also reducing the risk of MTCT. In Kenya, where the prevalence rate of HIV is relatively high, it was crucial to investigate whether pregnant women had access to these essential services before and during the COVID-19 pandemic in counties in the Eastern, Central, and Rift Valley regions of Kenya and to determine whether this influenced MTCT transmission rates.

The counties within the selected regions for the study were based on their geographical diversity and varying health care infrastructures. Comparing and contrasting findings from different authors, I aimed to understand the dynamics of HIV preventive care services accessibility for PWLHIV before and during the COVID-19 pandemic, while also identifying potential disparities and areas for improvement in access and service provision. This chapter consists of the literature search strategy, a discussion of the theoretical framework, and a literature review.

Literature Search Strategy

Various databases were searched for this literature review, including EBSCOhost, MEDLINE, PubMed Central, ProQuest Central, CINHAL, and Google Scholar. I also searched the National Institutes of Health and WHO Library. Several keywords and phrases were used to search: *PMTCT of HIV in Kenya*, *HIV preventive services*, *HIV* and *breastfeeding*, *ART use*, *HIV pregnant women*, *PMTCT*, *Guidelines and adherence to*

maternal transmission in a county in central, eastern, and the rift valley regions in Kenya, HIV, pediatric HIV infection, population-based survey, Kenya, pregnant women, transmission of HIV, and *HIV in Sub-Saharan Africa*.

The articles searched were from peer-reviewed journals that were mostly published within the past five years except for a few that were older but significantly relevant to this study. Also, the publications reviewed were those written in English. A few dissertations were reviewed to gain an understanding of how the researchers accomplished their goals.

Theoretical Framework

The theoretical framework that was used to guide this study was the theory of access. This theory was developed by Penchansky and Thomas (1981). The theory was selected because it had been used widely in public health research to predict access to health care services (Penchansky & Thomas, 1981). Penchansky and Thomas stated that access to health care is the central objective for most health care institutions. The theory is used to assess the capability of individuals to access basic health care services (Penchansky & Thomas, 1981). Penchansky and Thomas affirmed that access depends not on the availability of insurance or health care services but rather on the fit between providers' characteristics and clients' expectations. The access theory was created to understand barriers encountered when trying to access health care (Penchansky & Thomas).

Penchansky and Thomas (1981) claimed that there are five dimensions to access. These dimensions, or the five A's, include availability, accessibility, affordability,

accommodation, and acceptability. This theory is important because it states that all five A's are intertwined. None of the five dimensions is greater than the other; if one dimension is missing, then access to care cannot be attained. All five A's were significant to the current study regarding access to preventive care services for PWLHIV in counties in Eastern, Central, and Rift Valley. Penchansky and Thomas defined availability as the proximity of health care services to the consumer. According to Penchansky and Thomas, accessibility refers to the time it takes to receive care, the location of the facility, and the distance it takes for consumers to get to the facility. The theory of access was relevant and applicable in the present study because it emphasizes that if there is a good fit between the consumer and the provider, then access is optimized (see Penchansky & Thomas, 1981). When access is achieved, preventive care services can be provided, and this can lead to a reduction in MTCT of HIV, leading to a reduction in infant morbidity and mortality.

Penchansky and Thomas (1981) stated that availability refers to the proximity of health care services. Health care facilities are deemed available if they are located in proximity to the people they intend to serve. Accessibility refers to anything that significantly hinders access to health care services, such as financial barriers and organizational barriers (Penchansky & Thomas, 1981). Financial barriers include the cost of care and health insurance coverage, and these barriers might hinder individuals from accessing health care services (Penchansky & Thomas, 1981). Organizational barriers include long waiting times and limited operating hours, which might hinder patients from receiving timely care (Penchansky & Thomas, 1981). Affordability refers to the ability of

individuals to pay for health care services without financial constraints (Penchansky & Thomas, 1981). Penchansky and Thomas recognized that the cost of health care can limit individuals from accessing preventive health care services. Some of the financial challenges in accessing health care services might include high out-of-pocket expenses, which include deductibles, premiums, and copayments (Penchansky & Thomas, 1981). Accommodation refers to the ability of health care facilities to meet the needs and preferences of individuals (Penchansky & Thomas, 1981). Penchansky and Thomas intimated that health care facilities should ensure equitable access to individual needs, including cultural, physical, and linguistic accommodations. The final dimension to this theory is acceptability. Acceptability is the extent to which the client is comfortable with the more unchangeable characteristics of the provider (Penchansky & Thomas, 1981).

Myers and Hansen (2019) criticized the dimension of accessibility by stating that accessibility is the sole determinant of health care access. McCullough et al. (2020), on the other hand, argued that accessibility cannot be the only determinant of health care access. Though accessibility to health care facilities is imperative, individuals should also be able to afford the cost of health care. Besides affordability and accessibility, individuals should be accepted by the health care facility (Penchansky & Thomas, 1981). The theory of access was relevant and applicable in the present study because it emphasizes that health care access is a fundamental human right. The theory was important for this study because it considers access to HIV preventive care services for PWLHIV to be critical. Access to health care is pivotal in mitigating the global burden of disease among PWLHIV. The theory of access was also important in that it points out

that there are many intricacies and dynamics involved in achieving equitable access to health care services, which include not only access to health care facilities but also financial and organizational barriers. The theory of access was further relevant to the present study because it emphasizes that health care access has several dimensions, which include availability, accessibility, affordability, accommodation, and acceptability (see Penchansky & Thomas, 1981).

I considered using Levesque's (2013) conceptual framework for health care. This framework provides a holistic view of exploring, assessing, and measuring access to facilities and settings (Levesque, 2013). This framework was relevant and applicable in the current study because it emphasizes the health systems' perspective of access through the population or patients' point of view (see Levesque, 2013). This framework was not selected for use in this study because it would have required a lot of work and possibly complicated the study.

Penchansky and Thomas (1981) theory of access was used by Otieno et al. (2020) in a study on access to primary health care services and associated factors in urban slums in Nairobi, Kenya. The findings were that in the slums of Nairobi, living in a female-headed household seeking care from a public facility, and paying out of pocket for health care, were significantly associated with low access to primary care. Otieno et al. reported that the economic empowerment of female-headed households was paramount if access to primary care was to be improved.

Literature Review

History of HIV in Kenya

The first case of HIV in Kenya was diagnosed in 1984 (Okuro, 2022). HIV progressed quickly, and by 1998 almost 14% or 2.1 million people of the adult population were infected with HIV (Okuro, 2022). Since the initial diagnosis, HIV in Kenya has become one of the leading causes of death, putting a burden on the health system and the economy (Okuro, 2022). All populations have been affected by HIV. In 1999, the National Aids Control Council was formed as a corporate body aimed at providing the institutional framework to control and prevent HIV (Okuro, 2022). In 2000–2005, the National Aids Control Council identified five priorities for prevention and control of HIV/AIDS, which included prevention and advocacy for positive behavior change, treatment continuation of care and support, mitigation of socioeconomic impact, monitoring evaluation and research, and management and coordination (Okuro, 2022). This plan aimed to reduce the impact of HIV on society by reducing HIV prevalence in Kenya by 20% to 30% among people ages 15–24 by 2005, increasing access to care and support for these individuals, and improving response and coordination (Okuro, 2022). Despite progress made, HIV continues to be a major global public health issue; 40.4 million people have died from this virus globally (WHO, 2023).

The WHO (2023) estimated that 39 million people had HIV at the end of 2022 globally, of which two thirds were in sub-Saharan Africa. In 2022, 630,000 people died from HIV-related illnesses, and 1.3 million people newly acquired this virus globally (WHO, 2023). According to the WHO, HIV has no cure, but with effective preventive

measures such as early diagnosis and treatment, HIV can be managed as a chronic illness allowing people who are infected to live long and healthy lives. Between 2007 and 2010, 11.1% of infants tested positive in Kenya; from 2014 to 2015, there was a reduction to 6.9% of infants who tested positive for HIV in Kenya (WHO, 2023). Even though PMTCT is regarded as one of the most successful HIV prevention measures, MTCT rates are still high in sub-Saharan Africa (WHO, 2023). In Kenya, MTCT remains a great challenge, and increasing PMTCT services is crucial to eliminating MTCT of HIV. Annually, about 37,000 to 40,000 infants are infected with HIV (du Plessis, 2014). Progress was made so that the prevalence of adult HIV had been reduced to 5.9 % (Kamaara et al., 2019). In 2016, 64% of people living with HIV were on ART and 51% had undetectable viral loads (WHO, 2023). In 2022, about 130,000 children contracted HIV around the world (WHO, 2023). About 90% of these infections were through MTCT, and more than 90% occurred in sub-Saharan Africa (Sirengo et al., 2014). Globally, all deaths occurring in children less than 12 months are attributed to HIV, and 4.9% of deaths occur in 1–4 years old. Annually, about 13,000 new infections occur in children in Kenya each year (Sirengo et al., 2014).

To reduce MTCT rates and achieve national and global targets of 90% ART coverage in PMTCT and less than 5% MTCT, Kenya adopted the WHO's recommendations for ART regimen for PMTCT Option B+ (Pricilla et al., 2018). From 2012 to 2015, there was a decline in MTCT from 16% to 8.3% (Pricilla et al., 2018). Before the outbreak of the COVID-19 pandemic, Kenya had achieved advancements in lowering HIV prevalence and enhancing the availability of HIV preventive care services.

According to the Kenya National AIDS Control Council (2020), the national rate of HIV infection decreased from 6.6% in 2012 to 4.9% in 2019. This decline was partially attributed to the accessibility of HIV testing and ART for expectant mothers.

The Kenya National AIDS Control Council also reported PWLHIV had more access to HIV preventive care services in a county in the Central region for PWLHIV compared to a county in the Eastern and Rift Valley regions. They also reported uneven distribution of services throughout the three counties because there were differences between cities and rural areas. An increase in ANC visits was observed in all three counties before the COVID-19 pandemic. Ochieng et al. (2019) reported an increase in ANC attendance in Nairobi County from 87% in 2010 to 94% in 2016. This improvement was attributed to increased awareness campaigns, community mobilization, and government-led initiatives promoting ANC services (Ochieng et al., 2019). Similar progress was observed in counties in the Eastern and Rift Valley regions. Mwangi et al. (2018) found that ANC attendance had increased in a county in the Rift Valley before the COVID-19 pandemic. The Kenya Ministry of Health (2020) reported similar improvements in a county in the Eastern region during the pre-COVID-19 pandemic. These studies highlighted the success of efforts to increase access to ANC services and the benefits of early detection and management of HIV in pregnant women (Kenya Ministry of Health, 2020).

It is essential to ensure that PWLHIV have access to testing and HIV preventive care services to reduce MTCT. Macharia et al. (2022) reported that a county in the Central region had the highest percentage of women receiving ANC during the COVID-

19 pandemic, with about 90% attending at least one visit. Approximately 85% of women in a county in the Central region underwent HIV testing during their ANC visits as part of their care (Macharia et al., 2022). The percentages in the counties in Eastern and Rift Valley were lower, with around 70% of pregnant women attending at least one ANC visit and approximately 60% receiving HIV testing (Macharia et al., 2022). It is critical to increase the number of pregnant women who receive antenatal care and HIV testing to reduce the MTCT of HIV.

The literature reviewed revealed that the COVID-19 pandemic had devastating effects on the healthcare systems, but a study conducted by Bernard et al. (2022) in western Kenya showed that PWLHIV were not challenged in accessing ANC services. Researchers in this study reported that WLHIV were challenged in accessing HIV preventive services compared to PWLHIV. Another study conducted in Nairobi and Kiambu counties in Kenya revealed that access to prenatal and postnatal services was stressed to maximum capacity (Landrian et al., 2022). Some PWLHIV reported that they did not take their medication promptly for fear of running out of their medication (Landrian et al., 2022) They were afraid that they would contract the COVID-19 pandemic if they went to the hospitals (Landrian et al., 2022). The literature reviewed emphasized that prenatal and postnatal services are critical for PWLHIV. It was evident that the COVID-19 pandemic affected access to HIV preventive care services for WLHIV but did not affect access for PWLHIV in western Kenya (Bernard et al., 2022). Landrian et al. (2022) reported that nearly half of all women who delivered during the COVID-19 pandemic were affected by their ability to access care.

Access to HIV Services and Its Effect on MTCT in Kenya

A study conducted by Gill et al. (2020) examined missed opportunities in PMTCT. The study established that there were delays experienced in HIV testing of HIV-exposed babies (Gill et al.2020). Out of the 41 mothers who were known to be positive during pregnancy 25 of their infants were diagnosed by age two years while eight children were between two to four years when diagnosed and eight children were not diagnosed until they were five to twelve years (Gill et al.,2020). Of 76 mothers eight children were not diagnosed until 1-7 years after the mother tested HIV positive (Gill et al., 2020). The authors also stated that 60 PWLHIV who attended ANC had tested HIV-negative in 2017-2018 in Uganda and Kenya. The authors reported that an undetected virus in PWLHIV led to an increase in infant infections. Despite knowing their HIV status, a significant number of newly diagnosed children did not receive ART during pregnancy or breastfeeding. There were also delays in the time of maternal and child diagnoses and hence, initiation of therapy for the exposed children was delayed (Gill et al., 2020). Gill et al. reported that prompt access to HIV services had a significant effect on MTCT, and PWLHIV who accessed HIV preventive care services on time did not transmit HIV to their infants. On the other hand, Sirengo et al. (2014) conducted a study to assess the MTCT of HIV in Kenya, which showed that even though some PWLHIV received prenatal care, antepartum care, ART prophylaxis, and intrapartum prophylaxis and also reported that their infants received postpartum prophylaxis for PMTCT, 15.1% of these children tested positive for HIV. Sirengo et al. concluded that access to HIV services did not fully eliminate MTCT, but it reduced the transmission significantly,

suggesting that universal ART should be made compulsory for PWLHIV to reduce MTCT to less than 5%. Mwau et al. (2017) also investigated the MTCT of HIV in Kenya and found that infants whose mothers received no PMTCT intervention, no prophylaxis, and infants with mixed breast-feeding had higher chances of becoming infected with HIV than infants whose mothers followed the WHO recommended practices. The study's findings were similar to those by Sirengo et al. (2014), who asserted that PMTCT best practices should be followed to mitigate HIV-infected infants. Mwau et al. added that infant testing should be done, particularly in pediatric/outpatient departments to ensure that HIV-infected infants are detected early and subsequently commenced therapy. Mwau et al. concluded that ART reduced the MTCT of HIV rates. The authors further claimed that sub-optimal access to HIV services was more likely to increase the likelihood of MTCT of HIV (Mwau et al., 2017).

Access to HIV Services and Its Effect on MTCT in Counties in Eastern, Central, and Rift Valley Regions in Kenya

Nyagaka et al. (2022) investigated factors that caused MTCT to increase in a county in the Rift Valley part of Kenya during the COVID-19 pandemic. Nyagaka et al. concluded that infants whose mothers did not receive ART or were mixed- fed were more likely to test HIV positive . The authors suggested that PWLHIV should strictly adhere to ART prophylaxis and exclusively breastfeed for the recommended duration of time which is up to six months (Nyagaka et al., 2022). This study's findings were similar to other studies by Mwau et al. (2017), and Sirengo et al. (2014), who affirmed the need for PWLHIV to receive ART prophylaxis during their pregnancy to avoid MTCT of HIV.

Nyagaka et al. added that PWLHIV should exclusively breastfeed their infants to reduce the chances of transmitting HIV to the infants. Similarly, Okoko et al. (2017) examined factors associated with MTCT of HIV in Migori, a rural area in Kenya. Okoko et al. asserted that poor uptake of ART prophylaxis and poor adherence to HIV treatment results in increasing the odds of MTCT of HIV.

The COVID-19 pandemic placed an immense strain on healthcare systems worldwide, exacerbating existing disparities in access to healthcare services. Vulnerable populations, such as PWLHIV, faced unique challenges in accessing essential HIV services during the COVID-19 pandemic. In Kenya, where the COVID-19 pandemic had significant ramifications, variations in healthcare access were observed in Eastern, Central, and Rift Valley regions.

A county in the Eastern region faced unique challenges in keeping up with HIV preventive care services for PWLHIV due to its rural nature (Machakos County Department of Health, 2022). To tackle this, the county government collaborated with community health workers to conduct door-to-door HIV testing campaigns (Machakos County Department of Health 2022). This approach not only increased testing rates but also encouraged more pregnant women to seek HIV preventive care services. According to a study by the Machakos County Department of Health (2022) ART initiation among PWLHIV increased by 18% within six months after the peak of the COVID-19 pandemic.

On the other hand, a county in the Rift Valley adopted a technology-driven approach to maintain access to HIV preventive care services for PWLHIV. According to

the Kajiado Health Board (2022), telemedicine platforms were implemented to provide remote counseling and consultations, reducing the need for in-person visits during the COVID-19 pandemic. The Kajiado Health Board reported a 25% increase in virtual appointments for pregnant women living with HIV during the COVID-19 pandemic.

While all three regions made efforts to maintain access to HIV services, some differences were noted. According to Adeyemi (et al.2021) a county in the Central region's success can be attributed to its well-developed healthcare infrastructure and resources. In contrast, the Eastern region county collaboration with community health workers was more challenging in remote areas. A Rift Valley adaption of telemedicine was innovative but depended on internet access, which may not have been universally available. Despite challenges, some initiatives and adaptations were implemented to ensure continued access to HIV preventive care services for PWLHIV during the COVID-19 pandemic. In the Central region, telemedicine and mobile health units were introduced to reach pregnant women in remote areas (Adeyemi et al., 2021). These initiatives aimed to mitigate the impact of travel restrictions and reduce the risk of exposure to the COVID-19 pandemic while providing essential care services.

The counties in the Eastern and the Rift Valley also witnessed efforts to improve access to HIV preventive care services during the COVID-19 pandemic. Harsono et al. (2022) reported on community-based interventions that utilized community health workers to deliver ART and other essential services directly to pregnant women's homes. These efforts helped bridge the gaps in healthcare infrastructure and increased accessibility to HIV preventive care services.

The access to HIV preventive care services for pregnant women in Eastern, Central, and Rift Valley regions, pre-and during, the COVID-19 pandemic revealed both persistent challenges and new opportunities. These three counties in Kenya faced unique obstacles in delivering effective HIV preventive care services to pregnant women, and the outbreak of the COVID-19 pandemic further compounded these issues. Understanding the evolution of these challenges is crucial for designing targeted interventions that address the needs of PWLHIV during the COVID-19 pandemic.

Before the COVID-19 pandemic, the county in the Central region exhibited relatively better access to HIV preventive care services for pregnant women compared to the counties in Central and Rift Valley (Mwau et al., 2018). The county in the Central region's capital city status led to a more developed healthcare infrastructure, with a higher concentration of facilities offering HIV preventive care services as stipulated by Mwau et al. Better education and awareness about HIV in the Central region contributed to early diagnosis and timely initiation of ART during pregnancy, reducing the risk of MTCT of HIV (Thomson et al., 2018). The Central part of Kenya possesses a more robust healthcare infrastructure than the rural counties in the Eastern and Central parts of Kenya. Based on the data obtained from Kenya (Health Information System, 2020), it was found that the Central region had a proportion of healthcare facilities equipped to offer HIV preventive care services. Eighty-five percent of health facilities in the Central region provided ART services specifically for pregnant women, while the percentages were approximately 55% in Machakos and 60% in Kajiado counties as reported by the Kenya Health Information System, 2020). The disparities in healthcare infrastructure

highlighted the potential variations in service availability for PWLHIV during the COVID-19 pandemic (Health Information System, 2020).

Accessing healthcare services for WLHIV posed significant challenges, particularly in remote areas with limited healthcare facilities. The presence of stigma and discrimination acted as deterrents discouraging PWLHIV from seeking the necessary HIV preventive care services (Fryer, 2020). As a result, the risk of transmission was further heightened. Socioeconomic disparities and traditional gender roles also hindered access to HIV preventive care services in poor and remote areas of selected counties in Eastern, Central, and Rift Valley. According to Fryer (2020), poverty and limited decision-making power for women contributed to delayed or inadequate care.

During the COVID-19 pandemic the counties in Eastern, Central, and Rift Valley parts of Kenya all experienced disruptions to their healthcare systems. The diversion of resources and focus towards managing the COVID-19 pandemic had detrimental effects on routine health services, including preventive care services for PWLHIV (Ombere & Nyabundi, 2023). According to Ombere and Nyakundi (2023) lockdowns and movement restrictions made it difficult for PWLHIV to reach healthcare facilities, and fear of contracting the COVID-19 pandemic from healthcare centers led to decreased clinic attendance. The COVID-19 pandemic also exacerbated existing socioeconomic disparities, further impacting access to HIV services, especially in the selected counties in the Eastern and Rift Valley regions (Fryer, 2020).

The COVID-19 pandemic on the other hand also brought about some positive changes. Telemedicine and virtual healthcare services emerged as alternatives to in-

person visits, allowing pregnant women to access some HIV preventive care services remotely (Fryer, 2020). Innovative solutions like home-based ART delivery and virtual counseling helped bridge the gap caused by the COVID-19 pandemic (Fryer, 2020)

In summary, the studies reviewed concerning access to HIV services and the effect on MTCT revealed that access to HIV preventive care services plays a significant role in PMTCT. It is vital to have access to these services throughout pregnancy to ensure a healthy experience while also reducing the risk of MTCT. Ensuring that PWLHIV have access to HIV preventive care services is vital to preventing MTCT of HIV. The authors of both studies found that prophylactic and therapeutic ART medication during pregnancy and postpartum periods reduced MTCT of HIV, thus, PWLHIV should adhere to ART for PMTCT.

Access to HIV Preventive Care Services Variation for Pregnant PWLHIV in Counties in Eastern, Central, and Rift Valley Regions

The county in the Central region is the capital and the largest city in Kenya. According to (Mbugua & MacQuarrie, 2018) in their county-level national democratic health survey, Nairobi exceeded the national average on all maternal health indicators compared to all other counties in the country. Several studies conducted before the COVID-19 pandemic highlighted both strengths and weaknesses in access to HIV preventive care services for PWLHIV in a county in the Central region. Otieno et al. (2019) reported that approximately 80% of PWLHIV had access to ANC services and attended at least one session during their pregnancy. Despite the attendance rate for ANC, there were disparities in the utilization of interventions for PMTCT. A study by Mugo et

al. (2019) revealed that only 65% of PWLHIV in a county in the Central region received ART specifically for PMTCT purposes. This indicates that there is still room for improvement when it comes to PWLHIV utilization of ART to prevent PMTCT.

A county in the Eastern region is known for its underprivileged population as it falls within the arid region (Mulongo et al., 2017). The challenges faced by PWLHIV in accessing HIV preventive care services in this region were more pronounced than those in a county in the Central region. Mulongo et al. (2017) reported that ANC attendance among PWLHIV in a county in Eastern region was significantly lower than in a county in the Central region, with only 40% of PWLHIV accessing ANC services. The authors attributed low ANC attendance rates to various factors including long distances to healthcare facilities, limited transportation options, and cultural beliefs. This study also revealed that only half of PWLHIV in a county in Eastern region had access to interventions for PMTCT. This highlights the pressing need for accessibility to HIV preventive care for PWLHIV in a county in the Eastern region of Kenya.

A county, situated in the Rift Valley region of Kenya, is characterized by a blend of rural areas and is inhabited by a nomadic community of the Maasai people (Langat, 2019). The challenges faced by PWLHIV in this county were unique and required tailored interventions. A study by Langat (2019) indicated that ANC attendance among PWLHIV in a county in the Rift Valley was slightly better than in the Eastern region but still lower than the county in the Central region, with 55% of women accessing ANC services. Langat identified cultural practices and beliefs particularly among the Maasai community as barriers to ANC utilization and PMTCT interventions.

Comparing the three counties, access to HIV services for PWLHIV was most favorable in the Central region, where ANC attendance rates were relatively high. In contrast, the Eastern and Rift Valley counties faced more significant challenges, with lower ANC attendance rates and more significant barriers to accessing PMTCT interventions. The critical contrasts among the counties were the availability of healthcare infrastructure and cultural factors. A county in the Central region with an urban setting and relatively better healthcare infrastructure resulted in higher ANC attendance rates than a county in the Eastern and Rift Valley regions. The Eastern and Rift Valley counties with their rural and semi-arid settings caused difficulties for PWLHIV in reaching healthcare facilities due to transportation limitations and cultural beliefs that hindered ANC utilization.

Despite progress, several barriers hindered access to HIV preventive care services for PWLHIV in counties in the Eastern, Central, and Rift Valley regions of Kenya. Stigma and discrimination associated with HIV status were prevalent in society, leading to fear and reluctance to seek HIV preventive care services (Ngugi et al., 2021). A study by Ngugi et al. (2021) revealed that women from low-income backgrounds faced financial constraints in accessing HIV preventive care services, making it difficult to attend clinics regularly to receive the care they needed.

Access to HIV Services During the COVID-19 Pandemic

The emergence of the COVID-19 pandemic in early 2020 had a profound impact on healthcare systems worldwide, including those in Kenya. The COVID-19 pandemic brought about disruptions in the delivery of healthcare services affecting access to HIV

services for pregnant women in counties in the Eastern, Central, and Rift Valley regions of Kenya. Mwamba et al. (2021) reported a decline in the number of PWLHIV attending ANC and accessing HIV testing during the COVID-19 pandemic. Fear of contracting COVID-19 virus at healthcare facilities, movement restrictions, and resource diversion toward COVID-19 pandemic response significantly reduced service utilization (Mwamba et al. 2021).

To mitigate the impact of the COVID-19 pandemic on HIV services, the Kenyan government and nongovernmental organizations implemented various strategies. Telemedicine and mobile health interventions were introduced to provide virtual counseling and ART adherence support. The Ministry of Health in Kenya encouraged multi-month prescriptions of ART to reduce clinic visits (Wanyenze et al., 2020). Community-based interventions played a crucial role in ensuring that PWLHIV continued to receive essential services. A study by Kikuchi et al. (2020) highlighted the success of community health workers in delivering ART to patients' homes during lockdown periods.

Apart from the direct impact on HIV services, the COVID-19 pandemic also affected maternal health outcomes in a county in each of the three regions. A study by Aluisio et al. (2021) found an increase in maternal mortality rates during the COVID-19 pandemic, partly attributed to reduced access to essential healthcare services, including ANC and labor and delivery services. The diversion of resources and healthcare personnel to the COVID-19 pandemic response further strained the capacity to provide comprehensive maternal healthcare (Aluisio et al., 2021).

Critique of the Existing Literature

The studies reviewed investigated access to HIV preventive care, ANC, and the impact of the COVID-19 pandemic on PWLHIV, non-PWLHIV, or both. Bernard et al. (2022) investigated the impact of the COVID-19 pandemic on access to HIV medication for WLHIV in Western Kenya. This study explored how the COVID-19 pandemic affected pregnant and non-PWLHIV. Since the findings focused on WLHIV, it could not be generalized to PWLHIV. The study's strengths included the fact that it was conducted to assess whether the COVID-19 pandemic impacted access to HIV preventive care services for HIV-positive women in western Kenya. The authors used a mixed method and did not rely on one method which enhanced the study's credibility and reliability leading to improved results. This study has a critical strength as it deployed both surveys and in-depth interviews in gathering data. Despite some strengths, this study also has its weaknesses as its focus was on PWLHIV and WLHIV in western Kenya and the results cannot be generalized to PWLHIV in the three selected counties. Another weakness of the study is that it was conducted in facilities supported by the Academic Model Providing Access to Healthcare (AMPATH). Facilities supported by AMPATH had a constant supply of ART which made it easier for WLHIV to access ART compared to other facilities that were not supported by AMPATH (Bernard et al., 2022).

Nyagaka et al. (2022) investigated factors associated with MTCT in Kajiado County, a semi-arid county in Kenya. The benefit of investigating the factors associated with MTCT in semi-arid areas is that the study's findings highlight the challenges faced by PWLHIV in accessing HIV services in these areas before the COVID-19 pandemic.

The authors in the study employed a longitudinal design from 2014 - 2017. Reviewing research from a longitudinal study pre-COVID-19 pandemic helps the researcher understand the variations associated with MTCT over several years. . The weaknesses of Nyagaka et al. study were that it was conducted in a semi-arid area and its findings could not be generalized to other areas. Additionally, longitudinal studies take a long time to conduct and can be expensive to carry out.

Mwai et al. (2017) conducted an analysis of MTCT of HIV in Kenya. The authors utilized a longitudinal study of the national database for nine years, from January 2007 to July 2015. The study's strengths included establishing why some infants were infected with HIV despite benefitting from PMTCT best practices. For instance, Mwai et al. found that some PWLHIV who received PMTCT interventions exposed their infants to HIV One of the weaknesses of the study is that it was conducted in the entire country, which might limit the study's validity to applicability in all the regions in Kenya. A county in the Central region has better healthcare facilities than a county in the Eastern and Rift Valley region (Mwai et al., 2017). According to Mwai et al. urban areas, such as Nairobi have better access to HIV medication when compared to rural and semi- arid areas of Machakos and Kajiado.

Research Gap

There were notable research gaps in the literature review. Table 1 presents a summary of the knowledge gaps.

Table 1

Research Gap

Author	Title	Methodology	Finding	Knowledge gap
Bernard et al. (2022)	Impacts of the COVID-19 pandemic on access to HIV and reproductive health care among women living with HIV (WLHIV) in Western Kenya: A mixed methods analysis	Descriptive research	The study established that access to HIV services was interrupted for a large proportion of non- PWLHIV in Western Kenya. The study also established that innovative solutions are required to ensure that access to HIV services and other reproductive health outcomes do not worsen during pandemics.	The study only focused on Western Kenya; therefore, the study's findings cannot be generalized to other counties in Kenya. Telecommunication companies cannot apply to other countries.
Nyagaka et al. (2022)	Factors associated with mother to child transmission of HIV in a semi-arid county in Kenya, 2014-2017.	Longitudinal research	Exclusive breastfeeding and ARV prophylaxis are significant in determining MTCT.	The study was conducted in Kajiado County, which is a semi-arid area. As such, the study's findings cannot be generalized to other arid or semi-arid areas in Kenya. The study deployed a longitudinal study, from 2014-2017. The study was conducted before the pandemic.
Mwau et al. (2018)	Mother-to-child transmission of HIV in Kenya: A cross-sectional analysis of the national database over nine years	Longitudinal research	Infants whose mothers received no PMTCT intervention were more likely to get infected with HIV.	Longitudinal research was conducted over nine years. This survey could give irrelevant results due to the long duration of time. Nine years did not include the pandemic period. As such, the study's findings may not apply to pandemic situations.

Chapter 3: Research Method

The purpose of this study was to determine whether access to HIV preventive care services for PWLHIV was impacted before and during the COVID-19 pandemic in the Eastern, Central, and Rift Valley regions of Kenya, and whether a reduction in access to HIV preventive care services affected the MTCT of HIV in these counties. I endeavored to determine whether there were differences between the counties in these regions. Comparisons of access to services and MTCT of HIV were made before and during the COVID-19 pandemic within each county and across the counties.

This chapter provides a description of the chosen research design, the population selected, the sampling approach, the data collection approach, and the data analysis approach. The major sections that make up this chapter include a research design and rationale. A discussion of the methodology is provided, data analysis is reviewed, and an overview of threats to validity is also provided.

The research design that was used was a retrospective comparative design that focused on events in the past (see Johnston et al., 2019). In this design, I analyzed data using existing records (see Johnston et al., 2019). By using records that already existed, I sped up the process of data evaluation and reduced the cost of the study (see Johnston et al., 2019). I used data collected from health care sites in a county in each of the three regions.

Research Design and Rationale

This study was a quantitative study using a retrospective comparative design. The independent variable was the COVID-19 pandemic while the dependent variables

included (a) access to HIV preventive care services by PWLHIV and (b) MTCT of HIV. The county was considered as a potential mediating variable. Addressing the research questions, I compared access to HIV preventive care services for PWLHIV living in counties in Eastern, Central, and the Rift Valley regions of Kenya over the years 2019 and 2021, which captured the period before and during the COVID-19 pandemic. Data for this study were available from the Department of Kenya and were accessed to address the research questions.

The research design was critical in determining how data were collected and analyzed. Once the research questions were answered, the results could be used by public health workers to provide evidence-based care. The design choice of this study was consistent with advancing knowledge in the discipline. The key advantage of the retrospective comparative design is minimization of costs and resources (see Johnston et al., 2019). Data analysis can be done in a shorter time because this design included use of preexisting data (see Johnston et al., 2019).

Methodology

This research was a quantitative study using a retrospective comparative design to determine whether PWLHIV were challenged to receive care or had limited access to care before and during the COVID-19 pandemic in counties in Eastern, Central, and Rift Valley regions in Kenya. I wanted to determine whether the COVID-19 pandemic affected access to prenatal and postnatal services for PWLHIV in a county within each of the three selected regions and whether a reduction in access to these services affected MTCT of HIV. I also examined whether there were differences between the counties in

terms of access and transmission rates. The population targeted in this study included all PWLHIV because they are the ones eligible to receive HIV preventive care services before and during their pregnancies. I endeavored to determine the proportion of these women who received HIV preventive care services before and during the COVID-19 pandemic. To calculate the proportion of women who received HIV preventive care services, I needed to understand the total number of PWLHIV in these counties as well as the number of PWLHIV who received HIV preventive care services before and during the COVID-19 pandemic. The inclusion criteria were PWLHIV because they are the ones eligible to receive HIV preventive care services before and during pregnancy in the Eastern, Central, and Rift Valley regions of Kenya.

Data Collection Plan (Archival Data)

Data on HIV preventive care services on PWLHIV services in Eastern, Central, and Rift Valley regions were collected through routine health information systems such as registers, patient records, and electronic records. When an expectant woman presents for ANC, they are screened and tested for HIV and syphilis in Kenya. For a woman to receive any government services during prenatal and postnatal periods, they have to consent to HIV testing. Participants in the current study were PWLHIV who sought and received prenatal and postnatal HIV preventive care services in counties in Eastern, Central, and Rift Valley regions in Kenya before and during the COVID-19 pandemic. Once a woman tests positive for HIV, they are counseled and commence treatment. Their information is transmitted from the facility to the Kenya Department of Health. Data collected by the Kenya Department of Health from facilities include information on the

number of pregnant women who received HIV testing and counseling, the number of HIV-positive pregnant women who received ART, and the number of infants born to HIV-positive mothers who received ART prophylaxis. After identifying the archives that had the relevant data sets needed for my study, I sent a data request letter via email to the Ministry of Health in Kenya seeking authorization to access and collect data for my research. Included in the email were my identification, information on the nature of the study, the type of data needed, and the criteria for participants. IRB approval allowed me to access and utilize the pertinent data

Data Analysis Plan

I used SPSS for my data analysis.) SPSS was created for the management and statistical analysis of social science data (Masuadi et al., 2021. The independent variable in consideration was the COVID-19 pandemic. One of the dependent variables was access to HIV preventive care services by PWLHIV. This was a dichotomous variable and was coded as yes for access and no for no access. Another dependent variable was the MTCT of HIV. This was also a dichotomous variable and was coded as yes for MTCT of HIV or no for no MTCT of HIV. The county was considered as a mediating variable. For data analysis, I compared the proportions of eligible women who received HIV preventive care services before and during the COVID-19 pandemic. To identify the transmission rate, I needed to know the number of infants born in each county and the number of infants presenting for HIV services. This provided an estimate of the transmission rate, assuming all infants contracted HIV from their mothers.

Data cleaning involves inspecting data to identify any irrelevant, missing, or corrupt data that if not cleaned may lead to unsatisfactory results (Ridzuan & Zainon, 2019). This missing and irrelevant data were closely examined and corrected for accuracy (see Ridzuan & Zainon, 2019). The data needed included the total number of PWLHIV as well as the number of PWLHIV who were supposed to receive HIV preventive care services. The data also included the number of infants born with HIV to understand transmission.

Research Questions

RQ1: Did the COVID-19 pandemic affect access to prenatal and postnatal services for HIV-positive women in counties in the Eastern, Central, and Rift Valley regions in Kenya?

H_o1: The COVID-19 pandemic did not affect access to prenatal and postnatal services for HIV-positive women in counties in the Eastern, Central, and Rift Valley regions in Kenya.

H_a1: The COVID-19 pandemic affected access to prenatal and postnatal care services for HIV-positive women in counties in Eastern, Central, and Rift Valley regions in Kenya.

RQ2: Did access to HIV services affect the MTCT of HIV before and during the COVID-19 pandemic in counties in the Eastern, Central, and Rift Valley regions of Kenya?

H_o2: Access to HIV care services did not affect MTCT of HIV in counties in the Eastern, Central, and Rift Valley regions in Kenya.

H_a2: Access to HIV care services affected MTCT of HIV in counties in Eastern, Central, and Rift Valley regions in Kenya.

RQ3: Did access to HIV services for HIV-pregnant women vary between counties in the Eastern, Central, and Rift Valley regions of Kenya?

H_o3: Access to HIV services for HIV-pregnant women did not vary between counties in Eastern, Central, and Rift Valley regions in Kenya.

H_a3: Access to HIV services for HIV-pregnant women varied between counties in the Eastern, Central, and Rift Valley regions of Kenya.

Data analysis was conducted using statistical tests. The output included odd ratios, and chi-square tests of associations were used to compare variables that were of interest across the three counties (see McHugh, 2013; Szumilas, 2010). Descriptive statistics were calculated such as frequency distribution and/or a count that included comparisons between the three counties in 2019 and 2021 (see Vetter, 2017). Frequency tables and descriptive statistics were used that showed which county had a higher prevalence of PMTCT of HIV.

Threats to Validity

Internal validity refers to the accuracy of a study in measuring what it is intended to measure, and external validity refers to the applicability of a study's findings (Andrade, 2018). We ensured external and internal validity by selecting an appropriate sample size. Threats to a conclusion are factors that can lead a researcher to reach an incorrect conclusion about a relationship in the study (Garcia-Perez, 2012). Conclusion validity includes any effect that can impact the internal validity of a study, which may

bias the results and impact validity as statistical conclusions are reached (Garcia-Perez, 2012). These threats to internal validity include unreliability of treatment implementation, including lack of standardization, failure to control for external extraneous variables, and low statistical power (Patino & Ferreira, 2018). These threats can cause a researcher to incorrectly conclude that there is no relationship between variables (Patino & Ferreira, 2018). Poor reliability of treatment implementation, not using standard procedures and protocols, or other factors that can go unrecognized can cause a researcher to underestimate the effects (Patino & Ferreira, 2018).

Ethical Procedures

A data request letter sent to the Ministry of Health in Kenya and their response provided authorization to access data for my study. IRB authorization (Number 01-02-24) was also obtained. Xu et al. (2020) stated that the treatment of human participants in research is critical, and ensuring their safety and adherence to ethical considerations is paramount. Ethical treatment of human participants in research promotes a study's integrity. Ethical considerations in the current study included ethical review, informed consent, privacy, and confidentiality. I obtained approval from Walden University IRB to conduct this study. Informed consent from the participants was not required. No data were collected directly from the respondents. The Kenya Ministry of Health provided permission to access relevant data for use in my study from counties in Eastern, Central, and Rift Valley. The letter outlined the purpose of the study and how I intended to utilize the data. Privacy and confidentiality were ensured by removing any identifying information. All data collected, which included scanned hard copies and electronic files,

will be stored in a password-protected external flash drive for five years. In compliance with Walden University's IRB guidelines, all data used for the study will be destroyed after five years.

Summary

The population targeted in this study was PWLHIV who received prenatal and postnatal services in counties in the Eastern, Central, and Rift Valley regions of Kenya before and during the COVID-19 pandemic, and also all PWLHIV in these counties. Infants born to PWLHIV in these counties were included in this study. Data were obtained from the Kenyan Ministry of Health. Data were cleaned and screened to ensure they were not corrupted and to avoid bias. SPSS was used to analyze the data. Frequency tables, odds ratios, McNemar test, Friedman test and descriptive statistics were statistical tests used to test the hypotheses.

Chapter 4: Results

The purpose of this quantitative case study was to examine access to HIV preventive care services for PWLHIV in counties in Eastern, Central, and Rift Valley regions in Kenya before and during the COVID-19 pandemic. The sample population comprised of PWLHIV in counties in the Eastern, Central, and Rift Valley regions of Kenya before (2019) and during (2021) the COVID-19 pandemic. The Kenya Ministry of Health data for the same periods and counties were obtained and analyzed. The effect of the COVID-19 pandemic on the access to prenatal and postnatal care services for PWLHIV in counties in the three regions and whether access to HIV preventive care services impacted MTCT of HIV before and during the COVID-19 pandemic were determined. This chapter includes a presentation of findings from the data collected from the Ministry of Health in Kenya for the years 2019 and 2021, which represented the time period before and during the COVID-19 pandemic in counties in three regions of Eastern, Central, and Rift Valley regions of Kenya. Data collection methods and statistical analytical tests are reported. The chapter ends with a conclusion.

Presentation of the Findings

This quantitative study's overarching research question was the following: Did access to HIV preventive care services for PWLHIV change in Kenya before and during the COVID-19 pandemic in counties in Eastern, Central, and the Rift Valley regions in Kenya? The study was conducted to answer the following research questions:

RQ1: Did the COVID-19 pandemic affect access to prenatal and postnatal care services for PWLHIV in the Eastern, Central, and Rift Valley parts of Kenya?

RQ2: Did access to HIV preventive care services impact the MTCT of HIV during the period before and during the COVID-19 pandemic (2019 and 2021) in Eastern, Central, and the Rift Valley parts of Kenya?

RQ3: Did access to HIV preventive care services for PWLHIV vary between Eastern, Central, and Rift Valley parts of Kenya?

RQ1: Did the COVID-19 pandemic affect access to prenatal and postnatal care services for PWLHIV in counties in Eastern, Central, and Rift Valley regions in Kenya?

A chi-square goodness of fit test was conducted to determine whether the COVID-19 pandemic affected access to prenatal and postnatal care services for PWLHIV in counties in Eastern, Central, and Rift Valley regions in Kenya**.**

County in the Eastern Region

For a county in the Eastern region, the Chi-square test was statistically significant, χ^2 (2) = 85.325% and 69.146% before and during COVID-19 pandemic (respectively). The *p* value was= 0.000. We rejected the null hypothesis. Based on these findings, we concluded that the COVID-19 pandemic affected access to prenatal and postnatal care services for PWLHIV in a county in the Eastern region in Kenya. There were statistically significant differences in the number of ANC visits before and during COVID-19 pandemic (see Table 2).

Table 2

Chi-Square Goodness of Fit Test for a County in the Eastern Region

Test	ANC visits before COVID-19	ANC visits during COVID-19
Chi-square	85.325[a]	69.146[b]
Differential item functioning	6	5
Asymptomatic sig.	.000	.000

[a] 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 22.4.

[b] 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 22.8.

County in the Central Region

For the Central region, the Chi-Square test result was : χ^2 (2) = 151.872% and 115.466%. The *p* value was 0.000, which was lower than the threshold of < 0.050. The null hypothesis was rejected. Results showed that the COVID-19 pandemic affected access to prenatal and postnatal care services for PWLHIV in a county in Central region in Kenya. There were statistically significant differences in the number of ANC visits before and during COVID-19 pandemic (see Table 3).

Table 3

Chi-Square Goodness of Fit Test for a County in the Central Region

Test	ANC visits before COVID-19	ANC visits during COVID-19
Chi-square	151.872[a]	115.466[b]
Differential item functioning	6	5
Asymptotic	.000	.000

[a] 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 31.3.

[b] 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 27.2.

County in the Rift Valley Region

For the Rift Valley region, the Chi-Square test results was χ^2 (2) = 77.437% and 59.871%. The *p* value was 0.000, which is lower than the threshold of < 0.05. The null hypothesis was rejected . Based on these findings, we concluded that the COVID-19 pandemic affected access to prenatal and postnatal care services for PWLHIV in a county in the Rift Valley. There were statistically significant differences in the number of ANC visits before and during the COVID-19 pandemic (see Table 4).

Table 4

Chi-Square Goodness of Fit Test for a County in the Rift Valley Region

Test	ANC visits before COVID-19	ANC visits during COVID-19
Chi-square	77.437[a]	59.871b
Differential item functioning	6	
Asymptotic significance	.000	.000

[a] 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 19.3.

[b] 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 20.7.

Descriptive Tests

The descriptive test results on access to prenatal and postnatal care services for PWLHIV in counties in the Eastern, Central, and Rift Valley region of Kenya are presented in frequency tables and bar graphs. For a county in the Eastern region, statistics showed that before the COVID-19 pandemic, more women (162) had access to prenatal and postnatal care services than during the COVID-19 pandemic (141). This indicated that the COVID-19 pandemic affected access to prenatal and postnatal care services for PWLHIV in a county in the Eastern region (see Tables 5 and 6 and Figures 1 and 2).

Table 5

Access to Prenatal and Postnatal Care Services in a County in the Eastern Region Before the COVID-19 Pandemic

Valid	Frequency	Percentage
No	43	31.9%
Yes	92	68.1%
Total	135	100%

Figure 1

Access to Prenatal and Postnatal Care Services in a County in the Eastern Region Before the COVID-19 Pandemic

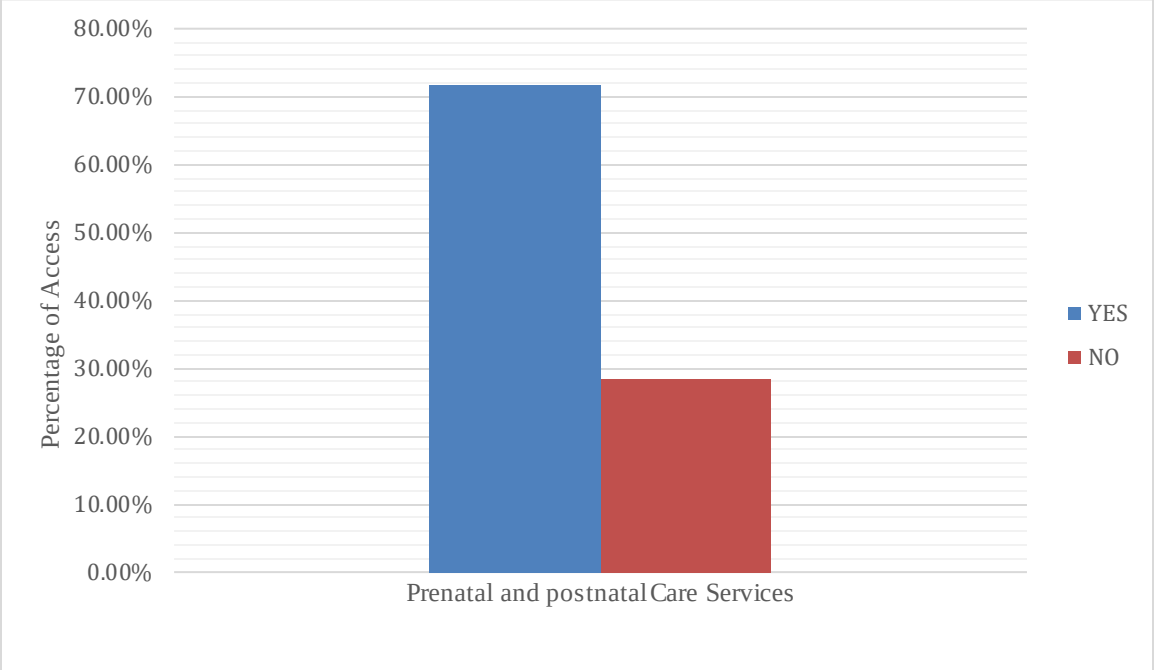


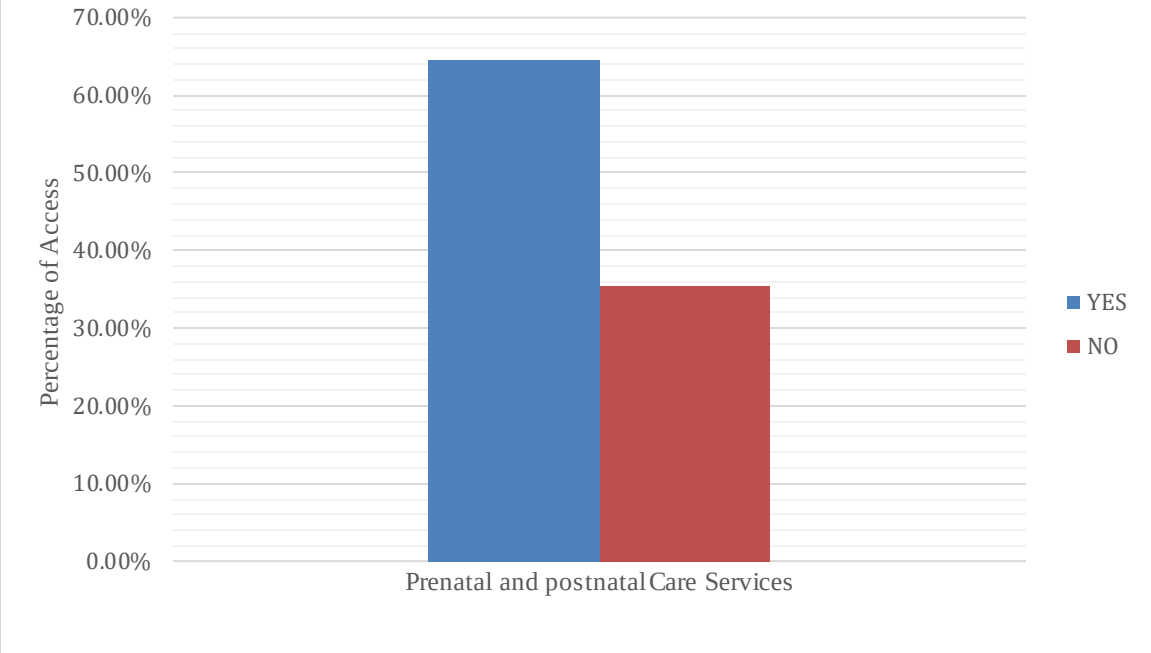
Table 6

Access to Prenatal and Postnatal Care Services in a County in the Eastern Region During the COVID-19 Pandemic

Valid	Frequency	Percentage
No	50	35.46%
Yes	91	64.53%
Total	141	99.99%

Figure 2

Access to Prenatal and Postnatal Care Services in a County in the Eastern Region During the COVID-19 Pandemic



For a county in the Central region, the statistics showed that before the COVID-19 pandemic, more women (219) had access to prenatal and postnatal care services than during the COVID-19 pandemic (163). This indicated that COVID-19 affected access to prenatal and postnatal care services for PWLHIV in a county in the Central region (see Tables 5 and 6 and Figures 1 and 2).

Table 7

Access to Prenatal and Postnatal Care Services in a County in the Central Region Before the COVID-19 Pandemic

Valid	Frequency	Percentage
No	82	37.4%
Yes	137	62.6%
Total	219	100%

Figure 3

Access to Prenatal and Postnatal Care Services in a County in the Central Region Before the COVID-19 Pandemic

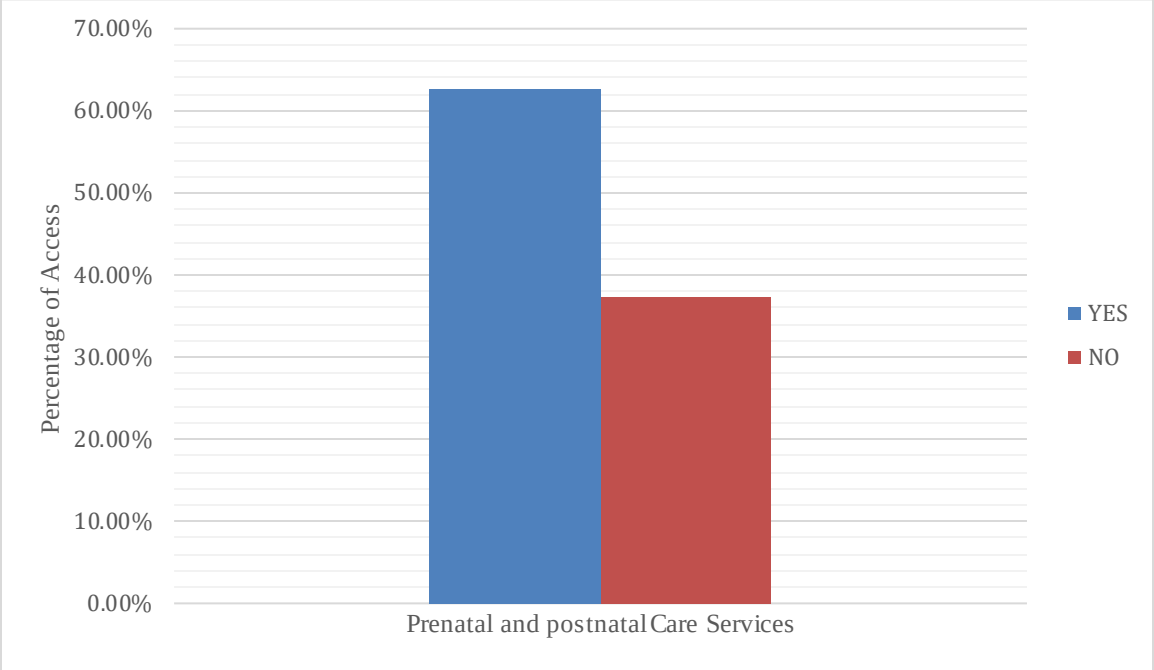


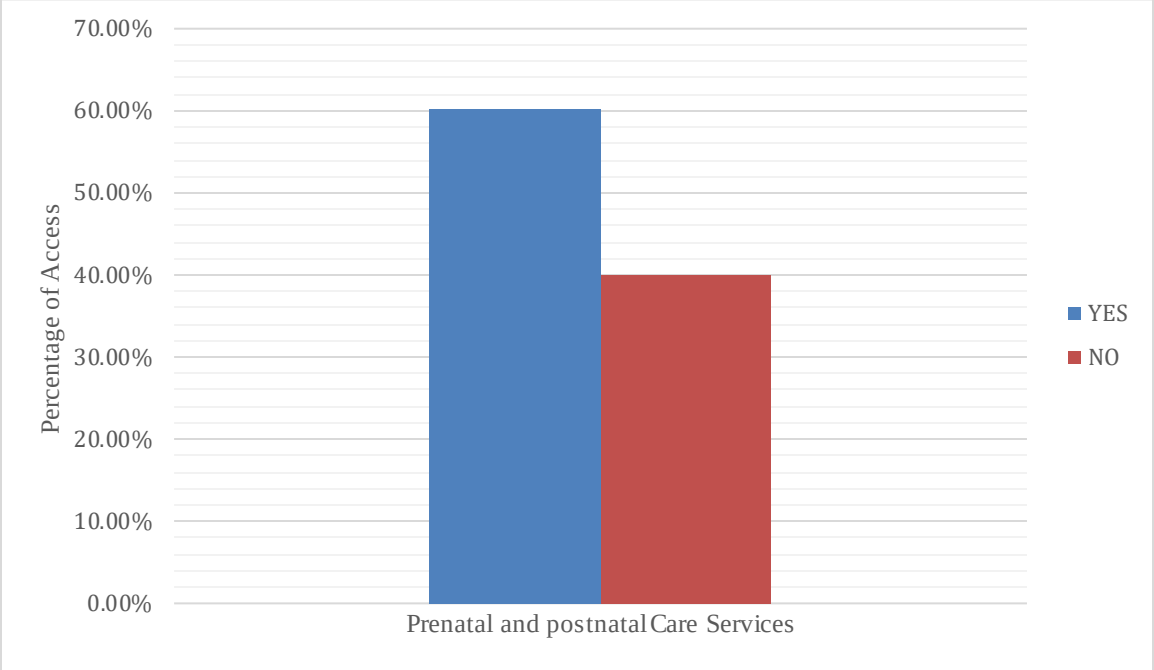
Table 8

Access to Prenatal and Postnatal Care Services in a County in the Central Region During the COVID-19 Pandemic

Valid	Frequency	Percentage
No	65	39.9%
Yes	98	60.1%
Total	163	100%

Figure 4

Access to Prenatal and Postnatal Care Services in a County in the Central Region During the COVID-19 Pandemic



In a county in the Rift Valley, statistics showed that before COVID-19 more women (135) had access to prenatal and postnatal services than during COVID-19 (126), indicating that the COVID-19 pandemic affected access to prenatal and postnatal care services for PWLHIV in a county in the Rift Valley region (see Tables 7 and 8 and Figures 3 and 4).

Table 9

Access to Prenatal and Postnatal Care Services in a County in the Rift Valley Region Before the COVID-19 Pandemic

Valid	Frequency	Percentage
No	43	31.9%
Yes	93	68.1%
Total	135	100%

Figure 5

Access to Prenatal and Postnatal Care Services in a County in the Rift Valley Before the COVID-19 Pandemic

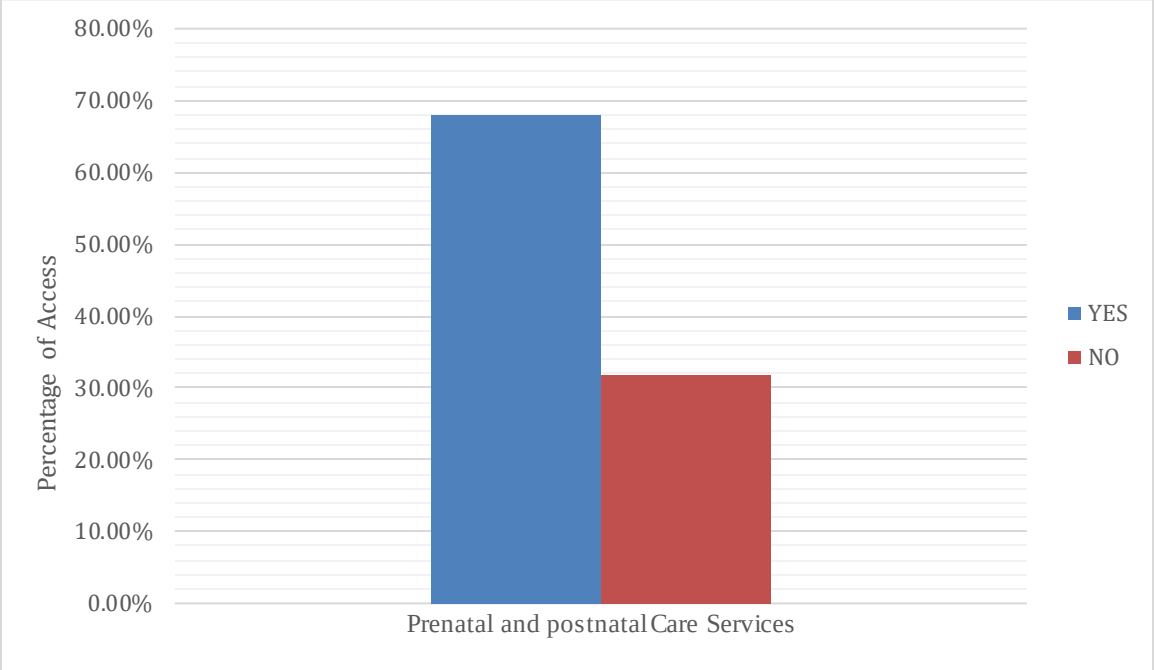


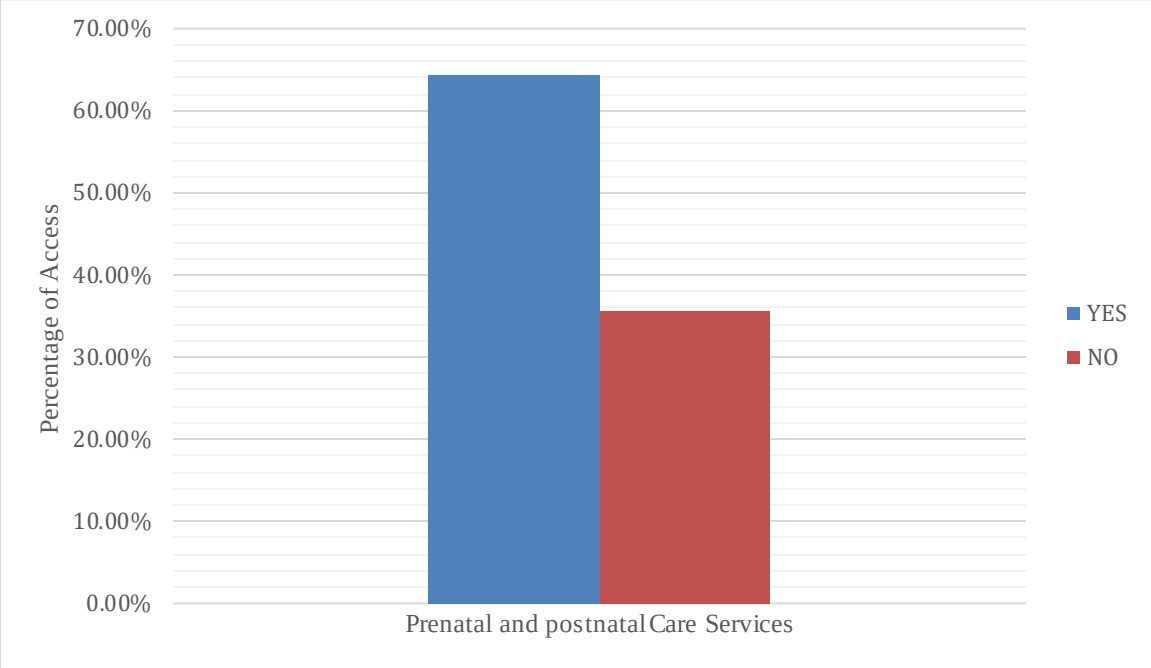
Table 10

Access to Prenatal and Postnatal Care Services in a County in the Rift Valley Region During the COVID-19 Pandemic

Valid	Frequency	Percentage
No	45	35.7%
Yes	81	64.3%
Total	126	100%

Figure 6

Access to Prenatal and Postnatal Care Services in a County in the Rift Valley Region During the COVID-19 Pandemic



RQ2: Did access to HIV preventive care services impact the MTCT of HIV before and during the COVID-19 pandemic in counties in Eastern, Central, and the Rift Valley regions in Kenya?

County in the Eastern Region

Even though there were differences in the percentages of people who received HIV preventive care services before and during the COVID-19 pandemic in a county in Eastern region of Kenya, the McNemar test which is a more focused and sensitive test was utilized to evaluate how significant the differences were. The test results showed a p-value of 0.268 which was not statistically significant. We were unable to reject the null hypothesis. This

showed that the observed disparity in access might not have been directly related to the COVID-19 pandemic but the product of chance or other causes (See Table 13).

Table 11

Access to Care Before and During the COVID-19 Pandemic in a County in the Eastern Region

	Access During	
Access Before	YES	NO
YES	73	38
NO	28	18

To evaluate how MTCT in a county in the Eastern region was impacted by access to HIV preventive care during the COVID 19 pandemic, a McNemar test was done. Findings indicated that there was a statistically significant difference between MTCT transmission due to access to HIV preventive care before the COVID 19 pandemic compared to during COVID-19. The p-value was 0.021, which is less than 0.05. The null hypothesis was rejected. The transmission of MTCT was influenced by the COVID-19 pandemic and not by chance or other factors (See Tables 13).

Table 12

Baby on ART/PROPHYLAXIS Before & Baby on ART/PROPHYLAXIS During the COVID-19 Pandemic in a County in the Eastern Region

	Baby on ART/PROPHYLAXIS During	
Baby on ART/PROPHYLAXIS Before	PROPHYLAXIS	On ART
PROPHYLAXIS	135	9
on ART	1	12

Table 13

McNemar Test for a County in Eastern Region

Test Statistics[a]

	Access Before & access During	Baby on ART/PROPHYLAXIS Before & Baby on ART/PROPHYLAXIS During
N	157	157
Chi-Square[b]	1.227	
Asymp. Sig.	.268	
Exact Sig. (2-tailed)		.021[c]

a. McNemar Test
b. Continuity Corrected
c. Binomial distribution used.

County in the Central Region

Regardless of the existence of disparities in proportions observed in the access to HIV preventive care services before and during the COVID-19 pandemic in a county in the central region of Kenya, the McNemar test results show that these differences are not statistically significant, with a p-value of 0.115. We reject the null hypothesis since the p-value is greater than 0.05. However, the observed disparity might have been due to chance or other circumstances rather than a clear link to the COVID-19 pandemic (See Tables 16).

Table 14

Access Before During the COVID-19 Pandemic in a County in the Central Region

	Access During	
Access Before	YES	NO
YES	94	43
NO	60	22

To evaluate how MTCT in a county in the Central region was impacted by access to HIV preventive care during the COVID 19 pandemic, a McNemar test was done. Findings indicated that there was a statistically significant difference between MTCT transmission due to access to HIV preventive care before the COVID 19 pandemic compared to during COVID-19. The p-value was 0.000. We reject the null hypothesis. The transmission of MTCT was influenced by the COVID-19 pandemic and not by chance or other factors. (see Table 16).

Table 15

Baby on ART/PROPHYLAXIS Before & Baby on ART/PROPHYLAXIS During the COVID-19 Pandemic in a County in the Central Region

	Baby on ART/PROPHYLAXIS During	
Baby on ART/PROPHYLAXIS Before	PROPHYLAXIS	on ART
PROPHYLAXIS	194	19
on ART	0	6

Table 16

McNemar Test for a County in Central Region

Test Statistics[a]

	Access Before & Access During	Baby on ART/PROPHYLAXIS Before & Baby on ART/PROPHYLAXIS During
N	219	219
Chi-Square[b]	2.485	
Asymp. Sig.	.115	
Exact Sig. (2-tailed)		.000[c]

a. McNemar Test
b. Continuity Corrected
c. Binomial distribution used.

County in the Rift Valley region

Although there are differences in proportions between the access to HIV preventive care services before and during the COVID-19 pandemic in a county in the Rift Valley of Kenya. a McNemar test showed a p-value of 0.550. We are unable to reject the null hypothesis since the p-value is greater than 0.05. The differences are not statistically significant. The observed disparity could not have been directly related to the COVID-19 pandemic, but rather could have been the product of chance or other reasons (See Table 19).

Table 17

Access to Care Before and During the COVID-19 Pandemic in a County in the Rift Valley Region

	Access During	
Access Before	YES	NO
YES	53	38
NO	32	12

To evaluate how MTCT in a county in the Rift Valley region was impacted by access to HIV preventive care during the COVID 19 pandemic, a McNemar test was done. Findings indicated that there was a statistically significant difference between MTCT transmission due to access to HIV preventive care before the COVID 19 pandemic compared to during COVID-19. The p-value of 0.000. We reject the null hypothesis. The transmission of MTCT was influenced by the COVID-19 pandemic and not by chance or other factors (See Tables 19).

Table 18

Baby on ART/PROPHYLAXIS Before & Baby on ART/PROPHYLAXIS During the COVID-19 Pandemic in a County in the Eastern Region

	Baby on ART/PROPHYLAXIS During	
Baby on ART/PROPHYLAXIS Before	PROPHYLAXIS	ON ART
PROPHYLAXIS	114	18
On ART	1	2

Table 19

McNemar Test for a County in Eastern Region

Test Statistics[a]

	Access Before & Access During	Baby on ART/PROPHYLAXIS Before & Baby on ART/PROPHYLAXIS During
N	135	135
Chi-Square[b]	.357	
Asymp. Sig.	.550	
Exact Sig. (2-tailed)		.000[c]

a. McNemar Test

Of note, the differences in access before and during the COVID-19 pandemic in a county in the Eastern, Central and Rift Valley regions can be explained by the fact that

the McNemar test that was utilized in the analysis in RQ 2 is a more specific and sensitive test.

RQ3: Did access to HIV preventive care services vary by county before and during the COVID-19 pandemic in counties in Eastern, Central, and Rift Valley regions of Kenya?

Variations between Counties

To test for variations in access to HIV preventive care services by county before and during the COVID-19 pandemic, I conducted a Friedman test. The results showed that there was a statistically significant differences in the mean ranks given that the *p* value was 0.000. This *p* value was less than 0.05. Therefore, I rejected the null hypothesis. The differences observed in each county's access to HIV preventive care services could have been due to the COVID-19 pandemic. In one way or another, the COVID 19 pandemic affected how and when people accessed HIV preventive care services in the various counties (see Tables 20 and 21).

Table 20

Friedman Test: Ranks

Category	Mean rank
County	2.34
Access before	1.84
Access after	1.83

Table 21

Friedman Test

Statistic	Data
N	511
Chi-square	137.828
df	2
Asymp. sig.	.000

Chapter 5: Discussion, Conclusions, and Recommendations

The study's overarching aim was to determine the impact of the COVID-19 pandemic on access to HIV preventive care services for PWLHIV in counties in Eastern, Central, and Rift Valley regions of Kenya before (2019) and during (2021) the COVID-19 pandemic. This study's specific research objectives included (a) to determine the effect of the COVID-19 pandemic on access to prenatal and postnatal care services for PWLHIV in counties in Eastern, Central, and Rift Valley regions in Kenya, (b) to examine the effect of lack of access to HIV preventive care services on MTCT of HIV before and during the COVID-19 pandemic in counties in Eastern, Central, and Rift Valley regions in Kenya, and (c) to investigate whether access to HIV preventive care services for PWLHIV varied between counties in Eastern, Central, and Rift Valley regions in Kenya. Data were obtained from the Kenya Ministry of Health on PWLHIV's antenatal and postnatal attendance before and during the COVID-19 pandemic for counties in Eastern, Central, and Rift Valley regions in Kenya. A chi-square goodness of fit test, McNemar test, Friedman test, odds ratio, and descriptive statistics were used in the analysis.

Interpretation of Findings

The purpose of RQ1 was to determine the effect of the COVID-19 pandemic on the access to prenatal and postnatal care services for PWLHIV in counties in Eastern, Central, and Rift Valley regions of Kenya. The results revealed that the COVID-19 pandemic impacted access to prenatal and postnatal care services for PWLHIV in counties in the Eastern, Central, and Rift Valley regions of Kenya due to the disruption of

access to health care services caused by curfews and lockdowns. The results indicated that there was a reduction in HIV preventive care-seeking behaviors by PWLHIV due to reduced ANC visits by these populations during the COVID-19 pandemic. The reasons for the lack of access to care were not studied. The study's findings corroborate the study conducted by Lamy et al. (2023), who investigated women's experiences with access to prenatal, childbirth, and postpartum care in several cities in Brazil during the COVID-19 pandemic. Lamy et al. (2023) found that the COVID-19 pandemic negatively affected access to care in most public and private health care facilities, which had a deleterious impact on women's health care. The COVID-19 pandemic exacerbated the disruption of women's health care through social isolation, inadequate health care personnel, a shift in health care protocols and networks, and a lack of organization of care. For instance, most hospitals and other health care facilities delayed the identification and testing of pregnant women, particularly those who had COVID-19 symptoms. Second, most hospitals faced a bottleneck due to the increasing number of emergency cases of COVID-19, causing an unprecedented delay in the effective management of pregnant women. The overloaded health care system could not accommodate and effectively manage the flow of patients, thereby posing a significant burden on the health care system and those individuals who needed prenatal and postnatal care services.

The current study's findings are also similar to the qualitative research by Oluoch-Aridi et al. (2020), who investigated the effect of the COVID-19 pandemic on access to maternal health services in Kenya. More than 50% of the women interviewed reported that they did not access maternal health services due to fear of contracting COVID-19.

Furthermore, the women reported that there was reduced access to prenatal and postnatal care services because of the imposed lockdown and curfew. These restrictions deprioritized health services, especially in urban areas, causing limited access to prenatal and postnatal care services.

The current study's findings were also similar to a study by Ombere (2021), who contended that the COVID-19 pandemic disrupted access to maternal services due to measures introduced by the government to curb its spread. A lack of access to health care facilities led to an increase in home deliveries (Ombere, 2021). Humphrey et al. (2023) found that the COVID-19 pandemic did not affect access to ART for PWLHIV. The focus of the study was on late postpartum PWLHIV. The COVID-19 pandemic affected access to preventive HIV care services due to the limited accessibility to health care facilities. The restrictions and curfews imposed by the government made it difficult to access these services. Most women, especially PWLHIV, did not access HIV preventive care services out of fear of contracting the COVID-19 virus. Lockdowns and curfews limited their access to the services they needed.

The purpose of RQ2 was to examine the effect of access to HIV preventive care services on the impact of MTCT of HIV before and during the COVID-19 pandemic in counties in Eastern, Central, and Rift Valley regions of Kenya. Results indicated that access to HIV preventive care services impacted the MTCT of HIV in a county in the Central region of Kenya due to curfews and lockdowns. Wexler et al. (2024) noted that most PWLHIV had anxiety about contracting COVID-19 during ANC care. This study was conducted at 12 public health facilities in Kenya. Most of the PWLHIV agreed that

less access to HIV preventive care services had a strong impact on the MTCT of HIV. This was caused by most mothers fearing a hospital-based delivery due to the fear of contracting the COVID-19 virus. Research by Long et al. (2023) also stipulated that the COVID-19 pandemic disrupted health care delivery due to minimal operations by the health care facilities in Kenya, and also due to care-seeking behaviors. Long et al. noted that there were 810 admissions per month before the pandemic, while there were 492 admissions per month during the COVID-19 pandemic. Long et al. also noted that the lack of accessibility to HIV preventive care services during the COVID-19 pandemic limited obstetrical care, which increased the MTCT of HIV. Long et al. reported that limited accessibility to health care facilities limited comprehensive emergency obstetric and neonatal care. Because of this limitation, comprehensive emergency obstetric and neonatal care was not able to prevent MTCT of HIV. These studies suggest that a reduction in accessibility to HIV preventive care services had a significant impact on the MTCT of HIV during the COVID-19 pandemic.

When analyzing and comparing the results for accessibility in RQ1 and RQ2, a variation was noted in the eastern, central, and rift valley regions of Kenya. In RQ1 a Chi-Square test was utilized to determine whether there was a relationship between access to Preventive care services by PWLHIV before and during the COVID-19 pandemic in Eastern, Central and the Rift Valley Region in Kenya. In RQ2 a McNemar test, which is a sensitive and more focused test was utilized to determine the strength of the differences in access to HIV Preventive care for PWLHIV in these selected counties.

The differences in the tests results may be as a result of utilization of two different tests used to analyze RQ1 and RQ2.

The purpose of RQ3 was to investigate whether access to HIV preventive care services for PWLHIV varied between counties in Eastern, Central, and Rift Valley regions in Kenya. Results indicated that there were statistically significant differences in the mean ranks given the $p = .000$ variations in access to HIV preventive care services for PWLHIV in counties in the Eastern, Central, and Rift Valley regions of Kenya. Research findings also showed that a county in the Central region, which is mostly urban, was more accessible to HIV preventive care services, followed by a county in the Eastern and lastly by a county in the Rift Valley region. Muhula et al. (2021) found that cities in Kenya, such as Nairobi, Mombasa, and Kisumu, had better access to HIV preventive care services for PWLHIV than rural areas due to an improved and robust health care infrastructure, improved transport network and accessibility, and a high resource allocation compared to rural areas such as counties in Eastern and Rift Valley regions.

Limitations of the Study

There were several limitations to this study. The study design was a retrospective comparative design that allowed for archival data to be used. In this study, databases were already available. The data were collected for other purposes. The available data may not have been able to answer all of the research questions depending on the clinical data recorded (see Karissa et al., 2019). Using readily available information from data sets meant that I did not have control over the data collection process or what data were available and had to use what was available. This database issue was overcome by

examining a few patient records for documented variables. Another limitation was that some PWLHIV received preventive care services in 2019 and did not deliver in 2019. They transitioned to 2020 while others may have received care in 2021 but also delivered in 2022. This was overcome by closely examining data. Data received for the study had month and year recorded for visits. Data were closely inspected to determine the months when visits occurred. This resulted in proper coding of yes or no within the appropriate year. Another limitation was that the results were based on access to HIV preventive care services in counties in the Eastern, Central, and Rift Valley regions of Kenya. The study's results could be generalized to PWLHIV in counties in Eastern, Central, and the Rift Valley regions of Kenya who lacked access to preventive care services before and during the COVID-19 pandemic. These results should not be generalized to all PWLHIV in Kenya or the world.

Recommendations

Further research is needed to include WLHIV in a county in these regions. No studies were found that included WLHIV in counties in these regions. Future studies should be conducted in counties in the other regions where there are higher rates of HIV, and the results should be compared to counties in the Eastern, Central, and Rift Valley regions of Kenya. More studies should be conducted over a longer period in these regions. This will enable the researchers to have access to more data for comparison purposes. More studies are needed that can involve different research designs other than archival data. The use of face-to-face interviews may allow the researcher to structure the interviews in a way that will allow for the collection of relevant data.

Implications

The implications for positive social change include the potential to introduce strategies to enhance access to HIV preventive services for PWLHIV in counties in the Eastern, Central, and Rift Valley regions of Kenya. Health care facilities in the three counties could use this study's findings to change their health treatment practices, particularly for PWLHIV to ensure that they get equitable access to HIV medication throughout the regions. The Ministry of Health in Kenya, both on the national and county levels, should develop stringent measures to ensure that the national and county health warehouses are adequately stored with HIV medication to mitigate a health crisis in the event of another pandemic. Findings from this study may contribute knowledge to Kenya's public health organizations, practitioners, and the general public concerning an effective way of putting measures in place to ensure that preventive care services are easily accessible to those in need when events such as the COVID-19 pandemic may arise. The results of this study can be generalized to other counties in the selected regions in Kenya.

Conclusion

Data suggested that COVID-19 played a significant role in access to HIV preventive care services for PWLHIV in counties in the Eastern, Central, and Rift Valley regions in Kenya in 2021. COVID-19 impacted PMTCT care-seeking behavior among PWLHIV in counties in the selected regions. PWLHIV who were afraid of exposure to the COVID-19 virus did not seek HIV preventive care services. Also, mandatory lockdowns restricted movement within and between the counties. This may have

increased the MTCT of HIV. Access to HIV preventive care services must be facilitated to ensure that PWLHIV receive the care they need during and following delivery to ensure good outcomes for both the mother and infant. The availability of HIV preventive care services for women in counties in the Eastern, Central, and Rift Valley regions of Kenya was an issue before and during the COVID-19 pandemic. It is essential to recognize the challenges while also acknowledging the opportunities for change. All studies addressing access to HIV services and its effect on MTCT transmission revealed that access to HIV preventive care services played a positive and significant role in PMTCT of HIV. It is vital to have access to HIV services throughout pregnancy to ensure a healthy experience while also reducing the risk of MTCT of HIV. Results revealed that PWLHIV's strict adherence to ART regimen can lead to a significant reduction in MTCT of HIV.

Even though there may appear to be differences in accessibility in the McNemar analysis before and during COVID-19 in the Eastern, Central and Rift Valley regions of Kenya, these differences did not cause MTCT of HIV.

References

Abuogi, L. L., Humphrey, J. M., Mpody, C., Yotebieng, M., Murnane, P. M., Clouse, K., Otieno., Cohen, C., & Wools-Kaloustian, K. (2019). Achieving UNAIDS 90-90-90 targets for pregnant and postpartum women in sub-Saharan Africa: Progress, gaps and research needs. *Journal of Virus Eradication, 4, 33–39.* https://doi.org/10.1016/s2055-6640(20)30343-5

Adeyemi, O., Lyons, M., Njim, T., Okebe, J., Birungi, J., Nana, K., Claude Mbanya, J., Ahmed, S. A. K. S., Ajisola, M., Azeem, K., Bakibinga, P., Chen, Y. F., Choudhury, N. N., & Fayehun, O. (2021). Communicable disease and HIV/AIDS management: A review of healthcare and implications for ART programmes. *African Journal of AIDS Research, 17(3), 241–247*. https://doi.org/10.2989/16085906.2018.1508044

Ahmed, S. A. K. S., Ajisola, M., Azeem, K., Bakibinga, P., Chen, Y. F., Choudhury, N. N., Fayehun, O., Griffiths, F., Harris, B., Kibe, P., Lilford, R. J., Omigbodun, A., Rizvi, N., Sartori, J., Smith, S., Watson, S. I., Wilson, R., Yeboah, G., Aujla, N., Azam, S. I., & Yusuf, R. Improving Health in Slums Collaborative (2020). Impact of the societal response to COVID-19 on access to healthcare for non-COVID-19 health issues in slum communities of Bangladesh, Kenya, Nigeria, and Pakistan: Results of pre-COVID and COVID-19 lockdown stakeholder engagements. *BMJ Global Health, 5*(8), Article e003042. https://doi.org/10.1136/bmjgh-2020-003042

Andrade C. (2018). Internal, external, and ecological validity in research design, conduct, and evaluation. *Indian journal of psychological medicine*, *40*(5), 498–499. https://doi.org/10.4103/IJPSYM.IJPSYM_334_18

Begnel, E. R., Chohan, B. H., Ojee, E., Adhiambo, J., Owiti, P., Ogweno, V., Holland, L. A., Fish, C. S., Richardson, B. A., Khan, A. K., Maqsood, R., Lim, E. S., Lehman, D. A., Slyker, J., Kinuthia, J., Wamalwa, D., & Gantt, S. (2022). HIV and SARS-Cov-2 infection in postpartum Kenyan women and their infants. *PLoS ONE*, *18*(1), 1-16. https://doi.org/10.1101/2022.06.23.22276827

Bernard, C., Hassan, S. A., Humphrey, J., Thorne, J., Maina, M., Jakait, B., Brown, E., Yongo, N., Kerich, C., Changwony, S., Qian, S. R. W., Scallon, A. J., Komanapalli, S. A. Enane, L. A., Oyaro, P., Abuogi, L. L., Wools-Kaloustian, K., & Patel, R. C. (2022). Impacts of the COVID-19 pandemic on access to HIV and reproductive health care among women living with HIV (WLHIV) in Western Kenya: A mixed methods analysis. *Frontiers in Global Women's Health*, *3*, 943641. https://doi.org/10.3389/fgwh.2022.943641

Bliss, K. E., & Simoneau, M. (2021). Kenya's pediatric HIV response under Covid-19. https://www.csis.org/analysis/kenyas-pediatric-hiv-response-under-covid-19

Creswell, J. W., & Creswell, J. D. (2017). Research design: qualitative, quantitative, and mixed methods approaches 4th Edition, SAGE Newbury Park

Cu, A., Meister, S., Lefebvre, B., & Ridde, V. (2021). Assessing healthcare access using

the Levesque's conceptual framework– A scoping review. *International Journal for Equity in Health*, *20*(1), 1–14. https://doi.org/10.1186/s12939-021-01416-3

du Plessis, E., Shaw, S. Y., Gichuhi, M., Gelmon, L., Estambale, B. B., Lester, R., Kimani, J., & Avery, L. S. (2014). Prevention of mother-to-child transmission of HIV in Kenya: challenges to implementation. *BMC health services research, 14 Suppl 1*(Suppl 1), S10. https://doi.org/10.1186/1472-6963-14-S1-S10

García-Pérez M. A. (2012). Statistical conclusion validity: some common threats and simple remedies. *Frontiers in psychology*, *3*, 325. https://doi.org/10.3389/fpsyg.2012.00325

Gill, M. M., Natumanya, E. K., Hoffman, H. J., Okomo, G., Taasi, G., Guay, L., & Masaba, R. (2020). Active pediatric HIV case finding in Kenya and Uganda: A look at missed opportunities along the prevention of mother-to-child transmission of HIV (PMTCT) Cascade. *Plos One*, *15*(6), 1–18. https://doi.org/10.1371/journal.pone.0233590

Harsono, D., Deng, Y., Chung, S., Barakat, L. A., Friedland, G., Meyer, J. P., Porter, E., Villanueva, M., Wolf, M. S., Yager, J. E., & Edelman, E. J. (2022). Experiences with telemedicine for HIV care during the COVID-19 pandemic: A mixed-methods study. *AIDS and Behavior*, *26*(6), 2099–2111. https://doi.org/10.1007/s10461-021-03556-7

Humphrey, J. M., Alera, M., Enane, L. A., Kipchumba, B., Goodrich, S., Scanlon, M., Songok, J., Musick, B., Diero, L., Yiannoutsos, C., & Wools-Kaloustian, K. (2023). Effects of the COVID-19 pandemic on late postpartum women living with

HIV in Kenya. *PLOS Global Public Health, 3*(3), 1–15. https://doi.org/10.1371/journal.pgph.0001513

Johnston, K. M., Lakzadeh, P., Donato, B. M. K., & Szabo, S. M. (2019). Methods of sample size calculation in descriptive retrospective burden of illness studies. *BMC medical research methodology, 19*(1), 9. https://doi.org/10.1186/s12874-018-0657-9

Kamaara, E., Oketch, D., Chesire, I., Coats, C. S., Thomas, G., Ransome, Y., Willie, T. C., & Nunn, A. (2019). Faith and healthcare providers' perspectives about enhancing HIV biomedical interventions in Western Kenya. Global public health, 14(12), 1744–1756. https://doi.org/10.1080/17441692.2019.1647263

Kenya Ministry of Health. (2016a). Kenya AIDS response progress report. https://nsdcc.go.ke/wp-content/uploads/2016/11/Kenya-AIDS-Progress-Report_web.pdf

Kenya National AIDS Control Council (2020). Kenya HIV estimates report (2020). https://nsdcc.go.ke/wp-content/uploads/2021/06/Kenya-HIV-Estimate-Report-A4.pdf

Kessler, S. (2018). Progress toward eliminating mother to child transmission of HIV in Kenya: Review of treatment guidelines uptake and pediatric transmission between 2013 and 2016-A follow up. *Maternal And Child Health Journal*, *22*(12), 1685–1692. https://doi.org/10.1007/s10995-018-2612-0

Kinuthia, J., Pintye, J., Abuna, F., Mugwanya, K. K., Lagat, H., Onyango, D., Begnel, E., Dettinger, J., Baeten, J. M., John-Stewart, G., & PrEP Implementation for Young Women and Adolescents (PrIYA) programme (2020). Pre-exposure prophylaxis uptake and early continuation among pregnant and post-partum women within maternal and child health clinics in Kenya: results from an implementation programme. *The lancet. HIV*, *7*(1), e38–e48. https://doi.org/10.1016/S2352-3018(19)30335-2

Lamy, Z. C., Thomaz, É. B. a. F., Da Silva, A. G., Alexandre, G. C., De Britto E Alves, M. T. S. S., De Souza Britto Ferreira De Helena Carvalho, R., De Menezes, L. O., De Oliveira, S. S., Moraes, M., Magalhâes, Y. B., Coimbra, T. R. S., & Guzman-Barrera, L. S. (2023). Experiences of women in prenatal, childbirth, and postpartum care during the COVID-19 pandemic in selected cities in Brazil: The resignification of the experience of pregnancy and giving birth. *PLOS ONE*, *18*(5), 1–17. https://doi.org/10.1371/journal.pone.0284773

Landrian, A., Mboya, J., Golub, G., Moucheraud, C., Kepha, S., & Sudhinaraset, M. (2022). Effects of the COVID-19 pandemic on antenatal care utilisation in Kenya: A cross-sectional study. *BMJ Open*, *12*(4), 1–8. https://doi.org/10.1136/bmjopen-

2021-060185

Levesque, JF., Harris, M.F. & Russell, G. (2013) Patient-centred access to health care conceptualizing access at the interface of health systems and populations. *IntJEquity Health* **12**, 18 https://doi.org/10.1186/1475-9276-12-18

Long, J. E., Wanje, G., Aliyan, N., Okello, D. O., Richardson, B. A., Wanjiru-Korir, N., Shikely, K., Abubakar, A., Oginga, P., & McClelland, R. S. (2023). Impact of the COVID-19 pandemic on obstetrical care at a tertiary care facility in Mombasa, Kenya: Time-series analyses and staff perspectives. *PLOS Global Public Health*, *3*(4), 1–15. https://doi.org/10.1371/journal.pgph.0001829

Macharia, P. M., Joseph, N. K., Nalwadda, G. K., Mwilike, B., Banke-Thomas, A., Benova, L., & Johnson, O. (2022). Spatial variation and inequities in antenatal care coverage in Kenya, Uganda and Mainland Tanzania using model-based geostatistics: A socioeconomic and geographical accessibility lens. *MC Pregnancy and Childbirth*, 1-16. https://doi.org/10.21203/rs.3.rs-1733690/v1

Masuadi, E., Mohamud, M., Almutairi, M., Alsunaidi, A., Alswayed, A. K., & Aldhafeeri, O. F. (2021). Trends in the usage of statistical software and their associated study designs in health sciences research: A bibliometric analysis. *Cureus*, *13*(1), e12639. https://doi.org/10.7759/cureus.12639

McCullough, K., Whitehead, L., Bayes, S., Williams, A., & Cope, V. (2020). The delivery of primary health care in remote communities: A grounded theory study of the perspective of nurses. *International Journal of Nursing Studies*, *102*, 1-9. https://doi.org/10.1016/j.ijnurstu.2019.103474

McHugh, M. L. (2013). The chi-square test of independence. *Biochemia Medica*, 143–149. https://doi.org/10.11613/bm.2013.018

Muhula, S., Opanga, Y., Oramisi, V., Ngugi, C., Ngunu, C., Carter, J., Marita, E., Osur, J., & Memiah, P. (2021). Impact of the first wave of the COVID-19 pandemic on HIV/AIDS programming in Kenya: Evidence from Kibera informal settlement and COVID-19 hotspot counties. *International Journal of Environmental Research and Public Health*, *18*(11), 1–12. https://doi.org/10.3390/ijerph1811600

Mulongo, S., Kaura, D. M., & Mash, B. (2022). Determinants of obstetric near miss in a tertiary hospital in Kenya: A retrospective study. *International Journal of Childbirth*, *12*(3), 117–130. https://doi.org/10.1891/ijc-2021-0050

Muthuka, J., Kiptoo, M., Oluoch, K., Nzioki, J. M., & Nyamai, E. M. (2022). Association of pregnancy with coronavirus cytokine storm: systematic review and meta-analysis. *JMIR Pediatrics and Parenting*, 5(4), e31579. https://doi.org/10.2196/31579

Mwangi, W., Gachuno, O., Desai, M., Obor, D., Were, V., Odhiambo, F., Nyaguara, A., & Laserson, K. F. (2018). Uptake of skilled attendance along the continuum of care in rural western Kenya: Selected analysis from global health initiative survey-2012. *BMC Pregnancy and Childbirth*, *18*(1), 1-13. https://doi.org/10.1186/s12884-018-1803-4

Mwai, E. N. (2022). Multilateral public health responses to global epidemics: A case study of international health organizations' response to the Hiv/aids epidemic in Kenya (Doctoral dissertation, University of Nairobi)

https://scholar.google.com/scholar?hl=en&as_sdt=0%2C21&q=Mwai%2C+E.+N.+%282022%29.+Multilateral+Public+Health+Responses+to+Global+Epidemics+a+Case+Study+of+International+Health+Organizations%E2%80%99+Response+to+the+Hiv%2Faids+Epidemic+in+Kenya+%28Doctoral+dissertation%2C+University+of+Nairobi%29&btnG=

Mwau, M., Bwana, P., Kithinji, L., Ogollah, F., Ochieng, S., Akinyi, C., Adhiambo, M., Ogumbo, F., Sirengo, M., & Boeke, C. (2017). Mother-to-child transmission of HIV in Kenya: A cross-sectional analysis of the national database over nine years. *PLOS ONE*, *12*(8), 1- 15, e0183860. https://doi.org/10.1371/journal.pone.0183860

Myers, R., & Hansen, C. P. (2019). Revisiting a theory of access: A review. *Society & Natural Resources*, *33*(2), 146-166. https://doi.org/10.1080/08941920.2018.1560522

Ng'andu, M., Mesic, A., Pry, J., Mwamba, C., Roff, F., Chipungu, J., Azgad, y.,& Sharma, A. (2022). Sexual and reproductive health services during outbreaks, epidemics, and pandemics in sub-Saharan Africa: a literature scoping review. *Systematic Reviews, 11(1*), 161. https://doi.org/10.1186/s13643-022-02035-x

Ngere, P., Onsongo, J., Langat, D., Nzioka, E., Mudachi, F., Kadivane, S., Chege, B., Kirui, E., Were, I., Mutiso, S., Kibisu, A., Ihahi, J., Mutehthya, G., Mochache, T., Loamar, P., Boru,W.,Makayotto, L., Okunga, E., Ganda, N., & Amoth, P. (2022). Characterization of COVID-19 cases in the early phase (March to July 2020) of the pandemic in Kenya. *Journal of Global Health, 12*.

https://doi.org/10.7189/jogh.12.15001

Ngesa, A. M., Kirui, J., Matheka, I., Otieno, G., & Yoos, A. (2021). Utilization of free maternity services among women of childbearing age in Machakos County, Kenya. *Pan African Medical Journal, 39*1-13. https://doi.org/10.11604/pamj.2021.39.25.26499

Ngugi, S. K., Muiruri, P., Odero, T., & Gachuno, O. (2020). Factors affecting uptake and completion of isoniazid preventive therapy among HIV-infected children at a national referral hospital, Kenya: a mixed quantitative and qualitative study. *BMC infectious diseases*, *20*(1), 294 https://doi.org/10.1186/s12879-020-05011-9

Nishioka, D. (2022). Reconsidering the Levesque framework: A social work perspective for healthcare professionals. *BJGP Open*, *6*(3), 1-3. https://doi.org/10.3399/bjgpo.2022.0055

Njuguna, I., Beima-Sofie, K., Mburu, C., Mugo, C., Black, D. A., Neary, J., Itindi, J., Onyango, A., Slyker, J., Oyiengo, L., John-Stewart, G., & Wamalwa, D. (2019). Managing the transition from paediatric to adult care for HIV, Kenya. *Bulletin of the World Health Organization*, 97(12), 837. https://doi.org/10.2471/blt.19.232702

Nyagah, L. M., Kirui, E., Young, P. W., Gikunju, J., Githuku, J., Lowther, S., & Kim, A. A. (2020). Knowledge of HIV status among mothers accompanying their infants for immunization in Machakos, Kenya, 2014. *eajahme*, *4*(4), 1-6. https://doi.org/10.58498/eajahme.v4i4.27

Nyagaka, C. G., Kirui, E., Owiny, M., Njoroge, A., & Oyugi, E. (2022). Factors associated with mother to child transmission of HIV in a semi-arid county in Kenya, 2014-2017. *Journal of Interventional Epidemiology and Public Health*, *5*(3), 1-10. https://doi.org/10.37432/jieph.2022.5.3.66

Ogalo, E. A., Adina, J. O., Ooko, H., Batuka, J., & Kimaiyo, S. (2018). Mother-baby dyads enrolled in PMTCT care in western Kenya: characteristics and implications for ART programmes. *African journal of AIDS research : AJAR*, *17*(3), 241–247. https://doi.org/10.2989/16085906.2018.1508044

Okoko, N. A., Owuor, K. O., Kulzer, J. L., Owino, G. O., Ogolla, I. A., Wandera, R. W., Bukusi, E. A., Cohen, C. R., & Abuogi, L. L. (2017). Factors associated with mother to child transmission of HIV despite overall low transmission rates in HIV-exposed infants in rural Kenya. *International Journal of STD & AIDS*, *28*(12), 1215-1223 one, 13(1), e0191463. https://doi.org/10.1371/journal.pone.0191463

Okuro, S. O. (2022). A history of HIV and AIDS responses in Kenya, 1983- 2003. *International Journal of HIV/AIDS Prevention, Education and Behavioural Science*, 8(2), 42-54. https://doi.org/10.11648/j.ijhpebs.20220802.11

Ochieng, C. A., & Odhiambo, A. S. (2019). Barriers to formal health care seeking during pregnancy, childbirth and postnatal period: A qualitative study in Siaya County in rural Kenya. *BMC Pregnancy and Childbirth*, *19*(1), 1-14. https://doi.org/10.1186/s12884-019-2485-2

Oluoch-Aridi, J., Chelagat, T., Nyikuri, M., Onyango, J., Guzmán, D. B., Makanga, C., Miller-Graff, L. E., & Dowd, R. A. (2020). COVID-19 effect on access to maternal health services in Kenya. *Frontiers in Global Women's Health*, *1*, 1–9. https://doi.org/10.3389/fgwh.2020.599267

Ombere, S., O. (2021). Access to maternal health services during the COVID-19 pandemic: Experiences of indigent mothers and health care providers in Kilifi County, Kenya. *Frontiers in Sociology*, *6*, 1–8. https://doi.org/10.3389/fsoc.2021.613042

Ombere, S. O., Nyabundi, A,A (2023). Effects of COVID-19 on Kenya's Healthcare System: Healthcare providers' experiences with maternal health services utilization in coastal Kenya. *World*. 2023; 4(1):140-152. https://doi.org/10.3390/world4010010

Otieno, P. O., Wambiya, E. O., Mohamed, S. M., Mutua, M. K., Kibe, P. M., Mwangi, B., & Donfouet, H. P. (2019). Access to primary healthcare services and associated factors in urban slums in Nairobi-Kenya. *BMC Public Health*, *20*(1), 1-9. https://doi.org/10.21203/rs.2.17010/v1

Patino, C. M., & Ferreira, J. C. (2018). Inclusion and exclusion criteria in research studies: definitions and why they matter. *Jornal brasileiro de pneumologia : publicacao oficial da Sociedade Brasileira de Pneumologia e Tisilogia*, *44*(2), 84. https://doi.org/10.1590/s1806-37562018000000088

Penchansky, R., & Thomas, J. W. (1981). The concept of access. *Medical Care*, *19*(2), 127-140. https://doi.org/10.1097/00005650-198102000-00001

Pricilla, R. A., Brown, M., Wexler, C., Maloba, M., Gautney, B. J., & Finocchario-Kessler, S. (2018). Progress toward eliminating mother to child transmission of HIV in Kenya: review of treatment guidelines uptake and pediatric transmission between 2013 and 2016-a follow up. *Maternal and child health journal*, *22*(12), 1685–1692. https://doi.org/10.1007/s10995-018-2612-0

Sirengo, M., Muthoni, L., Kellogg, T. A., A. Kim, A., Katana, A., Mwanyumba, S., Kimanga, D. O., Maina, W. K., Muraguri, N., Elly, B., & Rutherford, G. W. (2014). Mother-to-child transmission of HIV in Kenya. *JAIDS Journal of Acquired Immune Deficiency Syndromes*, *66*(Supplement 1), S66-S74. https://doi.org/10.1097/qai.0000000000000115

Songok, J., Musick, B., Diero, L., Yiannoutsos, C., & Wools-Kaloustian, K. (2023). Effects of the COVID-19 pandemic on late postpartum women living with HIV in Kenya. *PLOS global public health*, *3*(3), e0001513. https://doi.org/10.1371/journal.pgph.0001513

Szumilas, M. (2010). Explaining odds ratios. *Journal of the Canadian Academy of Child and Adolescent Psychiatry*, *19*(3), 227–229. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2938757/

Tang, Q., Liu, M., & Lu, H. (2019). Prevention of mother-to-child transmission (PMTCT) continues to play a vital role in the response to HIV/AIDS: Current status and future perspectives. *Bioscience trends*, *13*(1), 107–109. https://doi.org/10.5582/bst.2019.01009

Thomson, K. A., Telfer, B., Awiti, P. O., Munge, J., Ngunga, M., & Reid, A.

(2018). Navigating the risks of prevention of mother to child transmission (PMTCT) of HIV services in Kibera, Kenya: Barriers to engaging and remaining in care. *PLOS ONE, 13*(1), e0191463. https://doi.org/10.1371/journal.pone.0191463

Vetter, T. R. (2017). Descriptive statistics: Reporting the answers to the 5 basic questions of who, what, why, when, where, and a sixth, so what? Anesthesia & Analgesia, 125(5), 1797–1802. https://doi.org/10.1213/ane.0000000000002471

Wexler, C., Maloba, M., Mokua, S., Babu, S., Maosa, N., Staggs, V. S., Goggin, K., Acharya, H., Hurley, E. A., & Finocchario-Kessler, S. (2024). Assessing COVID related concerns and their impact on antenatal and delivery care among pregnant women living with HIV in Kenya: A brief report. *BMC Pregnancy and Childbirth*, *24*(1), 1–7. https://doi.org/10.1186/s12884-023-06216-x

World Health Organization. (n.d.). *Mother-to-child transmission of HIV*. https://www.who.int/teams/global-hiv-hepatitis-and-stis-programmes/hiv/prevention/mother-to-child-transmission-of-hiv

World Health Organization (2022). Maternal and fetal assessment update: imaging ultrasound before 24 weeks of pregnancy. https://www.who.int/publications/i/item/9789240046009

World Health Organization (2023). Coronavirus disease (COVID-19) https://www.who.int/news-room/fact-sheets/detail/coronavirus-disease-%28covid-19%29

Xu, Z., Shi, L., Wang, Y., Zhang, J., Huang, L., Zhang, C., Liu, S., Zhao, P., Liu, H. Zhu, L., Tai, Y., Bai, C., Gao, T., Song, J., Xia, P., Dong, J., Zhao, J., & Wang, F. S. (2020). Pathological findings of COVID-19 associated with acute respiratory distress syndrome. *The Lancet. Respiratory medicine*, *8*(4), 420–422. https://doi.org/10.1016/S2213-2600(20)30076-X