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DETERMINANTS OF MOTHER TO CHILD TRANSMISSION OF HIV IN MATOBO DISTRICT, MATABELELAND SOUTH, ZIMBABWE

BY

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A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF PUBLIC HEALTH IN THE COLLEGE OF HEALTH, AGRICULTURE AND NATURAL SCIENCES

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Abstract

Vertical transmission of HIV through mother to child remains a significant public health concern, particularly in regions like Matabeleland South. Vertical transmission of HIV through MTCT ranks the second most common means of HIV transmission. Matobo district, like many other regions in Zimbabwe, continues to grapple with high MTCT rates, recording an average of 3-4 cases of infant infections through MTCT every quarter (DHIS 2 data).Despite the adoption of the B+ option in 2013, MTCT rates in the district have remained stagnant at 10-14%, well above the global target of less than 5% (EMTCT Plan, 2023) Antiretroviral therapy for both the mother and baby, infant feeding method, maternal viral load and mode of delivery have been highlighted as one of the key factors that contribute to mother to child transmission of HIV. MTCT of HIV can occur during pregnancy, delivery, and breastfeeding period. This study aims investigate the determinants of MTCT of HIV contributing to the broader goal of realizing an AIDS-free generation. This was a retrospective analytical cross-sectional study where 185 records of mother baby pairs delivered between January and December 2021 were retrieved from the mother baby pair register and reviewed. A structured data collection proforma created in Microsoft Excel was used to extract data from the MBP registers. Data on mother's age, gestation age on booking, HIV status, antiretroviral therapy (ART)status, maternal viral load, syphilis results, infants HIV status, ARV prophylaxis status and feeding method were extracted. The study included 185 singletons and one set of twins. Among the mothers, 28.6% were HIV positive, accounting for the six mothers whose infants tested HIV positive. This resulted in an eMTCT transmission rate of 11.3%. The study's findings revealed several significant factors associated with mother-to-child transmission (MTCT) of HIV. Notably, maternal viral load greater than 1000 copies emerged as the primary contributor to MTCT, with (OR=92.0; 95%CI: 6.8-1249.7; p<0.050). Additionally, a positive syphilis result in the mother was strongly associated with MTCT (OR=21.0; 95% CI: 1,7-312.4; p<0.050). The practice of mixed feeding among infants showed a notable association with MTCT with an, (OR=45.0; 95%CI: 4.9 - 410.5; p<0.050). These findings underscore the importance of addressing maternal viral load, syphilis screening, and infant feeding practices to mitigate the risk of HIV transmission from mother to child.

Key words: mother to child transmission, HIV, determinants.

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Declaration

I declare that this proposal is my original work except where sources have been cited and acknowledged. The work has never been submitted, nor will it ever be submitted to another university for the award of a degree.

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Dedication

With profound gratitude and heartfelt appreciation, I dedicate this study to my cherished daughter, Lithalethu Elayne, whose unwavering love and inspiration have been a constant source of motivation throughout this academic journey. Additionally, I extend this dedication to my beloved parents, whose boundless support, encouragement, and sacrifices have shaped my path and enabled me to pursue my academic aspirations.

List of Acronyms and abbreviations

AIDS Acquired Immuno deficiency Syndrome.

ANC Antenatal Care

ART Antiretroviral therapy

AU Africa University

AUREC Africa University Research Ethics Committee

EMTCT Elimination of Mother To Child Transmission

HIV Human Immuno Virus

MTCT Mother To Child Transmission

NVP Nevirapine

PMTCT Prevention of Mother To Child Transmission

PNC Postnatal Care

UNAIDS United Nations Program on AIDS

WHO World Health Organization

Definition of key terms

Acquired immunodeficiency syndrome (AIDS) is the most advanced stage of HIV disease (WHO,2023).

Antenatal Care This is a form of care, given to a pregnant woman who registered in a health facility by a health official to help monitor her wellbeing during pregnancy.

Postnatal care If birth is at home, the first postnatal contact should be as early as possible within 24 hours of birth. At least three additional postnatal contacts are recommended for all mothers and newborns, on day 3 (48–72 hours), between days 7–14 after birth, and six weeks after birth.

Mother-To-Child Transmission (MTCT) Is the transmission of Human Immune Virus from a Human Immune Virus - positive mother to her child during pregnancy, labor/delivery, or breast feeding (WHO, 2016).

Prevention of Mother to Child Transmission (PMTCT) This is a program, which provides ART to Human Immune Virus - positive pregnant women to stop their infants from acquiring the virus either during pregnancy, or during labor/delivery or during breast feeding (Avert, 2016). In operational key concepts, in this study when talked about PMTCT, the researcher means the efforts and prevention strategies that have been set forth by the government and Non-Government Organization to ensure that Human Immune Virus infected mothers do not transmit Human Immune Virus to their babies either during pregnancy, child delivery, as well as during breast feeding.

Transmission - Transmission (transfer) is the act or process of passing something from one person, place or thing to another. It is also transmission of the disease or risk of transmission (Oxford Advanced Learner's Dictionary 2005:1573).

Prevention To prevent something means to ensure that it does not happen (Oxford Advanced Learner's Dictionary 2005:1149).

Human immunodeficiency virus (HIV) is an infection that attacks the body's immune system(WHO,2023)

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CHAPTER 1 INTRODUCTION

1.1 Introduction

Prevention of mother-to-child transmission of HIV (PMTCT) stands as a pivotal endeavor within global health priorities, garnering increased attention and resources over recent decades. The core objective of PMTCT programs is to facilitate access to essential interventions for pregnant and lactating mothers living with HIV, ensuring the safeguarding of their infants from acquiring the virus during critical stages such as pregnancy, childbirth, and breastfeeding. Through the implementation of evidence-based strategies, PMTCT has emerged as a cornerstone in enhancing maternal health outcomes, diminishing transmission rates, and advancing the overarching aspiration of realizing an AIDS-free generation.

In pursuit of this noble goal, PMTCT initiatives encompass a multifaceted approach, encompassing comprehensive healthcare services, counseling, and antiretroviral therapy. These interventions, coupled with targeted maternal and infant health monitoring, underscore the efficacy of PMTCT programs in curbing the transmission of HIV from mother to child. As a result, PMTCT not only holds immense promise in mitigating the impact of the HIV epidemic but also serves as a beacon of hope for fostering healthier communities and generations worldwide.

1.2 Background to the study

The global landscape of HIV transmission from mother to child underscores the persistent challenge of vertical transmission, with prevalence rates remaining alarmingly high despite the availability of antiretroviral treatment (UNAIDS, 2018). Estimates suggest that over 20% of HIV-positive infants globally are born through vertical transmission, with significant implications for child health and mortality (Ahlgren, 2018). Within the Sub-Saharan region, the burden of mother-to-child transmission (MTCT) is particularly pronounced, accounting for approximately 90% of new pediatric HIV infections (Monroe, 2020). Despite remarkable progress in scaling up interventions such as lifelong antiretroviral therapy (ART), MTCT rates continue to surpass targeted elimination thresholds set by organizations like UNAIDS (UNAIDS, 2015).

In 2015, it was estimated that MTCT attributed to 6.4% of all new HIV infections among children 0–14 years. According to UNAIDS (2019), comprehensive prevention of mother-to-child transmission (PMTCT) programs contributed to a 41% reduction globally and nearly 50% reduction in eastern and southern Africa in new child HIV infections from 2010 to 2018. Additionally, globally, 92% of HIV-positive pregnant women were on antiretroviral therapy (ART), which averted around 1.4 million in new child infections between 2010 and 2018 (Alderman, 2020). Despite these efforts, the new child HIV infection rate in Zimbabwe remains high, currently standing at 8.1% as of the Elimination of Mother-to-Child Transmission (EMTCT) plan of 2023. This rate is not satisfactory to reach the targeted MTCT rate of 5% and the 2030 global target of an HIV-free child

(UNAIDS, 2019). Notably, 85% of HIV-positive pregnant women in Zimbabwe received ARVs for PMTCT, 75% of infants received ARV prophylaxis in the first 6 weeks of life, and 55% of HIV-exposed infants received early infant diagnosis (UNAIDS, 2010).

Zimbabwe, like many countries in Sub-Saharan Africa, has grappled with the challenge of reducing MTCT rates to meet global targets. The country's PMTCT program, initiated in 1999, has undergone significant evolution, transitioning from nevirapine prophylaxis to the widespread adoption of triple antiretroviral therapy for pregnant and lactating women living with HIV (MOHCC, 2012). Despite these efforts, MTCT rates in Zimbabwe remain above desired levels, highlighting the need for a deeper understanding of the determinants and barriers to effective prevention strategies. Through the Ministry of Healtha and Child Care (MOHCC) the Government has been putting measures to expand the prevention of mother to child transmission (PMTCT) of HIV service by endorsing with free maternity and hospitalization for children under the age of five.

A thorough framework for treating MTCT is provided by the WHO's PMTCT approach, which is divided into four prongs: primary prevention, mother and child health care, HIV treatment and support, and treatment. (Gregor, 2016). The first prong addresses HIV primary prevention, emphasizing the maintenance of an HIV-negative status in both men and women through condom access, early STI diagnosis and treatment, increased accessibility to HIV testing and counselling services, and retesting of women during pregnancy and lactation. Testing all HIV-negative women should therefore occur in the

first and third trimesters (or at delivery), six weeks after giving birth, and every six months while the woman is nursing. Additionally, appropriate counselling services must be offered to both men and women who test negative for HIV.

The second prong focuses on family planning and reproductive choices for HIV-positive individuals to prevent unplanned pregnancies among women living with the virus. This prong aims to assist women who test positive for HIV in preventing unwanted pregnancies, hence lowering the number of newborns at risk of HIV infection through MTCT. Increased access to HIV testing and counselling services, the availability of efficient family planning methods to prevent unintended births, and the promotion of dual protection like the use of both male and female condoms in addition to family planning method. These are some of the additional goals of this prong. Providing excellent reproductive health guidance to clients to assist them in making decisions and preventing combined pregnancies is another objective.

The third strategy for preventing HIV transmission from mother to child is prevention of mother-to-child transmission. This part details the care given to mothers and their babies during their pregnancies, deliveries, and postpartum periods. This prong's services include treating and preventing ARV infection, using safer birth techniques, and introducing safer feeding habits for infants and early children. Provision of treatment care and support to women living with HIV, their partners, children, and family members is the final focus of the eMTCT program's fourth prong strategy. Support is offered under this strategy to

guarantee that women with a positive status continue to take ART throughout their pregnancies, deliveries, breastfeeding periods, and postpartum periods. The provision of ART for all pregnant women with positive HIV status for their own benefit, care and support for all infants exposed to HIV, nutritional support for all infants exposed to HIV, and care, treatment, and support for all women and their families were the specific paths that required assistance.

Zimbabwe's adoption of WHO strategies, including options A and B+, underscores its commitment to aligning national efforts with global recommendations. However, challenges persist in achieving optimal coverage and adherence to PMTCT interventions, necessitating a closer examination of contextual factors influencing program effectiveness. In a study cited by Takura (2022), a comprehensive package of eliminating infection in children and keeping the mothers alive encompasses preventing of women from becoming infected with HIV, protecting unwanted pregnancy, throughout pregnancy, provide safe delivery by a skilled health care worker, practicing exclusive breastfeeding and provision of appropriate HIV treatment, care, and support for mother and infants.

The national guidelines for the prevention of mother-to-child transmission of HIV (PMTCT) in Zimbabwe, as outlined by UNAIDS (2010), incorporated the adoption of the World Health Organization (WHO) strategies. In May 2010, the country implemented option A, followed by the adoption of option B strategy in 2013. Option A involved determining eligibility for antiretroviral prophylaxis or therapy based on women's CD4

count and WHO staging. Women with a CD4 count of ⩽350 cells/mm3 or WHO stage 3/4 were initiated on lifelong ART, while those with a CD4 cell count of > 350 cells/mm3 and WHO stages 1 and or 2 were initiated on antiretroviral prophylaxis, including zidovudine from 14 weeks gestation, single-dose nevirapine (NVP) during labor, and zidovudine and lamivudine given starting in labor through 7 days post-delivery; the breastfeeding infant received infant NVP syrup from birth until 1 week after cessation of breastfeeding.

It is also of paramount importance that healthcare workers have knowledge on the type of mothers at risk of transmitting HIV to their babies to know when to provide the appropriate measures or when to raise alarms. The risk factors to look out for are:

- A mother who is a newly diagnosed with HIV during labour and childbirth or during breastfeeding period.
- A mother with a viral load over 1000 copies/mL(unsuppressed) at 32 weeks (or more) gestation
- a mother who is not on ART (or having started ART in less than 8 weeks before delivery)

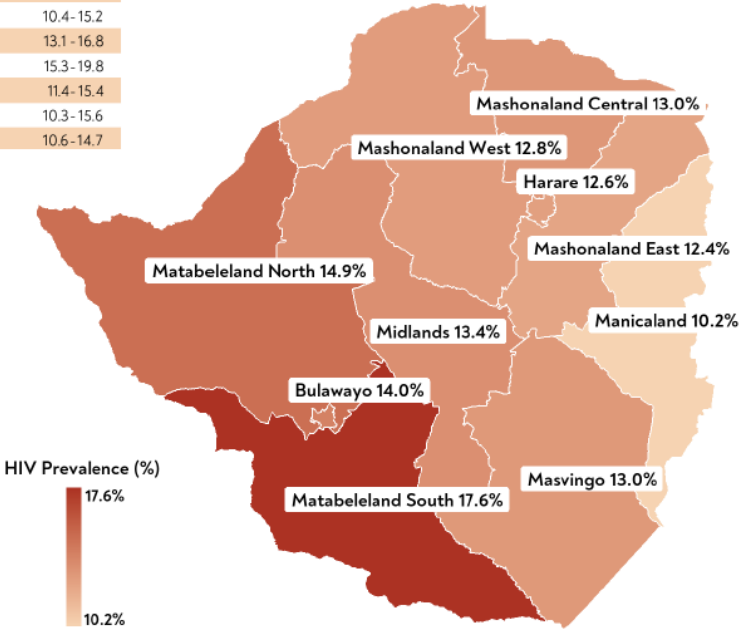
Against this backdrop, this study seeks to explore the determinants of mother-to-child transmission of HIV in the Matobo District of Zimbabwe. By examining factors contributing to MTCT within the local context, this research aims to inform targeted interventions and policy reforms aimed at accelerating progress towards the elimination

of pediatric HIV infections. Drawing on insights from previous studies and adapting methodologies to the specificities of the Matobo District, this research endeavors to contribute to the global effort to achieve an AIDS-free generation.

Key Features of the Matobo District:

The Matobo District in Zimbabwe's Matabeleland South region is distinguished by a variety of topographical features, such as valleys, plateaus, and rough terrain. The main economic activities for the people living in the primarily rural territory are mining and agriculture. Matobo is well known for its rich cultural legacy, which includes internationally recognized ancient rock art sites.

Province	HIV Prevalence (%)	95% CI
Bulawayo	14.0	12.3-15.8
Manicaland	10.2	8.6- 11.9
Mashonaland Central	13.0	11.0-15.1
Mashonaland East	12.4	10.7-14.0
Mashonaland West	12.8	10.4-15.2
Matabeleland North	14.9	13.1-16.8
Matabeleland South	17.6	15.3-19.8
Midlands	13.4	11.4-15.4
Masvingo	13.0	10.3-15.6
Harare	12.6	10.6-14.7



. **Figure 1.1: HIV prevalence rate per province**

Matobo has several difficulties, such as poor infrastructure and restricted access to healthcare services, despite its natural beauty and cultural value. These variables, which include high rates of HIV/AIDS prevalence and maternal mortality, contribute to health inequities. The prevalence of HIV in the Matobo district is 17.5%. In Matobo, there were 11 800 people living with HIV as of the final quarter of 2023, out of a total population of 95,696. The incidence rate of HIV in the 15–49 age group was 0.42%, while the incidence rate for males and females aged 0–14 was 0.08% and 0.45%, respectively. The ART coverage was 97.3%, falling within the UNAIDS target on the 95–95–95, which states

that 95% of individuals should be aware of their HIV status, 95% of those who are HIV positive should be receiving treatment, and 95% of those on ART should have viral suppression (DHIS 2 data). The age range of 15–49 years was the most common age group in the district's 331 new HIV positive cases that were reported in 2023 (DHIS 2 data). This could be due to the high rate of sexual engagement in this age group, which is within reproductive age. According to DHIS 2 data for 2023, the PMTCT coverage for the same year was 94.85%, falling within the predicted range of PMTCT coverage in Zimbabwe.

They are various other Non-Governmental Organizations that support the HIV program in Matobo district. These include the National AIDS Council (NAC), the Organization for Public Health Interventions and Development (OPHID), Zimbabwe Health Interventions, and the Matabeleland AIDS Council (MAC). These organizations collaborate with MOHCC to combat HIV/AIDS by providing technical assistance. They also support with the delivery of HIV/AIDS care both at the facility and in the community.

Illegal mining operations within the district make it more vulnerable to HIV spread in the fight against the virus. Due to high association between miners and a high HIV prevalence rate. As a microcosm of the larger issues plaguing Zimbabwe's healthcare system, the Matobo District emphasizes the necessity of focused interventions and research projects to address health issues in regional contexts. This study is to produce insights that can guide evidence-based policies and programmes targeted at lowering HIV transmission and

improving mother and child health outcomes not only in the district but also in comparable contexts throughout Zimbabwe and abroad by concentrating on MTCT factors in Matobo.

1.3 Statement of the Problem

Mother to child transmission of HIV ranks the second most common method of HIV transmission in Sub-Saharan Africa (Burusie et al., 2015). A crucial gap in comprehending and resolving this issue is highlighted by the dearth of research on the factors of MTCT in Zimbabwe, despite its prevalence. According to Nketiah (2013), MTCT is thought to be the cause of an astounding 90% of pediatric HIV infections worldwide, highlighting the critical need for focused treatments to lower transmission rates.

The Ministry of Heath and Child Care of Zimbabwe has managed to set high goals for its Prevention of Mother-to-Child Transmission (PMTCT) program. A remarkable progress has been made towards the elimination of mother-to-child transmission (MTCT) of both syphilis and HIV. These goals include reaching high rates of antenatal care (ANC), syphilis and HIV testing for expectant mothers, coverage of antiretroviral therapy (ART) for pregnant mothers positive for HIV, treatment for pregnant mothers seropositive for syphilis, and a reduction in MTCT rates to less than 5% across all populations of pregnant and lactating mothers(Zimbabwe HIV Guidelines, 2022). Nevertheless, there has been inconsistent progress made towards achieving these goals, they are obstacles still standing

in the way of pregnant women who are HIV positive getting the recommended coverage of ART and ANC.

Like many other areas of Zimbabwe, Matobo district records an average of 3–4 baby infections through MTCT per quarter (DHIS 2 data), indicating that the district is still struggling with high MTCT rates. The district's eMTCT rates have stayed steady at 10–14%, significantly over the global objective of less than 5%, even after adopting option B+ in 2013 (EMTCT Plan, 2023). The necessity for a greater comprehension of the factors behind the district's ongoing vertical HIV transmission is highlighted by this transmission rate persistence.

As Zimbabwe works to eradicate MTCT of HIV, it is critical to improve knowledge among programming officers, medical professionals, and patients about the variables influencing continuous transmission of HIV. This study aimed to shed light on the specific determinants of MTCT in Matobo District from January to December 2021. It does this by drawing on insights from previous studies conducted in similar contexts, such as the study by Burusie et al. (2015) in Ethiopia, which identified factors like maternal HIV status awareness, duration of zidovudine prophylaxis, maternal CD4 cell count, and breastfeeding practices as determinants of MTCT.

This research aimed to reduce MTCT rates and advance the progress towards the elimination of pediatric HIV infections in Matobo District and beyond by clarifying these variables and providing information for the formulation of evidence-based policies and

targeted interventions. This research aimed to enhance mother and child health outcomes in Zimbabwe and make a significant contribution to the worldwide effort to eradicate AIDS through thorough inquiry and analysis.

1.3 Research Objectives

Broad Objective

(i) To determine the determinants of mother to child transmission in Matobo District from January to December 2021

Objectives

- To measure the transmission rate of HIV through MTCT in Matobo district in the year 2021
- To determine the association between MTCT of HIV and maternal risk factors like viral load and syphilis results
- To determine the association between MTCT of HIV and infant feeding option, child ARV status.
- To determine how sociodemographic characteristics such as maternal age and gestation age are associated with the MTCT of HIV in Matobo District between January to December 2021.

1.4 Research Question

(i) What are the determinants of PMTCT in Matobo District?

(ii) What was the transmission rate of MTCT of HIV in Matobo district in the year 2021?

(iii) What is the association between MTCT of HIV and maternal risk factors like viral load and syphilis results?

(iv) What is the association between MTCT of HIV infant risk factors like infant feeding option, child ARV prophylaxis status?

(v) What was the association between sociodemographic characteristics such as maternal age and gestation age and MTCT of HIV in Matobo District between January to December 2021?

1.4 Hypothesis

- **Alternative Hypothesis**: There is a significant association between maternal viral load, antiretroviral therapy (ART) during pregnancy, and breastfeeding with mother-to-child transmission (MTCT) of HIV.
- **Null Hypothesis:** There is no significant association between maternal viral load, antiretroviral therapy (ART) during pregnancy, and breastfeeding with mother-to-child transmission (MTCT) of HIV.

1.5 Significance of the Study

1.51 To the Ministry of Health and Child Care

The findings of this study hold significant implications for the Ministry of Health and Childcare and other stakeholders involved in health services. By understanding the determinants of mother-to-child transmission of HIV (MTCT), the ministry can develop targeted strategies to enhance prevention techniques and improve treatment adherence. This is crucial in Zimbabwe, where the MTCT rate currently stands at 8.1%, as outlined in the Elimination of Mother-to-Child Transmission of HIV (EMTCT) Plan for 2023.

1.52. To Mothers and the Community at Large

The study's insights can facilitate comprehensive screening of HIV-positive mothers for comorbidities, thereby reducing the risk of MTCT of HIV. Awareness of effective prevention measures and strategies can empower mothers and the community to actively participate in efforts to eradicate mother-to-child HIV transmission, ultimately leading to healthier outcomes for both mothers and infants.

1.53 To Academia

This study contributed significantly to the academic community by expanding the existing body of knowledge on the determinants of PMTCT. It served as a valuable resource for future researchers, providing insights into effective strategies for enhancing the elimination of mother-to-child HIV transmission. By advancing knowledge in this field, the study offers a foundation for further research and exploration of related topics.

1.54 To the Student

The research experience gained from conducting this study served as a valuable learning opportunity for the researcher, contributing to their academic and professional development. Additionally, completing this project fulfilled the academic degree requirements, enabling the student to progress toward their qualification goals in the field of healthcare.

1.6 Delimitations of the Study

The study was conducted at the Matobo District because it is where the researcher works and stays, hence the study was restricted to that area. Furthermore, the study was unable to cover every district in the nation due to a lack of money and a short timeline. This restricted the sample's geographic scope, which affected how broadly the results could be applied. Results that are more broadly generalizable and relevant to other regions may be obtained by extending the range. To make use of much more recent research that can strengthen the validity and reliability of the results, the analysis was also restricted to the year 2021. To appropriately match the mother and baby records, the researcher collected data using the mother baby pair register variables. Since Maphisa District Hospital is the district's largest hospital and referral centre, records from mothers in the mother-baby pair registration were used.

The focus of the study was on the major factors that influenced the mother's and the child's MTCT of HIV. Age, ANC booking status, gestation age (GA) at booking, birth mode, delivery site, maternal HIV status, VL, and syphilis test result were among the mother's

factors that were looked at. The baby's birthplace, exposure to syphilis, state of syphilis treatment, choice of feeding, status of ARV prophylaxis, and HIV status were among the factors that were taken into consideration.

1.7 Limitations of the Study

The retrospective record review methodology, which depended on the completeness and quality of mother-baby pair records, was a significant source of limitation for this study. Generalizability may be confined to Matobo District's specific setting and population, limiting broader applicability. Unaccounted confounding variables might impact results, as the analysis didn't encompass all potential influencing factors. Additionally, the reliance on MOHCC mother-baby pair registers could introduce recording errors or omissions, affecting data accuracy as they were no data triangulation with other source documents like the ANC, DNA PCR, HIV expose infant register.

CHAPTER 2 REVIEW OF RELATED LITERATURE

2.1 Introduction

Preventing HIV transmission from mothers to children (PMTCT) remains a significant global challenge in the fight against the HIV/AIDS epidemic, with a focus on eradicating HIV transmission to children worldwide. This chapter delves into the importance of a theoretical framework in guiding PMTCT initiatives, emphasizing how human behavior and decision-making processes shape preventive strategies. Various factors influencing MTCT, such as maternal age, CD4 cell count, viral load, adherence to antiretroviral therapy (ART), infant feeding practices, partner involvement, and infant-related variables, are central to this exploration.

By examining these factors alongside preventive interventions like pre-exposure prophylaxis (PrEP), ARV prophylaxis, safer sex practices, double dose TLD, male partner engagement, women's empowerment, early infant diagnosis and treatment, and counseling services, this chapter aims to present comprehensive approaches for reducing transmission rates and improving maternal and child health outcomes within PMTCT programs.

2.2 Theoretical Framework

The health belief model (HBM) is a social psychological health behavior change model developed to explain and predict health-related behaviors, particularly in regard to the uptake of health services. The HBM was developed in the 1950s by social psychologists

at the U.S. Public Health Service and remains one of the best known and most widely used theories in health behavior research.

The HBM suggests that people's beliefs about health problems, perceived benefits of action and barriers to action, and self-efficacy explain engagement (or lack of engagement) in health-promoting behavior. A stimulus, or cue to action, must also be present to trigger the health-promoting behavior. Individuals will likely take action when experiencing a personal threat or risk, but only if the benefits of taking action outweigh the barriers, whether real or perceived. Being able to take action is also crucial (Becker.M.H 1974).According to the Health Belief Model, readiness to take action is based on the following beliefs or conditions:

- Being susceptible to a health risk or problem.
- serious threat to healthThe threat to my health is serious.
- Perceiving benefits of the recommended action outweigh the barriers or costs.
- being confident in carrying out the action successfully.
- Cues to action being present to remind me to take action.

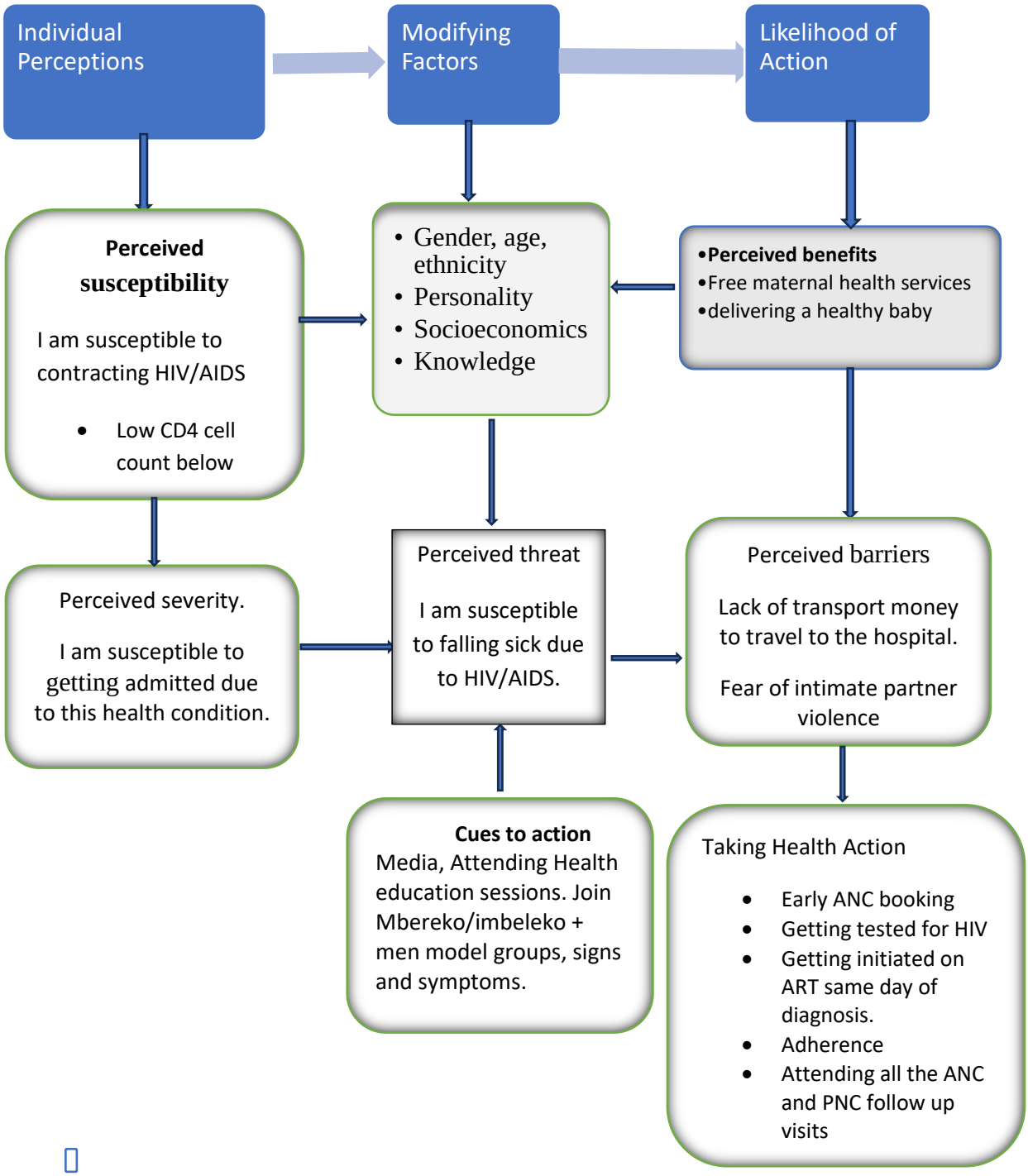


Fig 2.1: The Health Belief Model by Champion, V. L., & Skinner,C.S.(2008).

2.3 Relevance of the theoretical framework

Now that the HIV pandemic has stabilized, efforts are being made to manage new outbreaks. The goal of PMTCT programmes worldwide is to stop HIV from spreading to children. Granular programming is needed to complete this last mile, and knowing how people act and make health-related decisions is essential to achieving this. It is crucial to understand how they see the risk of HIV infection to their children and the medicinal treatments that can be used to halt the virus's spread.

2.4 MTCT risk factors

One of the challenges in the ongoing fight against the HIV/AIDS epidemic is mother-to-child transmission of HIV. Therefore, comprehending the mechanisms underlying this transmission is essential to creating efficient treatments that lessen its effects and enhance the health of both children and their mothers. HIV can spread from mother to child throughout the second and third trimesters of pregnancy, during childbirth, and during breastfeeding (Zijenah,2021). According to the same study, there is an estimated 49% probability of HIV transmission in the absence of intervention, approximately 8% of infections occur during pregnancy, while 15% occurred during labor and delivery, and 2-26% occur during breastfeeding period. However, they are several other factors, including the mother's viral load, duration of antiretroviral therapy, breastfeeding habits, and her pregnancy, that increase risk of HIV.

2.4.1 Maternal age.

Numerous research studies have identified maternal age as a risk factor for mother-to-child transmission of HIV (MTCT). A young mother's age may increase the chance of MTCT of HIV, according to some research. This could be because they will be hiding the pregnancy out of fear of embarrassing their families for becoming pregnant at such a young age, younger mothers may typically book maternity services later than expected. This delays access to preventive treatments if they become infected. Consequently, they increase chances of transmitting HIV to their children. However, there is a delay in the likelihood of HIV transmission from the mother to the children when the mother ages. This, in my opinion, may be the result of the mother's perception that she carries a low risk of HIV transmission to her children because she has given birth to HIV-negative babies before and is an experienced mother. Various studies have revealed varied associations between the age of the mother and the risk of MTCT; some have reported higher rates of transmission among younger mothers, while others have found higher risks among older mothers. Younger mother age was linked to greater rates of MTCT in the United States, according to Kourtis et al. (2017). This association may be explained by factors like poor ART adherence or a higher risk of vertical transmission following childbirth. On the other hand, a study conducted in South Africa by Goga et al. (2015) found that greater maternal age has been associated with elevated MTCT risk in specific circumstances, most likely because of increased incidence of comorbidities or longer duration of HIV infection. These results emphasized how crucial it is to design

interventions to specifically target the needs of women in a range of age groups and to take maternal age into account as a possible risk factor in MTCT prevention programmes.

2.4.2 Maternal CD4 cell count

CD4 count measures the number of CD4 cells in the body that can combat the HIV virus and stop its reproduction. Therefore, a high viral load is indicated by a lower CD4 cell count, and vice versa. The relationship between maternal CD4 cell count and HIV MTCT has been the subject of numerous studies. Dunn et al. (2018) found that lower maternal CD4 cell counts were linked to a higher likelihood of MTCT, highlighting the importance of the mother's immune status in the dynamics of HIV transmission. In a similar vein, Mofenson et al. (2016) discovered that mothers with higher CD4 cell counts had a decreased risk of HIV transmission to their offspring.

Moreover, the predictive value of CD4 cell count measures for MTCT risk may vary depending on when they are taken during pregnancy. According to Patel et al. (2019), CD4 cell counts assessed early in pregnancy had a stronger correlation with the likelihood of MTCT than did assessments later in pregnancy. This research highlighted the need of early HIV-positive pregnant women's diagnosis and treatment in order to enhance maternal health and reduce the risk of MTCT. When making clinical decisions on the introduction and maintenance of ARVs during pregnancy, the maternal CD4 cell count is a factor. In comparison to women who did not get therapy, the PROMISE study (2014)

discovered that starting ART in pregnant women with low CD4 cell counts dramatically lowered the chance of MTCT.

According to Stoikorff's (2020) research on MTCT among Russian middle-aged women, babies born to mothers with low CD4 counts (less than 200 cells/μl) were susceptible to HIV infection. Previous studies (Madueke, 2019, Olsen et al, 2017, Dolores, 2020) have demonstrated that women with CD4 counts < 200 cells/μl are five times more likely to transmit HIV during nursing. Maternal CD4 cell count and MTCT risk were found to be strongly correlated in another study by Warszawski et al. (2000), with lower CD4 counts being linked to higher rates of HIV transmission. Therefore, mentioned correlation highlights the importance of prompt HIV diagnosis and initiation of antiretroviral medication (ART) in order to diminish viral replication, preserve immune function, and diminish the likelihood of transmission to the foetus. Additionally, minimizing the incidence of MTCT while improving maternal health outcomes can be achieved by tracking the mother's CD4 cell levels during the pregnancy and adjusting the ART regimen accordingly.

2.4.3 Maternal HIV RNA levels (Viral load)

Even in women who are on antiretrovirals (ARVs), clinical studies have revealed a definite positive correlation between the mother's HIV viral load at the time of delivery or throughout pregnancy and the risk of HIV transmission to the foetus. The quantity of plasma HIV-1 RNA (viral load) in pregnant women with HIV-1 infection predicts the risk

of transmission to their unborn children, but not the timing of transmission, according to Garcia et al. (2019) (Dolores, 2020). A high viral load, or unsuppressed viral load, raises the risk of infection in the neonate. Infants may have different infection rates depending on the mother's immune response to the virus; nevertheless, newborns may develop immune responses that shield them from infection. Consequently, an individual's body has a lower viral load the more CD4 cells they have.

Numerous studies have investigated the connection between HIV transmission from mother to child (MTCT) and viral load during pregnancy or breastfeeding. A noteworthy study conducted in 2009 by John-Stewart et al. found a correlation between a greater maternal viral load during pregnancy and a higher risk of HIV transmission from the mother to the foetus. Similarly, Mofenson et al. (2010) discovered a link between a high viral load during the nursing phase and a higher risk of HIV transmission to the baby. These results emphasized how important it is to control the mother's viral load during pregnancy and lactation using antiretroviral therapy (ART) to reduce the occurrence of MTCT. Reducing the viral load with effective ART therapy has been shown to minimize the risk of transmission to neonates. Therefore, improving maternal viral load control is a key component in preventing HIV MTCT.This can be achieved by maintained a suppressed viral load between pregnancy and breastfeeding period.

2.4.4 Antiretroviral (ART) adherence

Adherence refers to taking the prescribed medication at the prescribed time, dose, and tablet. Pregnant HIV-positive women must adhere to ART to stop the virus from spreading from mother to child (MTCT). Adhering to antiretroviral therapy (ART) optimally during pregnancy and breastfeeding significantly reduces the risk of HIV transmission from mother to child. Research indicates that maintaining suppressed viral levels with long-term ART adherence greatly lowers the risk of MTCT. According to Olagunja et al. (2019), there is sufficient proof from other researchers that ARV concentrations and effective viral load control are related. On the other hand, problems with adherence, like stopping treatment abruptly or not adhering to the recommended dose, can raise the chance of HIV transmission from mother to child (Kuhn et al., 2015). Therefore, encouraging and sustaining good ART adherence among pregnant and lactating HIV-positive women is a crucial part of comprehensive MTCT prevention programmes.

2.4.5 Infant feeding method.

The risk of HIV transmission from mother to child (MTCT) is significantly influenced by the baby feeding technique selected by mother living with HIV. Compared to mixed feeding or exclusive formula feeding, exclusive breastfeeding has been associated with lower transmission rates when paired with mother antiretroviral medication (ART) and adherence (Kuhn et al., 2007). Even while breastfeeding lowers the risk of MTCT, exclusive formula feeding raises concerns about accessibility, cost, and nutritional sufficiency, especially in low-income environments (Doherty et al., 2015). According to

a survey conducted in India by Anand (2020), children who were breastfed had a higher risk of HIV infection. If it could have been done in these situations, stopping breastfeeding would have been the best course of action. It has been discovered that the length of the breastfeeding period affects HIV transmission. Therefore, weaning a child off the breast milk at an early age helped in reducing the child's exposure to HIV. Children who were breastfed for fewer than six months were more protected than those who were breastfed for a longer duration, according to the same Anand (2020) study. Since early breastfeeding cessation by HIV-positive women in India did not improve the infants' HIV-free survival, this finding may be site- or setting-specific.

It has been discovered that an early, abrupt stop to breastfeeding results in an increase in the breast milk virus load. If babies restart breastfeeding after an abrupt stop, this increase increases their risk of infection. It is recommended that mothers be advised that it is not advisable to reintroduce the newborn to breast milk once the decision to stop breastfeeding abruptly and early has been made. Additional research has shown that breastfeeding duration plays a significant role in postnatal HIV transmission. According to a study conducted in Ethiopia, over 65% of women breastfed their children for longer than six months, which raises the possibility of HIV transmission from mother to child. According to the same study, extended ARV prophylaxis may help lower the risk of postnatal infection in circumstances where nursing cannot be avoided.

In a that was conducted in Zambia, the majority of the mothers had their children tested for HIV between the ages of three and six weeks. This was because their children would not have acquired HIV, this may have encouraged the HIV-positive mothers to continue nursing. Breastfeeding increases the risk of MTCT cumulatively. Therefore, the extra risk of transmission during breastfeeding increases with the length of time the HIV-positive mother breastfeeds. An observational study conducted in South Africa indicated that exclusive breastfeeding during the first three months of birth was linked to a decreased transmission risk than mixed feeding, which corroborated this finding (Ndlozi, 2019).

Like other nations in sub-Saharan Africa, 97% of children in Zimbabwe report having ever been breastfed (Mavuvo, 2020). Since one-third of HIV infections happen when a woman is breastfeeding, HIV control programmes have difficulties in advising women on their options. HIV-positive mothers must choose between using formula, which lowers the risk of HIV transmission but is typically out of reach for most women and is linked to a higher rate of infant mortality from diarrheal illness, and breastfeeding, which carries a risk of HIV transmission through breast milk (Dube, 2021).

Currently, the WHO advises HIV-positive women to breastfeed for the first six months of their lives before introducing other foods, such as solids, unless formula replacement feeding satisfies the requirements of being acceptable, practical, affordable, sustainable, and safe (Mavuvo, 2020, Dube, 2021). Just one in three infants under the age of six months

in Zimbabwe are exclusively breastfed. According to studies, compared to mixed feeding, exclusive breastfeeding, which involves giving an infant only breast milk and no other liquids or solids for the first six months of life, lowers the rate of multitherapy-induced cancer therapy (MTCT) to less than one-fourth and increases the newborns' chance of surviving HIV-positive (Chiteke, 2018). Most mothers find it difficult to continue exclusive breastfeeding for the first six months of a child's life, which increases the infant's risk of HIV infection. This is especially true for mothers whose jobs require them to be away from their children during the day.

2.4.6 New infection during pregnancy and breastfeeding

HIV transmission from mother to child is mostly caused by new HIV infections contracted during pregnancy or nursing (MTCT). Numerous studies have discovered a correlation between specific dates and an increased frequency of MTCT linked to incident HIV infections. Moodley et al. (2013) found that compared to women who were HIV-positive from the moment of conception, pregnant women who seroconverted during pregnancy or breastfeeding had a higher risk of transmitting the virus to their unborn children. Similarly, women who acquired HIV while pregnant or nursing had greater rates of MTCT, according to Drake et al. (2014). These results underline how important it is to do early and routine HIV testing as part of prenatal and postnatal care to detect seroconversions early and start the right treatments to prevent MTCT. To reduce the number of new HIV infections during pregnancy and lactation and ultimately help achieve the global goal of

eliminating MTCT of HIV, comprehensive strategies that integrate HIV prevention, testing, and treatment services into maternal and child health programmes must be applied.

2.4.7 Partner HIV status

The risk of HIV transmission from mother to child (MTCT) is significantly influenced by the partner's HIV status, especially in sero-discordant couples when one partner is HIV-positive and the other is HIV-negative. Research has consistently shown that the partner's HIV status affects the chance of MTCT, with different transmission rates corresponding to partners who are HIV-positive or HIV-negative. In Zimbabwe, women in HIV-positive partnerships had a much higher risk of MTCT than women in HIV-negative relationships, according to research by Marinda et al. (2010). This highlights the value of partner testing and involvement in programmes aimed at preventing MTCT. In sero-discordant couples, techniques like condom use, safer conception techniques, pre-exposure prophylaxis (PrEP) for the HIV-negative partner, antiretroviral medication (ART) for the HIV-positive partner, and safer methods of conception can help reduce the risk of transmission and improve the health of both the mother and the child.

2.4.8 Infant related factors

The risk of HIV transmission from mother to child is greatly increased by infant factors (MTCT). According to De Vincenzi et al. (2017), there is a higher chance of MTCT of HIV when infant-related factors including preterm birth, low birth weight, and length of breastfeeding period are present. Because of their immature bodies and immature immune

systems, premature babies and low birth weight babies may be more vulnerable to HIV infection. Moreover, extended breastfeeding has been associated with a higher risk of transmission, especially when mixed feeding techniques or antiretroviral medicine (ART) is not administered to the mother. It is essential to comprehend and address infant-specific factors when developing treatments to lower the prevalence of MTCT and improve the health of infants exposed to HIV.

2.5 MTCT preventive measures

2.5.1 Use Pre-Exposure Prophylaxis (PrEP)

One effective strategy for lowering the risk of HIV transmission from mother to child (MTCT) is pre-exposure prophylaxis, or PrEP. PrEP is the term for antiretroviral medication use by HIV-negative individuals as a means of preventing HIV infection. Research by Thigpen et al. (2012) and Baeten et al. (2012) has demonstrated that PrEP is useful in reducing the risk of HIV infection in high-risk groups, such as women who are pregnant or nursing. PrEP offers an extra line of defense for HIV-negative expectant or nursing mothers who are more likely to encounter the virus because of things like their partner's status or inconsistent condom use. Promising results have been observed in reducing HIV vertical transmission when PrEP is incorporated into comprehensive prevention of MTCT programmes. Incorporating PrEP which is available in oral, ring, and the most recent injectable form into comprehensive MTCT prevention programmes

may help lower transmission rates even further and get us closer to the objective of ending HIV MTCT.

PrEP is beneficial for sero-discordant couples, meaning that one spouse is HIV positive, and the other is HIV-negative. It may also help prevent HIV infection in pregnant and nursing women. PrEP lowers HIV transmission in sero-discordant couples, according to the Partners PrEP Study and other trials (Baeten et al., 2012). In addition, by providing PrEP to the HIV-negative partner, especially during high-risk times like pregnancy and nursing, couples can lower the chance of HIV transmission to their uninfected partner and, eventually, their children. Therefore, PrEP can support broader efforts to prevent HIV transmission by enhancing other preventive strategies like condom use, HIV medication for the HIV-positive partner, and safer conception techniques among sero-discordant couples.

2.5.2 ARV prophylaxis

One of the most important preventive strategies for lowering HIV vertical transmission through MTCT is ARV prophylaxis. Several studies have demonstrated that the incidence of HIV MTCT can be effectively reduced by proper administration of ARV prophylaxis. One such study, conducted in Thailand by Tanarak Plipat, found that zidovudine taken by the mother for four weeks or longer prior to delivery was significantly protective against HIV MTCT. Another major trial, conducted in 2019 by Connor et al., examined various ARV regimens for PMTCT and found that giving zidovudine (ZDV) to HIV-positive

pregnant women likewise, the groundbreaking ACTG 076 experiment (1994) shown that utilizing a combination ARV regimen comprising ZDV throughout pregnancy and delivery, along with the infant's postnatal medication, further reduced the occurrence rate of MTCT by almost 70%.

PMTCT outcomes have been demonstrated to be improved by recent advancements in ARV regimens and implementation strategies. Regardless of CD4 level or viral load, the World Health Organization (WHO) advocates for a comprehensive PMTCT policy that includes universal ARV prophylaxis for all HIV-positive pregnant women. Combination ARV regimens are useful in minimizing the risk of MTCT, according to studies, such as the PROMISE trial (2014). This is especially true when the regimen is started early in pregnancy and maintained throughout the lactation period. In addition, breastfeeding babies born to HIV-positive mothers also need to get ARV prophylaxis postnatally and throughout the perinatal stage. It has been shown by the Kesho Bora Study Group (2011) and Chasela et al. (2019) that breastfeeding-associated ARV prophylaxis reduces HIV MTCT.

2.5.3 Safer sex practice

Remaining true to one partner and using the condom appropriately and regularly are two key components of safer sex. Safer sexual practices can help prevent HIV MTCTs when implemented properly.

Studies by Hoffman et al. (2019), Brou et al. (2017), and Drake et al. (2018) conducted a meta-analysis, among others, highlighted the significance of mutual monogamy and consistent condom use in reducing MTCT rates. It has been demonstrated that promoting safer sexual behaviours within comprehensive PMTCT programmes successfully reduces the risk of transmission. However, hurdles such as stigma, gender-based violence, and gender inequity persist, demanding comprehensive treatments. Addressing these hurdles, as well as adding counselling on safer sex habits into PMTCT interventions, is critical for improving mother and child health outcomes, with a focus on male engagement.

2.5.4 Use of double dose TLD

Several studies have evaluated the efficacy of double-dose TLD in PMTCT. In a research by Smith et al. (2020) on safety and efficacy of double dosage TLD against standard dose TLD in HIV-positive pregnant women. The data demonstrated that the double dosage TLD regimen was capable of drastically decreasing the MTCT rate as compared to the normal TLD regimen. Furthermore, observational studies have provided additional evidence to validate the use of double-dose TLD in PMTCT. Jones et al. (2021) discovered that pregnant women receiving double dose TLD had better rates of viral suppression at birth and lower rates of MTCT than those getting standard dose regimens. In addition to its efficacy, the double dosage TLD regimen has practical benefits, including easier dosing and a lower pill burden for pregnant women. These variables contribute to better adherence to ART regimens, therefore increasing PMTCT outcomes.

This evidence shows that double dosage TLD may be a promising alternative for PMTCT, as it enhances efficacy and streamlines treatment regimens. However, more study, including randomized controlled trials and long-term follow-up studies, is needed to confirm its safety and efficacy in a variety of scenarios. Implementing double dosage TLD in PMTCT programs has the potential to hasten progress toward the target of eliminating mother-to-child transmission of HIV.

2.5.5 Male partner involvement

Male partner involvement in HIV prevention (PMTCT) is crucial for boosting mother and child health outcomes. Engaging male partners in PMTCT programs enhances collaborative decision-making, boosts social support, and improves adherence to preventive measures. According to studies, engaging male partners in HIV testing and counselling during prenatal care visits enhances preventative intervention adherence and lowers the incidence of MTCT. For example, Aluisio et al. (2016) discovered that pregnant women whose male partners underwent HIV testing and counselling were more likely to adhere to antiretroviral therapy (ART) and achieve viral suppression, lessening the risk of vertical transmission. Furthermore, male engagement in PMTCT programs promotes communication between couples, resulting in a greater awareness of HIV transmission risks and prevention measures. PMTCT programs that actively engage male

partners can effectively address HIV preventative barriers while also enhancing mother and child health outcomes.

2.5.6. Involvement of women in PMTCT program

Women's active participation in prevention of mother-to-child transmission (PMTCT) programs is crucial for successfully minimizing HIV transmission from mother to child. Aluisio et al. (2016) underlined the importance of women's participation in PMTCT programmes, notably HIV testing, counselling, and adherence to antiretroviral therapy (ART). Women's engagement ensures that women have the support, knowledge, and resources they need to make educated decisions about their own and their infants' health. Furthermore, boosting women's agency in PMTCT programs fosters empowerment and autonomy, resulting in increased adherence to preventative measures and better mother and child health outcomes. Thus, empowering women as active participants in PMTCT programs is important to reaching the objective of eliminating mother-to-child transmission of HIV.

2.5.7 Early infant diagnosis and treatment

Early infant diagnosis (EID) and prompt antiretroviral therapy (ART) for HIV-positive infants are critical components of HIV prevention through mother-to-child transmission (PMTCT). Khamadi et al. (2018) illustrate the importance of EID programs in identifying HIV-infected babies early, allowing for timely ART therapy to reduce morbidity and mortality. Early therapy not only improves the health of HIV-infected babies, but it also

dramatically minimises the probability of viral transmission. Furthermore, EID programs improve access to complete treatment and support services for HIV-exposed babies and their families, resulting in better mother and child health outcomes. Thus, promoting EID and early treatment options is crucial for accomplishing the objective of minimising MTCT of HIV and maintaining the health of HIV-exposed neonates.

2.5.8 Counselling and support services

Social and psychological interventions, including as counselling and support services, are crucial components of comprehensive HIV prevention programs (PMTCT). Visser et al. (2018) underline the significance of providing psychosocial assistance and individualised counselling to HIV-positive pregnant women and their families. These programs not only address the emotional and psychological needs of HIV-positive women, but also assist them make informed decisions about PMTCT interventions and newborn feeding practices. Counselling and support services are especially helpful in boosting ART adherence and involvement in PMTCT programs, which leads to better maternal health outcomes and lower rates of vertical transmission. Counselling and support services play a significant role in the success of PMTCT programmes and the general well-being of HIV-affected families by fostering a pleasant environment and providing women with the knowledge and skills needed.

2.6 Summary

Finally, the theoretical framework highlights the necessity of understanding human behavior in preventing HIV transmission from mother to child (PMTCT). As global efforts to eradicate HIV transmission to children continue, tailored training that addresses individual behaviors becomes increasingly vital. Various risk indicators for MTCT, including maternal age, CD4 cell count, viral load, ART adherence, newborn feeding habits, and partner engagement, illustrate the complexity of the situation. Nonetheless, preventive measures such as PrEP, ARV prophylaxis, safer sex practices, double dose TLD, male partner engagement, women's empowerment, early infant diagnosis and treatment, and counselling services present promising opportunities for lowering transmission rates and improving maternal and child health outcomes. Eliminating MTCT needs collaborative initiatives integrating biological, behavioral, and structural interventions are crucial for reaching the aim of eliminating MTCT of HIV and enhancing the well-being of HIV-affected families internationally.

CHAPTER 3: METHODOLOGY

3.1 Introduction

This chapter focused on the methodological principles guiding research on the transmission of HIV from mother to child (MTCT). It focused on identifying the factors of MTCT within the setting of Maphisa District Hospital in Matobo District, Matabeleland South region. Key factors such as population sample methodology, data gathering tactics, analysis approaches, and ethical considerations are discussed to provide insights into the methodological journey. Through the synthesis of theory and practice, this chapter aimed to expand understanding of MTCT of HIV and inform decision-making in mother and child health interventions.

3.2 The Research Design

In this study, the researcher adopted a quantitative retrospective analytical cross-sectional design, gathering secondary data from mother-baby pairs (MBP) recorded in the MBP registers between January and December 2021.The selection of a retrospective design was driven by numerous considerations. Firstly, it enabled for the evaluation of historical data from January 2021 to December 2021, offering a thorough overview of trends and patterns across time. By looking into prior records, researchers got significant insights into the dynamics of MTCT within the study population, opening the path for informed analysis and interpretation.

Furthermore, an analytical method lends itself well to the examination of causal links and associations between diverse factors and the outcome of interest. By integrating secondary data from the Ministry of Health and Child Care (MOHCC) mother-baby pair registrations, researchers can undertake in-depth analysis to discover probable drivers of MTCT, thus contributing to a comprehensive understanding of the phenomena.

Cross-sectional in nature, the design allowed for the simultaneous analysis of several variables at a single point in time. This offered the researcher flexibility to evaluate a wide variety of factors impacting MTCT within the study population, covering variables linked to mother health, newborn features, healthcare consumption, and socio-demographic factors.

Importantly, the retroactive aspect of the design decreased the danger of temporal bias, as data collection was done after the result of interest had happened. This lowered the potential for information bias and boosted the validity of study findings. Additionally, by focusing on routinely gathered data from MOHCC registries, the research design maximized efficiency and lowered resource load, making it viable within the restrictions of the study context.

3.3 Population and Sampling

3.3.1 Study setting and rationale for selection.

The study was conducted at Maphisa District Hospital, situated inside Matobo District, Matabeleland South region, Zimbabwe. Maphisa area Hospital serves as the major

healthcare facility and a key referral hospital within the area. The researcher picked this hospital as the study location because to its vital significance in supporting the healthcare needs of the local people.

3.3.2 Study population and Inclusion/Exclusion criteria

Target population

The study was focused on mother baby pairings for infants that were delivered throughout the period of January to December 2021.

Inclusion Criteria

All mother baby pairs for newborns born throughout the period of January to December 2021, entered in the mother-baby pair registration for Maphisa Hospital were considered eligible for inclusion in the study. The prolonged period was chosen to obtain a broad spectrum of maternal and child health data, noting that these babies have been weaned and have attained final HIV results. This permits a complete investigation of determinants of mother-to-child transmission (MTCT) of HIV.

Exclusion Criteria

Mother-baby pairs for infants delivered within the period of January and December 2021 but were not included in the mother-baby pair registration for Maphisa were excluded from the study. This exclusion rule was implemented to prevent underrepresentation of cases and to ensure the accuracy of the data set.

Additionally, mother-baby pairings with incomplete or missing data on maternal age, gestation age on booking, HIV status, syphilis result, ART status, infant ARV prophylaxis status, final HIV status after the termination of breastfeeding were viral load eliminated in the study. This choice was motivated by the necessity to maintain data integrity and dependability, as incomplete records could have introduced bias and affected the validity of study findings.

3.3.3 Sample size and sampling procedure

The sample size for this study was derived from the target population, formula: N= [Z2P (1-P)]/E2 .Where: N= was the needed sample size, Z= the critical value associated with the level of confidence/significance (1.96 for 95%) P= the estimated proportion of the population with the attribute of interest (derived from the average of estimated district MTCT rate of 12%,p=0.12, q = 1-0.12= 0.88,E = margin of error(0.02).Giving a sample size of 185 participants. Convenience sampling method was utilized to select records from the MBP registration over the period of January to December 2021.

3.4 Data collection instruments

A standardized data collecting proforma designed in Microsoft Excel was utilized to gather data from the MBP registrations. These registers serve as a repository of vital clinical data pertaining to mother and child health, encompassing a wide range of factors relevant to the study aims.

3.4.1 Validity and Reliability of Data Collection Instruments

Ensuring the validity and reliability of data collection devices is crucial to the integrity and credibility of research findings. In the context of this study studying the determinants of mother-to-child transmission (MTCT) of HIV, extensive efforts were conducted to validate and assess the dependability of the data collection instruments deployed in the research endeavor.

Validity

In the context of this study, the validity of the data collection instruments was tested through multiple paths. Firstly, the structured data collecting proforma built in Microsoft Excel was meant to correspond closely with the variables of interest found in the Ministry of Health and Childcare (MOHCC) mother-baby pair registers. This ensured that essential data points were gathered accurately and completely.

Moreover, the content validity of the data collection tools was validated by expert review and consultation with subject matter experts in the field of mother and child health and HIV/AIDS. Feedback from experts was gathered to verify that the data collecting instruments sufficiently captured the breadth and depth of factors essential to the study objectives.

Additionally, the face validity of the data collection tools was tested through pilot testing with a sample of mother-baby pairs registered at Maphisa District Hospital. By administering the data collection instruments to a small sample of participants and

soliciting input on clarity, relevance, and comprehensiveness, the researcher was able to detect and correct potential ambiguities or inadequacies in the instruments.

Reliability

In the framework of this investigation, efforts were undertaken to enhance the reliability of data collection equipment by thorough training of the data collector and standardization of data extraction techniques. The data collector completed intensive training sessions to familiarize with the data collection tools and the specific variables of interest. Emphasis was focused on the necessity of consistency, precision, and attention to detail in data collection operations. Moreover, continuous supervision and monitoring was done to verify adherence to established protocols and recommendations.

To investigate intra-rater reliability, a subset of mother-baby pair registrations was re-reviewed by the same data collector at different time intervals, and the consistency of data extraction within the same collector was analyzed. Any discrepancies or inconsistencies discovered were resolved through additional training and reinforcement of data gathering processes.

3.5 Pilot study

The pilot study commenced with a systematic review of data from the mother-baby pair register at Maphisa District Hospital, focusing on a subset of 10 randomly selected mother baby pairs registered in January 2020 by 2 data collectors. This selective sampling

approach allowed researchers to obtain a representative snapshot of the study population and assess the comprehensiveness and quality of data recorded in the register.

During the pilot study phase, particular attention was paid to the functionality and usability of data collection instruments, including structured data collection proforma developed in Microsoft Excel. Through iterative testing and refinement, researchers evaluated the clarity, relevance, and completeness of data fields, ensuring that essential information pertinent to the study objectives was captured accurately and comprehensively.

Moreover, the pilot study provided an opportunity to assess the logistical feasibility of data collection procedures and identify potential logistical challenges or constraints that may arise during the main study. By simulating the data collection process under real-world conditions, the researcher was able to anticipate and address logistical issues proactively, thereby streamlining operations and optimizing resource utilization.

In addition to methodological considerations, the pilot study served as a platform for assessing inter-rater reliability and intra-rater reliability among data collectors. By comparing data extracted independently by the 2 data collectors and assessing the consistency of data extraction across different time points, the researcher was able to gauge the reliability and consistency of data collection procedures.

Furthermore, the pilot study facilitated the calibration of data collection protocols and standardization of data extraction techniques across multiple data collectors. Through training sessions and practical exercises, researchers ensured that all data collectors were

adequately equipped with the necessary knowledge and skills to perform data extraction accurately and consistently.

3.6 Data collection procedure

The data collection process commenced with the extraction of information from the Ministry of Health and Childcare (MOHCC) mother-baby pair registers utilized at Maphisa District Hospital between January and December 2021. To facilitate systematic data extraction, a structured data collection proforma was developed using Microsoft Excel, mirroring the format and fields of the MOHCC mother-baby pair registers. This proforma served as a standardized tool for recording key variables, ensuring consistency and uniformity across data collection efforts.

Data extraction was carried out by trained personnel under the supervision of the researcher ensuring adherence to established protocols and guidelines. The data collector underwent rigorous training sessions to familiarize himself with the data collection proforma and the specific variables of interest. Emphasis was placed on the importance of accuracy, completeness, and confidentiality in data collection efforts.

During the data extraction process, particular attention was paid to ensuring the integrity and quality of extracted data. The data collector cross-referenced information from the mother-baby pair registers with the corresponding entries in the data collection proforma, verifying the accuracy of recorded data and identifying any discrepancies or missing

information. MBPs with incomplete data sections were flagged and excluded from the study.

Moreover, the data collection procedure was conducted in accordance with ethical principles and guidelines governing research involving human subjects. Measures were implemented to safeguard participant confidentiality and privacy, including the anonymization of personal identifiers in all study documentation and adherence to strict data security protocols.

Throughout the data collection phase, ongoing monitoring and supervision were conducted to ensure the adherence to established protocols and the timely completion of data collection activities. At the end of each day the collected data was put in a lockable cupboard. The researcher was readily available to address any queries or concerns raised by data collectors and to provide guidance and support as needed.

3.7 Analysis and Organization of Data

The collected data was evaluated and analyzed using Microsoft excel and chi square test. The data was first presented in the form of simple frequency tables and percentages of variables, p values were calculated, the relationship between the dependent variable and independent variables was analyzed using a Chi-square test to determine associations between HIV status of the baby (CS) and various risk factors that include maternal and infant risk factors. Odds ratios and confidence intervals were assessed at a minimum of 95% level of confidence, with the level of significance set at ($p < 0.050$).

3.8 Ethical consideration

Prior to the initiation of the trial, approval to perform the study was sought from the District Medical Officer for Matobo. Ethical approval was obtained from the Africa University research and Ethics Committee (AUREC). To preserve anonymity, data collected from participants was anonymized and de-identified to prevent the revealing of personal identifiers. The study merely gathered clinical data from the registers, no personal details were added to ensure anonymity. Moreover, access to study data was restricted to the researcher and data collector by storing the registers in a lockable cupboard, strong data security rules were in place to prevent illegal access or disclosure. The laptop which was used to collect data was secured with a password which was only known by the researcher.

3.9 Summary

In summary, this chapter addressed the research design and procedures that were used to carry out the investigation. The study population and sampling procedures were also reviewed, and the data collection procedure and management were elaborated. The granting of permission to perform the study and the numerous ethical issues that were applied were also mentioned in this chapter.

CHAPTER 4: DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter presents the crucial findings of the study done at Matobo district on determinants of mother to child transmission of HIV within the period of January to December 2021. The data was analyzed using Microsoft excel and chi square test was performed. The presentation of data was done in the form of tables that displayed frequencies and percentages for each variable. The chi square test was later used to determine the level of association for each risk factor.

4.2 Data Presentation and Analysis

4.2.1 Demographics and characteristics of study participants

A total of 185 mother-baby pairs who met the inclusion criteria were enrolled. These were comprised of 185 singletons and 1 set of twins. Among these mother baby pairs, 132 mothers had an HIV negative status, while 53 were HIV positive (28.6%). The age range for HIV positive mothers was 17-43 years, 17 being the youngest mother and 43 being the oldest. The modal age for positive mothers was 22 years and a mean age was 29 years. Young mothers aged less than 24 years contributed 33% of the overall. Of the 187 babies who were enrolled in this study,134 were born from HIV negative mothers while 53 were born from positive HIV mothers.6 of the children who were born to HIV positive mothers tested positive for HIV using DNA PCR. From these 6 positive babies, 3 were born from mothers who were within the age range of 20-24 years whilst the other 50% were born

from mothers within the age range of 30-34 years. Table 4.1.1 illustrates the various characteristics listed above.

Table 4.2: Demographics and characteristics of study population

Category	Total number of participants	HIV negative mother	HIV positive mothers
Total mother baby pairs	185	132 (71.4%)	53 (28.6%)
Minimum age	16	16	17
Maximum age	43	43	43
Mean age	26	26	29
modal age	22	22	22 years
young mothers(< 25years)	99	66 (66.7%)	33 (33%)
Babies	187	134 (71.7%)	53 (28.3%)
HIV- babies	181	134 (100%)	47 (88.7%)
HIV+ babies	6	0 (0%)	6 (100%)
HIV+ babies(mothers age < 25)	3	0 (0)	3 (100%)
HIV+ babies(mothers age 25+)	3	0 (0)	3 (100%)

4.2.2 MTCT transmission rate

The 53 babies who were born from HIV positive mothers received an initial DNA PCR test within the first 6 - 8 weeks of delivery and a repeat DNA PCR was performed within 6 - 8 weeks after the cessation of breastfeeding for those who were breastfeeding. The results showed that 47 of these children tested negative, whereas 6 tested HIV positive, resulting in an 11.3% MTCT transmission rate. (Figure3.1)

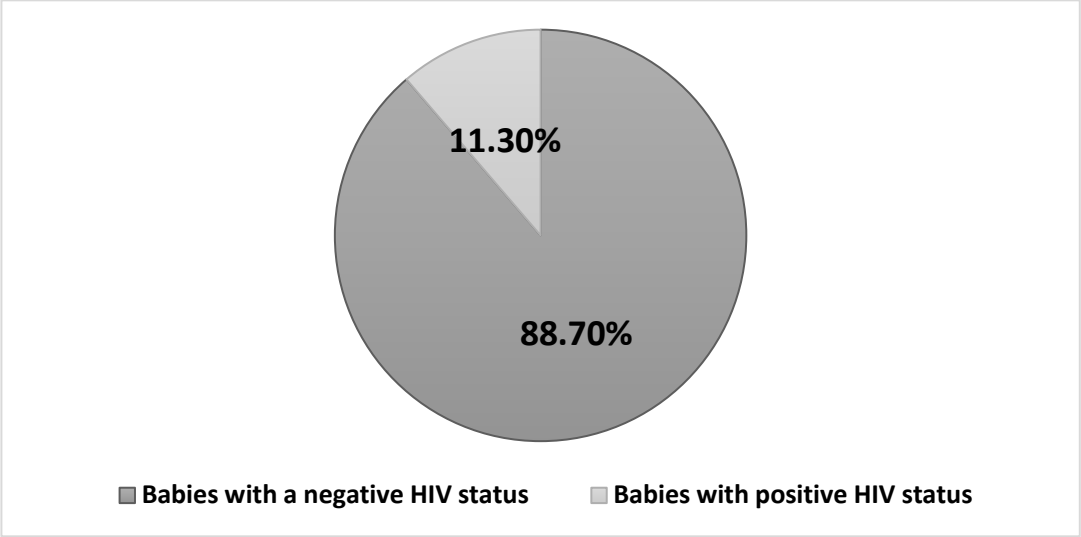


Figure 3. 1: MTCT transmission rate

4.2.3 Gestation Age at Booking and child's HIV status

The gestation age at booking was categorized into two following the recommendation from Zimbabwe Ministry of Health and Child Care (MOHCC) that 1st booking of pregnancy should be done within 12 weeks that is in the 1st trimester. In this study, gestation age of less than 12 weeks was considered as early booking while booking at a gestational age greater than 12 weeks was considered a late booking. The table above displays the timing of antenatal care initiation and its potential impact on HIV transmission risk. It presents the distribution of gestational age at booking among HIV-positive mothers, categorized by their infants' HIV test results. 19% babies were born to

mothers who made an early booking, and they had a negative status, only 1 child born from mothers who booked early got infected with HIV. The bulk of the mothers, 37 (70%) booked late and they managed to deliver HIV negative babies, while 5 (9%) who booked late had HIV positive babies.

Table 4.2 Gestation Age at Booking and child's HIV status (N=53).

Mothers gestational age on booking	**0-12 weeks**	**12+ weeks**
Number of children with a negative HIV status.	10 (19%)	37 (70%)
Number of children with an HIV positive status	1 (2%)	5 (9%)

4.2.4 Maternal Viral Load contribution to MTCT of HIV

Table 4.3: Viral Load Status Contribution to HIV Positive Results **(N=53)**

Mothers viral load results	**<1000 copies/ml)**	**>1000 copies/ml)**
Number of children with a negative HIV status	47 (89%)	1 (2%)
Number of children with a positive HIV status	0 (0%)	5 (9%)

Table 4.3 illustrates the association between maternal viral load status and the HIV test results of infants, categorizing infants into those born to mothers with viral loads below 1000 copies/ml and those born to mothers with viral loads above 1000 copies/ml. The table reveals that among infants born to mothers with viral loads below 1000 copies/ml, the majority tested HIV negative 47 (89%), while only 1 (2%) tested HIV positive. In contrast, among infants born to mothers with viral loads above 1000 copies/ml, none of the infants tested HIV negative.

4.2.4 Hypothesis Testing

In this study, hypothesis testing was conducted to determine the associations between HIV-positive test results in infants and various risk factors. The null hypothesis (Ho) stated that there was no association between certain demographic, clinical, and

behavioural factors, such as maternal age, gestational age at booking, viral load status, and infant feeding options and MTCT of HIV. In contrast, the alternative hypothesis (H1) suggested that there is an association between these factors and MTCT of HIV. Risk factors with a statistical value of $p<0.050$ were deemed significant indicating their association with MTCT of HIV.

4.3 Discussion and Interpretation

4.3.1 Association between MTCT and maternal risk factors.

Table 4.4: Chi square test: Association between maternal risk factors and child HIV status

Variables	HIV negative baby	HIV positive baby	Total number of babies	Odds ratio	95% confidence interval	P values Two sided
Maternal age						0.672
< 25 years	15	3	18	2.1	0.4 – 11.8	
> 25 years	32	3	35	0.5	0.1 – 2.6	
Maternal viral load						0.000
<1000copies/ml	47	1	48	0.0	0.0 - 0.2	
>1000copies/ml	0	5	5	92.0	6.7- 1249.6	
GA on booking						1.000
<12 weeks	10	1	11	0.7	0.1– 7.1	
>12 weeks	37	5	42	1.4	0.1 – 12.9	
Mother's syphilis result						0.030
Negative	46	4	3	0.0	0.0– 0.6	
Positive	1	2	50	23.0	1.6 – 312.4	

The table provides an overview of the association between various maternal risk factors and mother-to-child transmission (MTCT) of HIV, as well as the significance of these associations based on the calculated p-values. The maternal risk factors associated with MTCT of HIV were maternal viral load and maternal syphilis result (P< 0.050). The analysis reveals that there is no significant association between maternal age and HIV test results of infants (p-value = 0.672). This suggests that maternal age may not be a determining factor in MTCT of HIV, and other factors may play a more significant role. Also, the data indicates that there is no association between gestational age at booking for antenatal care and HIV test results of infants (p-value = 1.000). Table 4.4 and 4.5 summarize maternal and infant risk factors associated with MTCT of HIV.

Table 4.4 shows that the odds ratio of a mother aged less than 25 years (OR=2.1;95%CI:0.4 – 11.8) having a child that tests positive is 2.1 times higher than a mother who is 25 years and above having a child who tests positive. The 95% confidence interval of the odds contains 1 meaning the odds ratio are not significant. Having a maternal viral load > 1000 copies/ml and child testing positive is 92 times higher (OR=92.0; 95%CI:6.8-1249.7) compared to a mother with < 1000 copies/ml having a child testing positive. The confidence interval of the odds ratio does not contain 1 meaning the odds ratio was significant.

The odds of having a first ANC booking in more than 12 weeks and delivering a child with an HIV positive status is 1.4 times (OR=1.4; 95%CI:0.1 – 12.9) the odds of a mother booking in at most 12 weeks and having a child who tests HIV positive. The confidence interval of the odds ratio includes a 1 meaning the odds were not significant. On the other hand, the odds of the mother not having a negative syphilis result and having a a child who tests HIV positive is 0.0 times (OR=0.0; 95%CI: 0.0 – 0.6) the odds of a mother with positive syphilis results and having a child who tests HIV positive. The confidence interval of the odds in this case does not contain 1, meaning the odds ratio was significant.

4.3.2 Association of infant risk factors and MTCT of HIV

Table 4.5: Chi square test Infant risk factors and MTCT of HIV.

Variable	HIV negative babies	HIV positive babies	Total number of babies	Odds ratio	95% confidence interval	P value two sided
Infant feeding						0.000
Exclusive	46	1	47	0.0	0.0 – 0.2	
Mixed feeding	1	5	6	45.0	4.9 – 410.5	
Child ARV prophylaxis						0.177
Not given	21	5	26	6.2	0.7 – 57.2	
Yes	26	1	27	0.2	0.0 -1.5	

From table 4.5 above infant risk factors which were found to be significantly associated with MTCT of HIV is the infant feeding option only (P< 0.05). The odds of an infant being given mixed feeding testing HIV positive is 45 times (OR=45.0; (95%CI: 4.9 - 410.5) higher as compared to an infant being exclusively breastfed testing positive. The confidence interval of the odds ratio does not contain 1 meaning the odds ratio was significant. The odds of not giving ARV prophylaxis to the baby and having the child test HIV positive is 6.19 times the odds of giving ARV prophylaxis and the child test HIV positive. In this case the confidence interval of the odds ratio includes 1, meaning the odds ratio is not significant.

4.3 Summary

In summary, our analysis identifies maternal viral load of more than 1000 copies/ml as the most significant risk factor for mother-to-child transmission (MTCT) of HIV. On the infant side, mixed feeding emerges as the lone contributor to transmission. Overall, maternal viral load greater than 1000 copies/ml emerges as the major contributor to MTCT in our study.

Our research conducted at Maphisa District Hospital offers a comprehensive examination of MTCT determinants. By rigorously analysing demographic, clinical, and behavioural factors, we have unveiled key insights that enhance our understanding of MTCT dynamics and pave the way for targeted prevention strategies.

CHAPTER 5 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter includes a discussion, conclusion, and recommendations based on the study findings. The purpose of this study was to determine the drivers of MTCT, calculate the MTCT rate for Matobo in 2021, and measure the various relationships between child and maternal risk factors and MTCT of HIV.

5.2 Discussion

The study aimed to explore the determinants of mother-to-child transmission (MTCT) of HIV within Matobo District, focusing on demographic, behavioural and clinical factors. The researcher had hypothesised that there was an association between certain demographic, clinical, and behavioural factors, such as maternal age, gestational age at booking, viral load status, and infant feeding options and MTCT of HIV. This hypothesis guided the investigation into the determinants of mother-to-child transmission (MTCT) of HIV within the study population**.**

The research findings brought valuable insights into the dynamics of MTCT of HIV and offer significant implications for public health interventions. It is therefore important to understand the factors of PMTCT for designing interventions that can help curb MTCT of

HIV. In this study various factors like gestational age on booking, viral load, infant feeding pattern and ARV prophylaxis administration had an influence on MTCT of HIV.

5.2.1 Demographic characteristics of study population `

The study involved 185 mother-baby pairs, including 185 singletons and 1 set of twins. HIV positive mothers were within the age range of 17-43 years (modal age: 22 years, mean age: 28 years). Young mothers (15-24 years) constituted 33% of the sample. Among the 187 babies enrolled, 134 were born to HIV-negative mothers, while 53 were born to HIV-positive mothers, with 6 testing positive for HIV. Half of the babies were born to mothers aged 20-24 years, while the other half were born to mothers aged 30-34 years.

5.2.2 Mother to child transmission rate

The study aimed to determine the MTCT rate for this research. From our findings, Matobo District had an HIV transmission rate of 11.3%. According to our analysis this eMTCT rate is consistent with the range that was indicated in the problem statement. Moreover, similar transmission rates have been found in studies done in other countries, for example in a study done in Nigeria by Adejuyigbe et al. (2018), demonstrating that this issue persists despite progress in PMTCT programs.

In another study by Wudineh and Damtew (2016) on investigating the determinants of HIV among exposed infants in Ethiopia. The study's findings revealed an HIV infection prevalence rate of 15.7% among HIV exposed infants, which was consistent with both the

national prevalence estimate of 17% and results from similar studies conducted in resource-poor settings, where prevalence rates ranged from 11% to 21.8% (as cited by Wudineh & Damtew, 2016). Despite ongoing global efforts to eliminate mother-to-child transmission (MTCT) of HIV and promoting an HIV-free generation, low-income countries are having higher prevalence rates.

According to Malaju and Alene (2012), MTCT of HIV can be decreased to less than 2% in industrialized nations by combining anti-retroviral prophylaxis, elective caesarean delivery, and abstaining from breastfeeding. Therefore, such a high MTCT rate can be due to factors including an HIV positive pregnant mother having restricted access to PMTCT services, an unavailable choice for difficult elective caesarean sections, and cultural and economic hurdles that impede the adoption of practices like as exclusive formula feeding. The district has only 2 hospitals that offer caesarean section services of which the other is a private hospital where they charge user fees. This can be a major barrier to clients who end up opting for home deliveries further increasing the chances of MTCT.

5.2.3 Determinants of mother to child transmission of HIV

Maternal age did not have any statistical significance in our study. Those below and above the age of 25 showed the same risk of transmitting HIV to their babies. This finding could be due to young mothers perceiving themselves not to be at risk of contracting and transmitting HIV since they are still young. On the other hand older mothers may perceive themselves as not being at risk of contracting or transmitting HIV since they are now

experience in taking care of babies or managing their relationships. From our study findings 5 of the positive babies reported were born from mothers that made their 1st ANC booking after the recommended 12 weeks gestation age while one had booked before 12 weeks. These findings reveal the importance of early booking and its impact on reducing MTCT of HIV.However, to successfully address these challenges they is need to dig deeper on socioeconomic and structural hurdles that may prevent timely access to antenatal care services, particularly in resource-constrained settings like Zimbabwe. In a study conducted by Aliyu et al. (2017) and Okereke et al. (2020), discrepancies in healthcare access among marginalized populations, emphasizing the importance of tailored interventions.

In addition to addressing structural barriers, study findings highlighted the need for comprehensive maternal health education and community engagement programs. Another study by Yotebieng et al. (2018) and Ditekemena et al. (2021) they found that community-based interventions can promote early antenatal care uptake and improve mother and child health outcomes, including MTCT prevention. As we negotiate the complex backdrop of MTCT prevention, we must take a multidimensional approach that considers both individual and systemic factors influencing availability, accessibility, affordability and utilisation of healthcare services. A significant progress toward our goal of eliminating MTCT of HIV and ensuring the well-being of HIV-affected mothers and children worldwide by incorporating targeted interventions aimed at promoting early antenatal care

initiation, reducing structural barriers, and increasing community engagement. The infected child who was born for a mother who had made an early booking could indicate a gap in implementing MTCT strategies that could need to be strengthened to avoid this happening in the future. Creation of Mbereko/Imbeleko groups can help increase the awareness and prompt more mothers to book early.

The analysis from our study did not reveal any significant relationship between child ARV prophylaxis and HIV test results (p-value = 0.18). Infants who got ARV prophylaxis did not show any reduced chance of HIV transmission than those who were not given. 1 infant who was given ARV prophylaxis at birth tested positive for HIV. These results differ from a study done by Wudineh and Damtew (2016) in Nigeria were babies who did not receive ARV prophylaxis at birth were said to be 5.8 times more at risk of contracting HIV as compared to those who received ARV prophylaxis. This difference could be maybe the infant vomited soon after being given the medication without the healthcare workers noticing in such cases the dose should be repeated so the effects can be maximised.

Infant feeding option was another risk factor that was found to be significant in this study. The practice of breastfeeding is of paramount importance in nourishing the baby and creating the bond between the mother and the baby. However, in areas where HIV prevalence is high like in our study setting, breastfeeding increases the risk of mother to child transmission of HIV. In a study by Wudineh and Damtew (2016), they found that infants who had mixed feeding were 42 times more likely to contract HIV than those who

received exclusive breastfeeding. This finding was consistent with the findings of this study; infants exposed to mixed feeding had a significantly increased risk of developing HIV, with odds around 45 times greater than infants exclusively breastfed. This could be due to the damage formula milk does to the epithelial cells in the baby's mouth, thus increasing the risk of contracting HIV if the nipples also have an open wound.

On the other hand, in a study by Anand(2020) the duration of breast feeding was said to have an influence the transmission of HIV, early cessation of breastfeeding would decrease the child's exposure to HIV through breast milk. In addition, babies who were breast fed for less than six months were more protected than those who were breast fed for a longer period. This finding could be site/setting specific as early cessation of breastfeeding by HIV infected mothers in India did not improve the HIV-free survival among their infants. Avoiding breastfeeding in all HIV positive mother baby pairs could be the best intervention to be applied if possible. In our study one of the infected infants was on exclusive breastfeeding, this could require us to look at other factors like viral load, CD 4 and adherence which could also be a contributor.

Findings from our research showed a relationship between maternal viral load and the risk of HIV MTCT. Infants delivered to mothers who had a high viral load (≥ 1000copies/ml) were more 92 more likely to have their babies testing HIV positive as compared to those with a viral load < 1000 copies/ml. This highlights the need of maintain a suppressed viral load(<1000copies/ml) during pregnancy and breastfeeding period. This validates the

findings from a study done by Li et al. (2021) and Puthanakit et al. (2018), who discovered a direct link between a high maternal viral load and an increased MTCT risk. These findings emphasize the necessity of viral load monitoring and adherence to antiretroviral therapy in achieving positive PMTCT results. In addition, following the viral load monitoring algorithm for pregnant and lactating women can help in detecting a high viral load early and prompt enhanced adherence counselling (EACs) sessions that can bring a better outcome.

Elimination of syphilis from mother to child is one of the goals of the MTCT program in Zimbabwe. Our study indicated a statistically significant relationship between maternal syphilis and HIV MTCT. 2 of the infants who tested HIV positive were delivered by mothers who had a positive syphilis result. From previous research, such as those by Gomez et al. (2017) and Marangoni et al. (2019), they highlighted the potential synergistic effects of HIV and syphilis co-infection on MTCT risk. These results were like findings from a study that was done in Ethiopia were infection by syphilis during pregnancy found to be associated with MTCT. The researcher indicated that this relation could have been caused by development of genital ulcer which pauses a high risk of transmitting HIV. These necessities a comprehensive MTCT risk reduction through integrated screening and treatment services for maternal diseases, as well as the use of the syphilis duo test kit for all appointments. Moreover, it is important for health care workers to offer syphilis test to all the mothers on their 1st bookings.

5.3 Conclusions

The investigation of the determinants of mother to child transmission of HIV in Matobo revealed that a high maternal viral load (>1000 copies/ml) is the major contributor of MTCT of HIV**.** In addition, other factors like mixed feeding option, maternal syphilis result were also found to be significantly associated with the MTCT of HIV**.** In conclusion, these findings suggest that controlling maternal viral load, promoting exclusive breastfeeding, and addressing co-infections such as syphilis are key strategies for reducing MTCT of HIV. Implementing comprehensive prevention and treatment programs targeting these factors can contribute to improving maternal and child health outcomes in HIV-affected populations.

5.4 Implications

5.4.1 Theoretical Implications

The theoretical implications underscore the significance of the Health Belief Model (HBM) as a robust framework for comprehending health-related behaviors related to Mother-to-Child Transmission (MTCT) of HIV. The study's findings align seamlessly with the fundamental principles of the HBM, highlighting the crucial role of individual perceptions, susceptibility, and perceived benefits in shaping engagement with health-promoting actions.

By emphasizing the importance of these factors in the context of MTCT, the study contributes to the ongoing validation of the HBM, affirming its applicability in guiding targeted interventions and strategies. The HBM's capacity to elucidate individual decision-making processes, perceptions of risk, and the perceived effectiveness of recommended actions provides a solid foundation for designing effective public health campaigns and interventions.

This theoretical alignment supports the continued utilization of the HBM in shaping policies and interventions aimed at reducing MTCT of HIV, ensuring that efforts are grounded in a comprehensive understanding of the psychological and behavioral factors influencing health-related choices**.**

5.4.2 Practical Implications

The study holds practical implications vital for preventing Mother-to-Child Transmission (MTCT) of HIV in Matobo District. Strengthening antenatal care services, with a specific emphasis on early identification and management of maternal factors like CD4 cell count and viral load, is paramount. Tailored interventions are essential for supporting appropriate breastfeeding practices, including comprehensive education on exclusive breastfeeding, and extending the provision of ARV prophylaxis.

Community engagement and education programs, involving collaboration with local leaders and healthcare workers, play a pivotal role in dispelling myths and reducing stigma surrounding HIV. Implementing these recommendations can markedly improve the

effectiveness of Prevention of Mother-to-Child Transmission (PMTCT) programs. This, in turn, contributes significantly to the broader global health goal of eliminating MTCT of HIV. These practical strategies do not only address the unique challenges faced by mothers in Matobo District but also have broader implications for enhancing overall maternal and child health outcomes in similar settings.

5.5 Recommendations

	Recommendations	**Responsible**	**Timeframe**
1	HCW to enter or update all the mothers and babies they are attending in the mother baby pair register in every encounter.	Nurses	Immediately
2	Promote early prenatal booking using the Mbereko/imbeleko + men model.	SIC FCH	immediately
3	HCW to complete all the sections available in the mother baby pair register.	Nurse in charge maternity and FCH	immediately
4	Optimize the usage of HIV treatment and ARV prophylaxis protocols.	SIC maternity and FCH	Immediately
5	Conduct birth testing of HIV all exposed infants within 72 hours after delivery.	SIC maternity, PNW and FCH	immediately
6	Promote exclusive breastfeeding of at least 6 months.	HCW, CHWs	6 months

7	Conduct case investigation for all infants who get infected through PMTCT.	DHE	When a positive EID result is reported
8	To improve on viral load monitoring for pregnant and lactating mothers.	DHIVFP, SICs	3 months
9	To follow up exposed infants to obtain their outcome on HIV status 6-8 weeks after the cessation of breastfeeding.	SIC FCH	Ongoing

5.6 Suggestions for Future Research

Future research endeavors should address the identified limitations and explore nuanced aspects to advance our understanding of MTCT determinants in Matobo District. Firstly, conducting longitudinal studies over an extended period ie from birth up to 6-8 weeks after cessation of breastfeeding period can unveil temporal variations, enabling a more comprehensive assessment of risky periods and interventions' long-term efficacy obtaining a final HIV outcome for all the exposed babies. This could be more explorative if a descriptive research design using a mixed method approach is implied.

Exploring psychosocial factors, cultural influences, and healthcare system dynamics in-depth can enhance the study's breadth, providing a holistic perspective on MTCT determinants. Engaging a mixed methods approach would offer valuable insights into the reasons behind the stagnant transmission rate, including community perceptions, healthcare access challenges, and barriers to adherence.

Expanding the geographic scope to include the whole province can enhance the generalizability of findings and capture potential variations in MTCT rates across different districts. This broader approach would contribute to a more nuanced understanding of contextual factors influencing MTCT.

Additionally, investigating the impact of specific interventions or changes in PMTCT program strategies on MTCT rates can guide future program development and provide more insight on viable interventions. Moreover, community engagement can help address stigma, discrimination, and community-specific challenges, promoting a more comprehensive approach to eliminating MTCT of HIV in different set ups.

5.7 Dissemination of result and any action taken in response to the findings

The study's findings were shared with the district medical officer for Matobo District. Further, the findings were shared with the Maphisa district health executive committee for discussion during a quarterly review meeting scheduled for in early June 2024. The sister in charge for family and child health (FCH), post-natal ward, and maternity were invited to be part of this meeting. The stated recommendations were shared with each of the responsible implementors and DMO were responsible for endorsing. In addition, the research plans to get this study published for wider circulation.

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Appendices

Appendix 1

82 Jaywick

Matsheumhlophe

Bulawayo

31 October 2023

DISTRICT MEDICAL OFFICER
MAPHISA DISTRICT HOSPITAL
01 NOV 2023
P. BAG 5750, MAPHISA
CELL: 0788 769 305

Authority granted. Please adhere to the Ethical Standards of research as guided by MRCZ, Also share your findings with the DMC.

THE DMO

Maphisa District Hospital

P Bag 5750

Bulawayo

Dear Dr Mthunzi

RE: Determinants of mother to child transmission of HIV in Matabeleland South, Matobo District between 2018 and 2022.

I am a student at Africa University studying for a Master of Public Health Degree.

Mother to child transmission of HIV continues to be a contributor to ongoing transmission of HIV worldwide. According to the World Health Organization's (WHO) most recent recommendations, if lifelong antiretroviral therapy is given, the risk of the virus spreading from mother to child can be considerably decreased. Between 15 and 45 percent of children born to HIV-positive mothers are expected to contract the virus if no action is taken. If they are not treated, 50% of all HIV-positive newborns will probably pass away before the age of two.

A variety of interventions are needed to reduce HIV transmission from mother to child, starting with HIV testing followed by lifelong ART initiation to those who test HIV-positive during pregnancy or breastfeeding period, maintaining a suppressed viral load, safe delivery procedures. Moreover, as a preventative measure, antiretroviral prophylaxis should be given to their unborn children. There are a few studies have been done on evaluating the determinants of mother to child of HIV in Zimbabwe. This study seeks to address this gap through the collection of secondary data from the mother baby pair register both on mother and infant.

This evaluation will be conducted in partial fulfilment of the requirements for Master Public Health and will be conducted under the supervision of Dr Mathuuge Mahaman Tanko Salissou(Lecturer at Africa University) and Dr Macdonald Hove(Program manager at OPHID).

Your approval to conduct this study will be greatly appreciated.

For more information you can contact me on email: nsethell@africau.edu Contact 0777212756.

Yours Sincerely

Ntombizile Sethell

Investing in Africa's future

AFRICA UNIVERSITY RESEARCH ETHICS COMMITTEE (AUREC)

P.O. Box 1320 Mutare, Zimbabwe, Off Nyanga Road, Old Mutare-Tel (+263-20) 60075/60026/61611 Fax: (+263 20) 61785 Website: www.africau.edu

Ref: AU3037/23 27 November, 2023

NTOMBIZILE SETHELI
C/O Africa University
Box 1320
MUTARE

RE: DETERMINANTS OF MOTHER TO CHILD TRANSMISSION OF HIV IN MATOBO DISTRICT BETWEEN 2018 TO 2022

Thank you for the above-titled proposal that you submitted to the Africa University Research Ethics Committee for review. Please be advised that AUREC has reviewed and approved your application to conduct the above research.

The approval is based on the following.

a) Research proposal

- **APPROVAL NUMBER** AUREC 3037/23
  This number should be used on all correspondences, consent forms, and appropriate documents.
- **AUREC MEETING DATE** NA
- **APPROVAL DATE** November 27, 2023
- **EXPIRATION DATE** November 27, 2024
- **TYPE OF MEETING**: Expedited
  After the expiration date, this research may only continue upon renewal. A progress report on a standard AUREC form should be submitted a month before the expiration date for renewal purposes.
- **SERIOUS ADVERSE EVENTS** All serious problems concerning subject safety must be reported to AUREC within 3 working days on the standard AUREC form.
- **MODIFICATIONS** Prior AUREC approval is required before implementing any changes in the proposal (including changes in the consent documents)
- **TERMINATION OF STUDY** Upon termination of the study a report has to be submitted to AUREC.

AFRICA UNIVERSITY RESEARCH ETHICS COMMITTEE (AUREC) APPROVED P.O. BOX 1320, MUTARE, ZIMBABWE

Yours Faithfully

MARY CHINZOU
ASSISTANT RESEARCH OFFICER: FOR CHAIRPERSON
AFRICA UNIVERSITY RESEARCH ETHICS COMMITTEE

Appendix 2

Appendix 3: Questionnaire mother's section

	Question	Instruction
1a	Mother baby No	Record the mother baby number in the format PPDDSSYYYYMBSSSSS
1b	Relationship to baby	
2	Age	Record date of birth of mother and age in years
3	ANC booked	indicate with a if the mother was booked for ANC on "Yes" or "No" if she did not book or "unknown" if she deceased.
4	GA at booking	Record the gestation age in weeks at first ANC booking
5	Parity	Record the number of deliveries that the woman has ever had (including still births)
6	Gravidity	Record the number of pregnancies that the woman has ever had.
7	Gestation age at Delivery	record the gestation age in weeks at delivery.
8	Place of delivery	Circle the approppriate
9a	Mother's mode of delivery	Circle the appropriate
9b	Mother's HIV status at post-delivery registration	circle the appropriate HIV status at registration, if positive, Record the mother's OI/ART number in the format PPDDSSYYYYSSSSS
9c	On ART	Circle the appropriate
10	Screened for syphilis during ANC	Circle the appropriate
10a	Syphilis result	Circle the appropriate screening outcome
10b	If positive Number of doses given	If positive circle the number of doses given
10c	Treatment given: benzathine penicillin	Circle yes or no
11	Screened for Anaemia	Circle the appropriate. If screened state the result

12	FP method	Circle the type of family planning the mother is currently using.
13a	TB screening done	Indicate whether mother was screened for TB, using TB screening tool(symptomatic questions).Circle "Yes" if she was screened, "No" if she was not screened and "OT" if she is already on treatment for TB
b	TB screening outcome	Circle as appropriate, "N" if normal, "P" if presumptive, and N/A if mother not screened
c	TB test done	Circle as appropriate: "Yes" if sputum sample collected, "No" if not collected, and N/A if not applicable(i.e. mother was not eligible for an HIV test).
d	TB preventive therapy given	Record whether mother was given IPT. Circle, "Y" if she was not and "NA" if not applicable
14a	HIV tested	Record whether mother was tested for HIV.Circle "Y" if she was, "N" if she was not and, "NA", if not applicable(i.e mother was not eligible for an HIV test.
b	HIV result	Circle the appropriate
15	Preventative services given	Select the appropriate method used
16	Partner HIV status	Circle the appropppriate
17	CTX given	Record if mother was given cotrimoxazole.Circle the appropriate
18	CD4 cell counts	circle the most appropriate
19	Viral load result	Circle the appropriate
20	ART status	Circle the appropriate

Appendix 4: Baby section questionnaire

	Question	Instruction
1	Birth Cohort number	Enter the date of birth(month & year) of the infant in the format mmm(month), yyyy(year) e.g. Jan 2018
2	MBP No	Record the mother baby number in the same format as from the mother in the format PPDDSSYYYYMBSSSS
3	Age(in months)	Record the infant's date of birth in the format day(dd)month(mm)year(yy) and the age at registration
4	Sex	Circle the appropriate.
4	Place of birth	Hospital or home delivery
5	Birth weight	Record the birth weight of the infant in grams(g)
6	Apgar score	Record the infant's apgar score at 1 minute and 5 minutes
7	Did the baby cry at birth	Indicate as appropriate if it was a home delivery
8	Syphilis exposed	Circle the appropriate. "yes" if the mother tested positive at any time during ANC. "No" if the mother did not and "UK" if the mother was not tested for syphilis during ANC.
9	Was baby treated	Circle the appropriate if anfant ws born with congenital syphilis.If yes circle the appropriate to indicate whether the infant was treated or not.
	Does baby have congenital syphilis	
	If yes, treated?	
11	Infant final outcome	Circle the appropriate follow up outcome.(Infant HIV negative or infant HIV positive after cessation of breastfeeding, Died, Lost to follow up.
12	Infant feeding option	Record the infant feeding option by circling the appropriate method.
13	Child TB expo	Record the child TB eposure status: Circle "yes" if in contact with a patient with infection, "N" if not, "UK"if uknown.
14	TB preventive therapy	Record whether isonaizid preventive therapy has been administered to the infant.Circle "Y" if given, "N" if not given, and "NA" if not appliacable.

15	Child ARV prophylaxis given	Circle as appropriate."Y" if given, "N" if not given, and "NA" if not applicable.If yes specify the medicine given
16	HIV test done	Circle yes or no. If yes indicate the date result received
		Result - P/N/I/ND/NA
17	HIV result	circle the appropriate
18	Result given to mother/caregiver	If "Yes" indicate the date when results were received
19	Cotrimoxazole	Record whethet the child has een supplied with cotrimoxazole.Circle "I" if initial supply or "R" resupply and NA if not applicable.
20	ART	Record whethet the child has been supplied with ART.Circle "I" if initial supply or "R" resupply,NA if not applicable and No if not given.
21	Vl results	Circle the appropriate