FACTORS INFLUENCING THE UPTAKE FOR POSTNATAL HIV RE-TEST AMONG BREASTFEEDING MOTHERS IN NKURENKURU DISTRICT, KAVANGO WEST REGION, NAMIBIA

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ABSTRACT

Postnatal mother-to-child transmission (MTCT) of HIV can occur breastfeeding. About 90% of children living with HIV acquired it through their mothers. Postnatal MTCT of HIV from breastmilk is one of the concerns placing a burden on paediatric HIV infection elimination efforts. Therefore, postnatal HIV re-testing is crucial in the detection of acute infections among breastfeeding mothers to prevent avoidable MTCT of HIV. This study aimed to investigate factors influencing postnatal HIV retesting uptake among breastfeeding mothers in Nkurenkuru district. The study was carried out among breastfeeding mothers who were HIV-negative at delivery from 7 participating health facilities in Nkurenkuru district (Gcaruhwa Clinic, Mbambi Clinic, Mpungu H.C, Nankudu Clinic, Nkurenkuru H.C, Rupara H.C, and Tondoro H.C) with a sample size of 342 in October 2023. A cross-sectional quantitative design was employed. All respondents consented in writing and the researcher used a questionnaire to collect the study data. The data was cleaned and analysed using Epi Info 7.2 version. Dependent and independent variables association was tested using Chi-square test, with the statistical significance acceptance of p-value ≤0.05. This study found a declining HIV retest uptake among breastfeeding mothers. Out of 342 mothers enrolled, 280 (82%) were tested 3 months after delivery, and only 22 (7%) were tested by month 12. Education level ($\chi 2 = 18.25$, $p < 0.001$), ANC visits count ($\chi 2 = 18.25$, $p < 0.001$), and parity ($\chi 2 = 36.44$, $p < 0.000$) were associated with HIV retesting among breastfeeding mothers. Factors influencing the uptake of postnatal HIV retesting among breastfeeding mothers are the mother's education level, ANC visits, and parity. The study recommends the Ministry of Health to strengthen awareness and on-going health education on the importance and benefits of consistent postnatal HIV retesting among breastfeeding mothers, as well as ensuring testing accessibility through outreach programs.

Keywords: Mother-to-child-transmission, Antiretroviral Therapy, Antenatal Care, Prevention of Mother to Child.

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LIST OF ABBREVIATIONS AND ACCRONMYS

HIV: Human Immunodeficiency Virus

AIDS: Acquired Immunodeficiency Syndrome

MTCT: Mother-to-Child-Transmission

PMTCT: Prevention of Mother to Child

UNAIDS: United Nations Program on HIV and AIDS

WHO: World Health Organization

MOHSS: Ministry of Health and Social Services

ART: Antiretroviral Therapy

PHC: Primary Health Care

ANC: Antenatal Care

DHS: Demographic and Health Survey

HIS: Health Information System

PEPFAR: US President's Emergency Plan for AIDS Relief

UNAM DEC: University of Namibia Decentralized Ethical Committee

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DEDICATIONS

In recognition of the significant time and effort invested in the completion of this paper, I would like to dedicate it to my child, Esther Aylin Amputu. This dedication is a token of my love and appreciation for all the lost bonding time during this journey. This is the answer to why I was never home with you most of the time ever since I brought you onto this planet. Your presence has brought joy and comfort during moments of stress and self-doubt. I am grateful for your patience as I worked late nights and weekends to fulfill my academic responsibilities. I am forever indebted to you, my dear child!

DECLARATIONS

I, Saara Andreas, hereby declare that this study is my own work and is a true reflection of my research, and that this work, or any part thereof has not been submitted for a degree at any other institution.

Saara Andreas		October 2025
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Name of Student	**Signature**	**Date**

CHAPTER 1: INTRODUCTION AND BACKGROUND TO THE STUDY

1.1 Introduction

Chapter 1 includes the study's overview and main purpose. The chapter briefly provided the HIV statistics background worldwide, in Sub-Saharan Africa region and Namibia, the context of mother-to-child transmission (MTCT) will be provided. The study specific objectives, significance, and key concepts used in the study will also be presented.

1.2 Background of the Study

To date, there are 36.9 million people that are infected by HIV worldwide, whereby 70% are from Sub-Saharan Africa region. By 2017, almost 59% of the HIV infected people in the region were women. The HIV infected children (0-14 years) are accounting for 1.8 million, with newly infected children at 180 000. This statistic illustrates a high MTCT of HIV among children [1].

Overall, HIV vertical transmission rates are reported to be high in south Asia Because the region low burden and testing coverage, while in South and East Africa it is Because new incidences during pregnancy and breastfeeding and in Western and Central Africa the transmission is attributed to low ART coverage[2]. In Namibia, HIV/AIDS is one of the children leading causes of mortality. The country has high HIV prevalence and incidence rates [3], which are generally higher among women [4]. Currently, 8.3% of the Namibian population live with HIV [3], and children of 0-14 years accounting for 1% [4].

Literature reveals that 90% of children living with HIV acquired it through their mothers [5]. Mother to child transmission of HIV occur through direct lineage during pregnancy, labor, delivery (perinatal) or breastfeeding period (postnatal)[6] and prevalence rate differs country by country. Postnatal MTCT of HIV can occur during breastfeeding [7,8] Because contaminated breast milk [8]. Postnatal MTCT of HIV places a burden on paediatric HIV infection elimination efforts [8].

There is a gap between postnatal and perinatal MTCT of HIV with postnatal outweighing. Globally, breastfeeding contributed more than 50% MTCT of HIV in

the 15 of 21 global priority countries in sub-Saharan Africa. Recently, Cameroon recorded 7% overall rate of MTCT of HIV[9], Ethiopia 9.93%[10], Malawi 4.9% [11].

In 2017-2018, South Africa recorded an increased trend in postnatal MTCT of HIV of 75% compared to 40% recorded in 2004-2005[12].The observed trend is suggesting gaps in PMTCT of HIV policy, particularly in postnatal period. Although, there is a noticeable downtrend in the overall rate of MTCT of HIV in Namibia, the current statistics did not break down the percentages in terms of perinatal versus postnatal cases. However, the 2015 statistics translate to more than 2.1% of MTCT cases encountered in the country after 6 weeks postnatal, and the 2017 data indicates a 4.3% of MTCT cases encountered in the country after 6 weeks postnatal.

In the context of MTCT of HIV, the risk of HIV transmission through breastfeeding is well documented in resource limited settings Because recommended exclusive breastfeeding practices[13], while women from Europe and other high-income settings are advised against breastfeeding[14] . The global prevalence of breastfeeding was shown to be at high rates in most of Africa and south Asian countries. There is lack of updated data regarding breastfeeding in high-resource settings[15].

On the other hand, in many resource-poor settings, including Namibia, breastfeeding remains the most common form of infant feeding, making it essential to understand the uptake of HIV retest among breastfeeding mothers with perinatal negative results[16]. Despite postnatal MTCT of HIV prevention measures such as antiretroviral (ARV) drugs and infant feeding modification practices[17], breast milk transmission of HIV has been documented [8]. During the postnatal period, mother's acute HIV infection results in a high risk of MTCT of HIV throughout breastfeeding [8]. Hence, postnatal HIV re-test is crucial in the detection of acute infections [1].

It is required to repeat HIV testing in HIV-negative women every 3 months during the breastfeeding period in high prevalent HIV settings, for early diagnosis of seroconversion [18]. Late HIV diagnosis in breastfeeding mothers poses a higher risk of MTCT of HIV.

Several individual, health system and community factors can influence the uptake of HIV retesting among breastfeeding mothers. Therefore, accurate information about

the factors influencing the uptake of postnatal HIV retesting among breastfeeding mothers with negative prenatal status is crucial, especially in high HIV burden settings.

1.3 Statement of the problem

Globally, HIV testing is critical in eliminating MTCT of HIV [19]. Despite efforts services integrate (mother, child health and PMTCT services), low postnatal HIV retest uptake (30.4%, 57.7%) has been reported [1,19] respectively. Although Namibian figures on postnatal HIV retest could not be found, it is worth noting that, from October 2017 to September 2018, 74% of MTCT of HIV were during breastfeeding, whereby 21% of mothers were not on ART [20]. In 2019, nearly 10% (1138) of PMTCT clients in Namibia were women with previous HIV-negative results who were diagnosed as HIV-positive late during pregnancy, labor, and delivery[3]. Treatment delays and increased MTCT of HIV might erupt in the absence of intervention addressing low postnatal HIV retest among breastfeeding mothers. On 21/09/2021, Nkurenkuru Health Centre recorded a postnatal MTCT of HIV through a breastfeeding case. The mother seroconverted during the breastfeeding period and only got initiated on antiretroviral therapy (ART) when the baby was 6 months [21]. The case was detected through a Primary Healthcare Department (PHC), whereby the mother came to the clinic for the infant who was sick and had no intention of being tested for HIV as per the guidelines.

This observation indicates a gap in HIV retest among breastfeeding mothers who previously tested HIV-negative during antenatal care (ANC) or at 6 weeks post-delivery. Hence, there was a need to investigate postnatal HIV re-test uptake in the Nkurenkuru district. The study investigated factors influencing postnatal HIV re-test uptake among breastfeeding mothers who tested HIV-negative at 6 weeks post-delivery in Nkurenkuru district, Kavango West region. The study findings provided necessary information for the interventions aimed at preventing MTCT of HIV during the breastfeeding period, avoidable cases.

1.4 Study purpose

This study's primary purpose was to investigate factors influencing postnatal HIV re-test uptake among breastfeeding mothers with previous negative status at six weeks post-delivery in Nkurenkuru district, Kavango West region.

1.5 Study objectives

Study specific objectives are:

1. To describe the socio-demographic characteristics of breastfeeding mothers in Nkurenkuru district, Kavango West region.
2. To identify factors influencing HIV retest uptake among breastfeeding mothers in Nkurenkuru district, Kavango West region.
3. To analyze the association between HIV retest uptake and breastfeeding mothers' socio-demographic factors in Nkurenkuru district, Kavango West region.

1.6 Study significance

The study findings of the factors influencing the uptake of postnatal HIV retest among breastfeeding mothers in Nkurenkuru District are of great use to MOHSS, public at large, as well as to the future researchers. Relevant insights on uptake for postnatal HIV retest among breastfeeding mothers in Nkurenkuru District provided. The Ministry of Health can capitalise these findings to improve the uptake of postnatal HIV retest among breastfeeding mothers by amending the PMTCT programs towards preventing MTCT of HIV during breastfeeding, especially in high HIV burden settings in the country.

The study provided an in-depth report on MTCT of HIV during breastfeeding for educational purposes, which is relevant to the public at large. In return, ensuring that the 3-month interval HIV retest is adhered to during breastfeeding for early infection detection and treatment initiation among infected mothers, hence prevention of MTCT of HIV.

The study as well contributed to the public health body of academic knowledge. Researchers interested in postnatal HIV retest can build on its findings and use it as reference material.

1.7 Definitions of key concepts

Breastfeeding

Breastfeeding, also known as nursing, provides a mother's milk to an infant or young child directly from the breast. Breastfeeding is not only a fundamental aspect of maternal-infant bonding but also offers numerous benefits to both the mother and the infant[22]. These benefits include the provision of passive and long-lasting active immunity to infections, which helps protect the infant from various diseases. Breastfeeding also plays a role in the potential long-term improvements in the intellectual development of the infant[22]. It is the most common feeding method practiced by mothers[23]. This study investigated breastfeeding mothers as the study population.

HIV Testing

HIV testing refers to detecting the presence of the human immunodeficiency virus in a person's body. HIV retesting, or repeat testing for HIV, is part of comprehensive HIV prevention strategies as well as care. HIV retesting involves conducting additional HIV tests on individuals who have previously tested negative for the virus[24]. Individuals get retested to ensure that they are not mistakenly considered HIV-negative Because false-negative test results, as well as to detect any recent HIV infections that may have occurred since their last test[24]. The study concentrated on postnatal HIV retest uptake and influencing factors.

Postnatal HIV retest

Postnatal HIV retesting refers to the practice of conducting additional HIV tests on women who have previously tested negative for the virus during their pregnancy or breastfeeding period to identify any incident HIV infections that may have occurred during that time[23,25]. The study investigated factors influencing the uptake of postnatal HIV retest among breastfeeding mothers with negative perinatal results in Nkurenkuru District.

1.8 Study overview

This study consists of 6 chapters. See the chapters brief details below:

Chapter 1: Study introduction & background

This chapter discussed the study background, to help the reader relate to the research topic clearly. The chapter introduced the study problem statement, main purpose, specific objectives, significance, and key concepts definitions to the reader.

Chapter 2: Research synthesis

This chapter put together the reviewed literature related to the study topic. The searcher reviewed books, and articles on the topic. Therefore, this chapter revealed the existing knowledge and gap around the study topic. The chapter also discussed and explained theories and framework related to the topic.

Chapter 3: Research approach

Chapter 3 detailed the study's conduct and data collection approach. The study details about the design, population, sampling, and data collection tool were given. Thereafter, the study data collection tool validity and reliability aspects were discussed.

Chapter 4: Study results & interpretations

Chapter 4 presented the study, analysed and interpreted, and presented the results. It has addressed the research objectives as listed in chapter 1.

Chapter 5: Study results discussion

Chapter 5 discussed the study results. The chapter related the current study findings to previous studies findings. The study similarities were highlighted as well as contradictions.

Chapter 6: Study conclusion and recommendations

Chapter 6 is the last chapter of this study. The study conclusion, limitation and stakeholders recommendations were given.

1.9 Chapter 1 summary

This chapter 1 introduced and outlined the study background. The chapter detailed the study statement of problem, main purpose, specific objectives, significance, and key concepts definitions to the reader.

CHAPTER 2: RESEARCH SYNTHESIS

2.1 Overview

Chapter 2 of the study reviewed and appreciated the existing knowledge done by previous researchers about the study topic. The reviewed literature focused on defining and discussing postnatal HIV seroconversion, postnatal MTCT of HIV, PMTCT of HIV during breastfeeding, status of the uptake for postnatal HIV retest among breastfeeding mothers, factors influencing the uptake, theoretical and conceptual framework.

2.2 Literature Review Strategy

To understand the study topic, a comprehensive literature review was conducted. Numerous browsers were used during the review such as Google Scholar, Scopus, PubMed, and Research Gates. The study search criterial was English articles that were recently published at least within the last 10 years. The search terms and phrases used were as follows: HIV, HIV retesting determinants, breastfeeding mothers and HIV retesting, postnatal HIV seroconversion, and postnatal HIV retesting uptake.

2.3 Postnatal MTCT of HIV

Most pediatric HIV infections occur in resource-limited settings, with more than 90% in sub-Saharan Africa[5]. On the other hand, women of the reproductive age are pronounced to have reached HIV epidemic with a continual rise in MTCT of HIV in the region. The 90-90-90 UNAIDS targets for pregnant and postnatal women have broad progress in the achievement of universal treatment among these groups in sub-Saharan Africa. The first 90 translates to 90% of the population knowing their HIV status, second 90 translates to 90% of the HIV diagnosed initiated on ART and the third 90, translates to 90% of those on ART achieving viral suppression. However, the gaps in implementing the first 90 still exists[10]. Namibia is currently at 93-95-99 and the country was recognized by PEPFAR for exceeding the 90-90-90 targets, and now on the path towards the 95-95-95 targets[26]. The country aims to reach these targets particularly among women.

Mother to child transmission of HIV rates varies from country to country. Although there is lack of updated data regarding breastfeeding in high resource countries, the same countries are said to meet or surpass the MTCT of HIV elimination thresholds of <2% with transmission risk as low as less than 1% Because early ART coverage and breastfeeding guidelines adherence among women[27]. While in limited resource countries with exclusive breastfeeding practices recommended[13] , progress in reduction of MTCT of HIV at 6 weeks is notable. However, it is worth mentioning that the final MTCT of HIV including the breastfeeding period for these countries is still higher than 5%[27]. This is a calling for countries to intervene in the prevention of MTCT of HIV program implementation status during the breastfeeding period to meet the elimination threshold.

Yearly, almost half a million (nearly 90%) of children who become infected with HIV through MTCT live in sub-Saharan Africa[8]. As of 2017, Sub-Saharan African global priority countries MTCT of HIV rates were as follows[27]:

Country	**% of MTCT of HIV at 6 Weeks**	**% of MTCT of HIV inclusive of breastfeeding period**
Angola	14.7	26.1
Botswana	2.8	5
Burundi	6.3	13.9
Cameroon	8.7	15.1
Chad	9.8	17.9
Cote dlvoire	7.8	15.5
Democratic Republic of Congo	11.7	20.4
Eswatini	2.7	8.3
Ethiopia	11.3	21.2
Ghana	10.5	18.7
Kenya	6.4	11.5
Lesotho	4.6	11.3
Malawi	3.0	8.9
Mozambique	6.8	14.4

Namibia	1.7	6.0
South Africa	1.7	5.3
Uganda	4.2	7.9
United Republic of Tanzania	5.9	12.2
Zambia	3.9	10.3
Zimbabwe	2.4	6.7

In terms of progress in the MTCT of HIV in sub-Saharan Africa, Botswana, South Africa and Namibia are reported to have rapidly reduced the transmission rate. While Angola, Congo, Ethiopia and Ghana are still recording high transmission rates. Namibia has been recording a down trend in the reduction of MTCT of HIV, whereby in 2015, the country recorded 4.1% of MTCT of HIV overall rate, with less than 2% of MTCT of HIV rate at 6 weeks postnatal[4] , while in 2017 the country recorded 1.7% rate at 6 weeks and 6% overall rate[27] .

In 2022, Namibia recorded 4% overall rate of MTCT of HIV[28]. Namibia was recognized by WHO in 2024 for reducing MTCT of HIV from 13.4% (2010) to 3.8% (2024) [26]. Although, there is a noticeable downtrend in the overall rate of MTCT of HIV in Namibia, the current statistics did not break down the percentages in terms of perinatal versus postnatal cases. However, the 2015 statistics translate to more than 2.1% of MTCT cases encountered in the country after 6 weeks postnatal, and the 2017 data indicates a 4.3% of MTCT cases encountered in the country after 6 weeks postnatal.

The postnatal period is crucial in fighting pediatric HIV. In the absence of prevention measures, about 10 to 20% of MTCT of HIV happens during this period [10]. Therefore, it is required to repeat HIV testing in HIV-negative women every 3 months during the breastfeeding period in high HIV burden settings for early diagnosis of seroconversion [18]. Kavango West region is one of the Namibian regions with a record of high HIV prevalence of 12.1% among women [4], this is a transmission risk indicator. Hence, failure to follow the recommended test timing may result in late diagnosis of breastfeeding mothers who seroconvert, posing a higher risk of MTCT of HIV.

2.4 **Postnatal MTCT of HIV and Breastfeeding**

Postnatal exposure to MTCT of HIV refers to the period after delivery and during breastfeeding [10]. In a context where breastfeeding is normative and vital to infant survival, MTCT of HIV during breastfeeding remains a challenge [8], like in sub-Saharan Africa, where breastfeeding has contributed to the total transmission of HIV. The risk of postnatal MTCT of HIV during breastfeeding burdens elimination of pediatric HIV [8].

During breastfeeding, women continue to contract HIV in countries with high generalized HIV prevalence[10] , like Namibia. Breastfeeding can lead to an extra 10% transmission (for 6 months) and 17.5% (for 18-24 months) without interventions[20]. Fortunately, MTCT of HIV risk may be reduced to less than 2% with evidence-based PMTCT interventions, which include antiretroviral prophylaxis and treatments and feeding patterns[8].

There is a doubled risk of MTCT of HIV during breastfeeding among infants born to women who experience an acute infection as compared to women with known HIV diagnosis [8]. The newly seroconverted women have high levels of viremia and are more likely to experience MTCT than women with established HIV infection[10,29]. A study conducted in Mozambique, reported an estimate of 3.20/100 (women) postnatal HIV incidence rate. Of these new infections, 34% were diagnosed during the 6 months postnatal, 27% between 6 and 12 months, and 39% between 12 and 18 months [8].

In the Sub-Sahara Africa region, one of the PMTCT gaps identified is late ART initiation [30], which delays in testing can cause. On the other hand, literature shows that for pregnant women there are strategies that are being enforced towards improving HIV testing uptake during this period[10]. However, the same strategies are less enforced during the postnatal period.

2.5 PMTCT of HIV during Breastfeeding

Prevention of mother-to-child transmission (PMTCT) of HIV during breastfeeding is a crucial aspect of comprehensive HIV prevention and care programs[31]. The PMTCT

strategies during breastfeeding, including the use of the universal triple antiretroviral therapy (ART) [32] are recommended, or providing formula feeding for infants at high risk. Implementing these strategies can minimize the risk of MTCT of HIV while still supporting the health and well-being of both the mother and child.

However, the implementation of these PMTCT strategies is not without its challenges, as it requires healthcare infrastructure and resources, and the stigma associated with HIV can often hinder program uptake [31,33]. In resource-constrained settings, the sustainability and implementation of ARV prophylactic regimens for long periods during the postpartum period can be challenging. In addition, there are cases where breastfeeding mothers may acquire HIV infection during breastfeeding, and PMTCT programs would fail to identify them [34].

Furthermore, understanding PMTCT of HIV during breastfeeding involves recognizing the challenges, as this will improve PMTCT outcomes [11]. Approximately 90% of infected with HIV acquired it through MTCT of HIV[4,19]. In Sub-Saharan Africa, the most common PMTCT challenge identified in the region is the infant feeding methods. Breastfeeding is the most common feeding method practiced by mothers since it provides essential early infant growth benefits[10]. In the absence of interventions, MTCT of HIV can range from 20 to 45% in the breastfeeding population[20].

2. 6 Statistics on Uptake for Postnatal HIV Re-testing: Globally, Africa and Namibia

Despite significant progress in PMTCT programs, there are few to no statistics on the uptake for postnatal HIV retesting among breastfeeding mothers with a prior negative result. A study conducted in Tanzania among 668 women reported a low postnatal HIV retesting uptake of 30.4% (203 women) [1]. Poor uptake of PMTCT services in developing countries can be a reason for MTCT of HIV high prevalence.

It is observed that women who initially test HIV negative during their antenatal visit rarely retest for HIV during postpartum, despite recommendations from the World Health Organization and national guidelines[2434], and high HIV incidence during this

period, for instance, in a study done in Mozambique [17]. Given the increased risk of HIV transmission during breastfeeding, coupled with mothers and infants' potential poor health outcomes, retesting among this demographic is crucial in mitigating MTCT of HIV [35] .

About 12 000 of infants are born to HIV positive mothers in Namibia yearly[36] . Of which in 2023, the country reported 1.5% of MTCT of HIV among the infants born to HIV positive mothers. Furthermore, Namibia HIV testing among pregnant women was at 99.7%, the ART coverage was at 98%[36] . However, little is known about the postnatal HIV testing follow ups especially among breastfeeding mothers.

2.7 Factors influencing the uptake for postnatal HIV re-testing.

Several factors can influence the uptake of HIV retesting among breastfeeding mothers.

Below are some factors found in the literature:

Individual Factors

The level of education level (both for the mothers and that of their partners), mother's marital status, age, parity, occupation, and number of ANC visits[18] are some factors influencing the uptake of HIV retest. Fellow researchers reported mothers with high level of education to be more likely to go for HIV testing [1,19]. These were the same findings reported by the study done in Namibia on "HIV testing among women" [37].

Women with more children and older tend to opt for HIV retesting as compared to younger women, and this can be attributable to previous birth experiences with ANC attendance [19]. It is also worth noting that most women with highly educated partners and who are unemployed do not uptake HIV testing [1]. Moreover, societies have less HIV exposure consideration among married couples and long relationships Because

the so-called partner's trust. Mothers with prenatal HIV negative results may assume themselves HIV free [19], which cannot be the case always.

Health System Factors

Antenatal quality of care summarized the health system factors influencing HIV testing among women [1,19,38]. The ANC quality of care refers to the client's service satisfaction based on the provider's attitude, communication skills, counseling comprehensiveness and competence, privacy maintenance, supplies availability, staff availability, waiting time, as well as linkage to care [19]. Mothers will be influenced to uptake HIV retest if initial ANC counseling's are correctly done [1,19]. One study noted long clinic waiting times and non-involvement of men in PMTCT as some of the MTCT of HIV continual threats [38].

Community Factors

Stigma and discrimination are some of the factors that discourage HIV testing and retest uptake. Stigma has an influence in HIV testing uptake among people with perceived risk behaviors because people are afraid of being given a positive result [1,19]. Therefore, a low HIV retesting uptake can be anticipated Because stigma among mothers as well. A study done in Namibia reported 61% of MTCT of HIV-modified factors related to the mothers, 30% related to health workers, and 10% to related to the health system [39].

Children are vulnerable, and it is up to us to protect them. No child deserves to be infected by HIV through his/her mother. Although Namibia reported low MTCT of HIV (4.1%), the fact remains that the country has a generalized HIV prevalence, and different regions are not affected the same by the virus. Moreover, HIV testing is crucial in eliminating MTCT of HIV. Hence, further studies on women's implementation of HIV retesting and barriers are recommended [10].

Breastfeeding mothers who test HIV-negative need to be consistently encouraged to remain negative, and if seroconverted, they must be diagnosed as early as possible to mitigate the risk of transmission. Therefore, there was need to conduct this study with the aim of understanding why breastfeeding mothers who seroconverted in the Nkurenkuru district were identified through outpatient departments only after they presented with opportunistic infections. To address this issue, a critical understanding of factors influencing the uptake of postnatal HIV retesting among breastfeeding mothers was important.

2.8 Study theoretical framework

The researcher used the Health Belief Model (HBM) to understand the uptake of postnatal HIV retesting among breastfeeding mothers influencing factors. The model simplified people's engagement behaviors towards diseases prevention, detection, and cure initiatives [40]. It suggests that an individual's health-related behavior is influenced by several factors, including perceived susceptibility to a health condition, perceived severity of the health condition, perceived benefits and acting motivators and barriers, as well as self-confidence.

When applied to HIV retesting among breastfeeding mothers, the Health Belief Model suggests that the uptake of HIV retesting is influenced by variety of factors. Such as mothers perceived susceptibility to HIV transmission, the perceived severity of potential consequences for themselves and their infants if HIV transmission occurs, the perceived benefits of retesting (such as identifying and managing potential HIV transmission), the perceived barriers to retesting (such as stigma or fear), cues to action (such as healthcare provider recommendations or information campaigns), and their confidence in their ability to undergo retesting.

Several studies have examined the factors influencing HIV retesting among breastfeeding mothers. For instance, a study conducted in Ethiopia found that cultural beliefs and norms around HIV and breastfeeding influenced women's decision to undergo retesting. In addition to these factors, healthcare workers' views and opinions can also play a role in influencing HIV retesting uptake among

breastfeeding mothers. Healthcare workers' knowledge, attitudes, and practices regarding HIV retesting can shape the information and support provided to breastfeeding mothers[10]. Therefore, societal, familial, and economic factors can also impact a mother's decision to undergo HIV retesting while breastfeeding. These suggest a critical need for postnatal HIV retesting investigation.

Hence, this study aimed to determine and analyse factors influencing postnatal HIV retesting among breastfeeding mothers. It sought to understand the implementation of HIV retesting among breastfeeding mothers, particularly in the Kavango West region. The study results may also be used for interventions aimed at preventing MTCT of HIV during breastfeeding in Namibia.

2.9 Chapter 2 Summary

This chapter used existing literature and available knowledge to provide an in-depth review of the uptake for postnatal HIV retesting among breastfeeding mothers. The researcher defined and discussed MTCT of HIV, postnatal MTCT of HIV, and PMTCT of HIV during breastfeeding. The researcher further provided the uptake for postnatal HIV retesting among breastfeeding mothers' status. The chapter proceeded with the factors influencing the uptake of postnatal HIV retesting among breastfeeding and concluded by reviewing the theoretical framework.

CHAPTER 3: RESEARCH APPROACH

3.1 Overview

Chapter 3 detailed the study's conduct and data collection approach. The study details about the design, population, sampling, and data collection procedure and tool were given. Thereafter, the study data collection tool validity and reliability aspects were discussed as well as ethical principles that applied to the study.

3.2 Study design

The study adopted a quantitative, cross-sectional analytical approach [1,41] . This design is considered cost-effective and relatively fast compared to other research designs, making it highly suitable for population-based studies[41]. This study investigated influencing factors of postnatal HIV retest uptake among breastfeeding mothers. Hence, this design provided a snapshot of the current practices related to the study topic and allowed efficient data collection from participants within a short period.

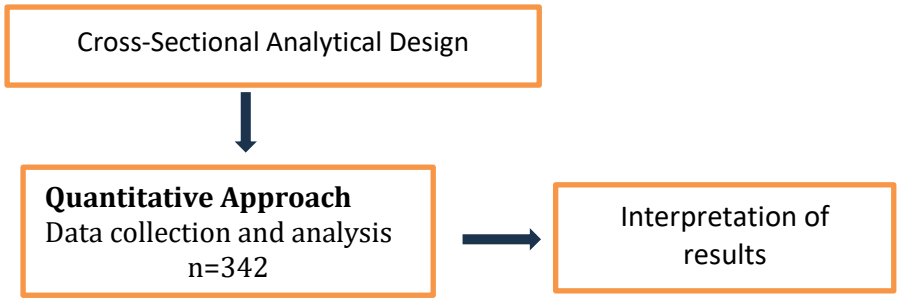

Figure 1- 3.1 Summarized Study Design

3.3 Research setting

Nkurenkuru district is in the Kavango West Region, Namibia. The region is largely rural, with an economy primarily dependent on subsistence farming and small-scale trading. In 2014, the Demographic and Health Survey (DHS) conducted by Namibia, shows the northern regions of Namibia, including Kavango West, are highly affected by HIV/AIDS[4], and this is particularly evident in Nkurenkuru district's elevated infection rates.

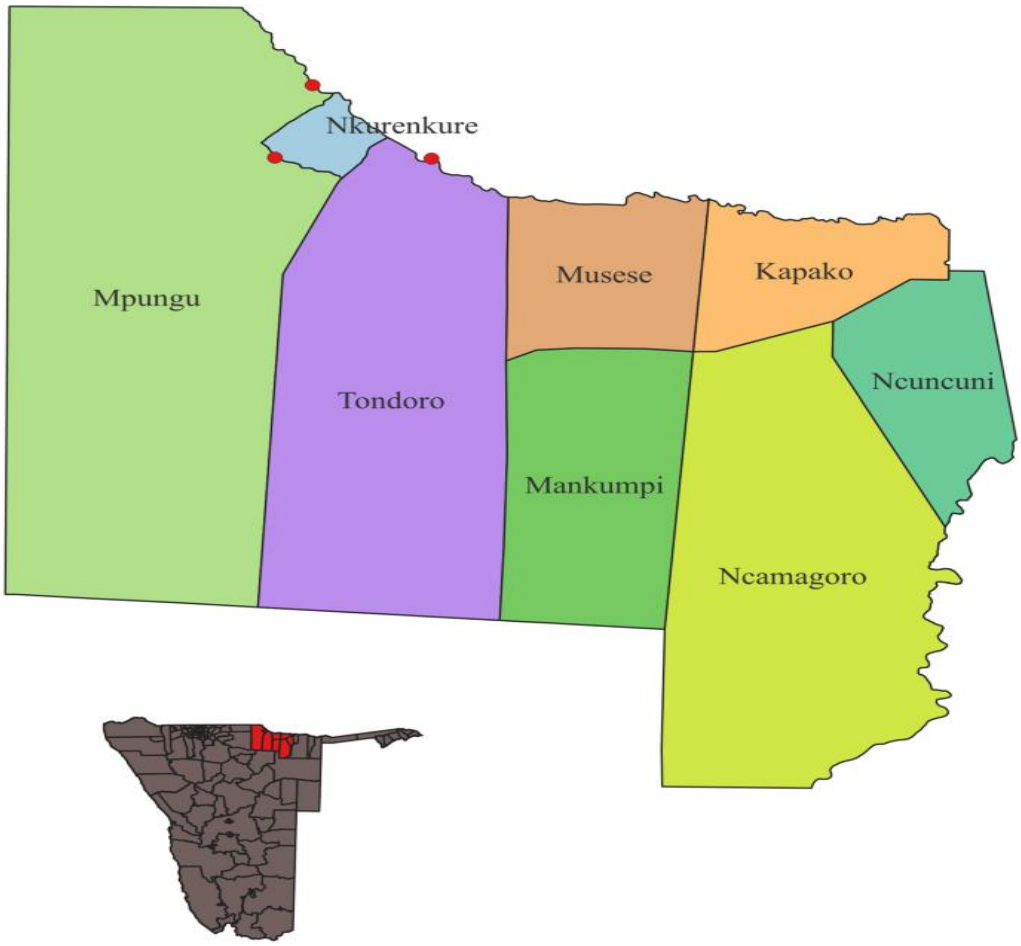

Figure 2- 3.3.1 Kavango West region

3.4 Study population and sampling

3.4.1 Study population

The study population in simple terms can be defined as the total number of members of the group of interest or target that the researcher chose to study [42]. In this study, the target population was the breastfeeding mothers who tested HIV-negative at delivery from 13-state healthcare facilities in Nkurenkuru district. A total population of 29008 of breastfeeding mothers who tested HIV-negative in Nkurenkuru district was obtained from Kavango West MOHSS HIS.

3.4.2 Study sampling procedure

Sampling frame

The study used probability sampling to select the sample by employing a stratified proportionate random sampling technique. For all state healthcare facilities offering immunization in Nkurenkuru district to have an equal chance of selection and adequate representation, multistage sampling at two stages was used [43].**Stage 1**: A list of all healthcare facilities offering immunization in Nkurenkuru district was obtained (sampling frame). The facility's names were then arranged alphabetically, and participating facilities names were selected randomly. Starting with the name at position one on the list, then 3, 5, 7, 9, 11, and 13 (7 of 13). Facility names were selected this way to ensure an equal chance of selection for each facility to be part of the study. Hence, the study occurred at Gcaruhwa Clinic, Mbambi Clinic, Mpungu H.C, Nankudu Clinic, Nkurenkuru H.C, Rupara H.C, and Tondoro H.C.

Stage 2: The total populations of selected facilities (sampling frame) were obtained, and proportionate stratified sampling was used to get equal representation from all facilities. The proportion of participants was calculated per facility using the district sample size to ensure adequate representation.

At the facilities, the researcher recruited the study respondents using convenience sampling. The researcher opted for this method Because the time allocated to the study and the distance between the facilities. The breastfeeding mothers who met this study inclusion criteria at facilities and consented to partake were recruited until the target sample size for the specific healthcare facility was attained [1].

3.4.3 Study sample size

The sample size was calculated using Epi info version 7.2.5 using cross-sectional studies formula [44]. The researcher opted for this formula because a similar study from Tanzania [1] used it and the study findings were credible.

Where, $n=\frac{\left((\frac{Za}{2})^2)\right)\times P(1-P)}{E2}$

$n=\frac{1.96^2\times 0.5(1-0.5)}{0.05^2}$

n=342

Whereby,

n= required sample size

N=Population (total) where the sample will be drawn (Data obtained from Kavango West MOHSS HIS)

P= percentage of breastfeeding mothers who uptake HIV retest during breastfeeding period = 50%, Because lack of relevant reference of actual HIV retesting among breastfeeding mothers in Kavango West region, it was assumed that the mother's percentage (p) for the uptake of HIV retest during breastfeeding is 50% [44].

E=Marginal error =5%, the level of precision is set at 95%.

Z= Standard normal deviation for the desired 95% confidence level = 1.96.

Further adjustment of 10% was made to accommodate data spoilage.

Therefore, n=342

Data will be collected from 342 breastfeeding mothers from those 7 selected healthcare facilities.

Hence, the sample sizes per facilities are as follows,

1. Gcaruhwa clinic:

$$n = \frac{1860}{29008} \times 342$$

n =22 women

2. Mbambi Clinic:

$$n = \frac{2882}{29008} \times 342$$

n=34 women

3. Mpungu H.C:

$$n = \frac{4277}{29008} \times 342$$

n =51 women

4. Nankudu Clinic:

$$n = \frac{3254}{29008} \times 342$$

n=38 women

5. Nkurenkuru H.C:

$$n = \frac{6043}{29008} \times 342$$

n=71 women

6. Rupara H.C:

$$n = \frac{6973}{29008} \times 342$$

n= 82 women

7. Tondoro H.C:

$$n = \frac{3719}{29008} \times 342$$

n=44 women

3.5 Study inclusion and exclusion criteria

3.5.1 Study inclusion

- All 6 weeks post-delivery HIV-negative breastfeeding mothers.
- Who delivered in Nkurenkuru district from October 2022-July 2023.

The study included eligible breastfeeding mothers who consented to participate.

3.5.2 Study exclusion

- The study excluded non-breastfeeding mothers and breastfeeding mothers for less than 3 months post-delivery.
- Breastfeeding mothers with known HIV infection before pregnancy, during pregnancy, or at 6 weeks postnatal.
- Moreover, other conditions that are preventing eligible participants from being part of the study, such as breastfeeding mothers who declined to participate, those who are deaf, those with mental problems, as well as mothers who are severely sick [1].

3.6 Data collection tool

A questionnaire is one of the data collection methods for the quantitative approach studies [43], hence a tool of choice for this study. A structured questionnaire consisting

of standard questions was used to collect the study data. The researcher asked eligible breastfeeding mothers close-ended questions and recorded responses on the questionnaires as the study data tool. The tool was developed by the researcher based on the review of various studies [1,19,37] and study objectives.

The questionnaire had three sections, and each section collected variables of interest to the study. The **first section** collected data on socio-demographic characteristics, namely employment status, age, parity, level of education, and marital status. The **second section** assessed the uptake of HIV retest among breastfeeding mothers, and the variables collected were HIV retest uptake and timing. The **third section** investigated HIV retest factors, and the variables collected are:

- PMTCT factors (testing accessibility, awareness, ANC visits, perceived counseling quality, and service satisfaction),
- Individual factors (awareness, self-perceived HIV risk, partner's education), and
- Community factors (stigma, fear of disclosure).

The tool content was reviewed by this study supervisors, ethical committees and piloted to ensure the quality and appropriateness.

3.7 Data collection tool reliability and validity

3.7.1 Reliability

This study data collection tool, the questionnaire, was developed in English to ensure uniform understanding among the researcher, participants and interpreter for consistent and accurate responses. The questionnaire internal consistency was calculated using the Cronbach's alpha test and a of value > 0.7 for the question domains was obtained. The obtained value confirmed that the study data collection tool was reliable.

3.7.2 Validity

A theoretical framework was used in aligning this study data collection tool. The tool content was confirmed by this study supervisors and ethical committees, whereby feedback obtained from them were used to revise the tool and ensure that it is clear and relevant. Before data collection took place, the tool was pretested through a pilot study. This all ensured the study data collection tool validity.

3.8 Data collection procedure

Immediately after the researcher obtained all the necessary approvals, data collection commenced. At the health facilities in the immunization rooms, the researcher introduced herself to the respondents and screened the mothers for the study criteria. The researcher stated the study's purpose to those who meet the inclusion criteria. She explained to the respondents their rights to participate, and withdrawal can be done at any time of the study. Furthermore, mothers that agreed to participate in the study documented their consent. Participants who consented to the study were admitted to a separate room to complete the self-administered questionnaires, which the researcher presented for further clarification as needed. The questionnaire completion took approximately 15-25 minutes per respondent.

3.9 Study data analysis

The collected study data were cleaned using Excel. The data was then analysed using Epi Info 7.2 version to generate frequencies and proportions. The analysis indicated the respondent's socio-demographic characteristics and distribution and determined HIV retest uptake. Bivariable analysis determined HIV retest uptake (dependent variable) with the independent variables. The logistic regression analysis established the significance of association [1], by identifying significant predictors contributing to HIV retesting uptake while controlling for other factors. In all the analyses, a statistical significance of p-value of ≤ 0.05 was set [1].

The study data were summarized and presented in percentages into tables, graphs, and charts for straightforward interpretation and understanding.

3.10 Research Ethics

Before data collection, Ethical Clearance Certificate was obtained from the UNAM DEC, approval from MOHSS as well as permission from the Kavango West region Directorate of Health. However, prior to commencing the study, authorization from selected health facility supervisors will be obtained.

The principles of research ethics that apply to the study are informed consent, privacy, confidentiality, anonymity, autonomy and voluntary participation, justice, beneficence, and non-maleficence[45]. Moreover, below is how they were applied:

Informed consent: The researcher up-hold to this principle by empowering participants with the study full information for their informed decision to participate. Participants were briefed on the study purpose, procedures, participation risks and benefits and given opportunities to ask questions before they entered the study. Participants documented their consent on the consent form before participating.

Privacy: To maintain the participants' privacy, the researcher informed participants of their rights to participate, rejects, or withdraw from the study without consequences. Questionnaires were completed in the immunization rooms, where only the participant, the researcher, and the interpreter (if required) were allowed to be present. The researcher sought the participant's consent to involve an interpreter whenever required.

Confidentiality: The study upholds confidentiality to reduce HIV-related emotional sensitivity by ensuring privacy in data collection and storage. This was applied and always maintained by conducting in private room and mothers were informed that their responses would not affect their relationship with health providers. Furthermore, the study data was stored on a personal computer (the researcher's laptop) locked with a password. Hence, data was only accessible to the researcher and the study supervisors. When the study was completed, the raw data was destroyed.

Anonymity: The researcher allocated study numbers to participants for identification purposes to ensure that there was no way to trace participants' identity in the results that the study generated.

Voluntary participation and autonomy: Participation in this study was done in a voluntary and respectful manner. Participants were informed that they were free to decline and withdraw from the study at any time, without giving a reason and at no cost or penalty. The principles were up-hold by allowing participants to participate in this study, after signing the consent form voluntarily.

Social justice: The study upholds social justice principles to ensure fairness, equity and participants respect to HIV-related stigma as well as emotional sensitivity. The study design employed the probability sampling method; granting all health facilities in Nkurenkuru district a chance to participate in the study. Data was collected once off in alignment with participants routine immunization visits for their infants at the facilities and no participant was forced to participate. Efforts were made to avoid interfering with facilities services by performing the data collection at the end of services and keeping the session short.

Beneficence and non-maleficence: The researcher explained the study aims, objectives, possible benefits, and knowledge to be mined from this study to relevant committees and participants. The study did not reveal participants' HIV results, and no harm of any nature was caused to the participants during and after the study. A report was shared with UNAM and MOHSS.

3.11 Chapter 3 Summary

Chapter 3 discussed this study methodology. It outlines the study design, target population, sampling procedures, data collection procedure and tool, tool validity and reliability, as well as data analysis, and study ethical principles.

CHAPTER 4: STUDY RESULTS & INTERPRETATIONS

4.1. Overview

Chapter 4 presents the study data analysis and findings on data collected from breastfeeding mothers in Nkurenkuru District, Kavango West region. The researcher entered the data into the computer, cleaned, coded, edited it for inconsistencies, and then analysed it using Epi Info 7.2 to generate frequencies and proportions. The researcher performed descriptive analysis to describe, identify, and analyse respondents' socio-demographic characteristics frequencies, distribution, and proportion of HIV retest at three-month follow-ups—data presented as tables, charts, and graphs.

The researcher conducted a bivariate analysis to determine the association of HIV retest uptake (dependent variable) with the independent variables. The bivariate analysis established the relationship between HIV retest uptake at three months and influencing factors. The researcher used Chi-square to assess association, with the statistical significance acceptance of p-value ≤ 0.05. Lastly, the researcher performed a multivariate logistic regression analysis test on all the factors found to be statistically significant in the bivariate analyses as dependent variables to quantify the most critical factors and mitigate the effect of confounders.

4.2 Study Population socio-demographic characteristics

4.2.1 Response Rate

The study recruited 342 HIV-negative tested breastfeeding mothers presenting at selected healthcare facilities. These mothers with infants 3 – 12 months come for immunization follow-ups at seven state health facilities across Nkurenkuru Health District, Kavango West region. Most participants were from Rupara Health Centre, recording 82 (24%), followed by Nkurenkuru District Hospital, 71 (21%), while only 22 (6%) participants were at Gcaruhwa Health Centre.

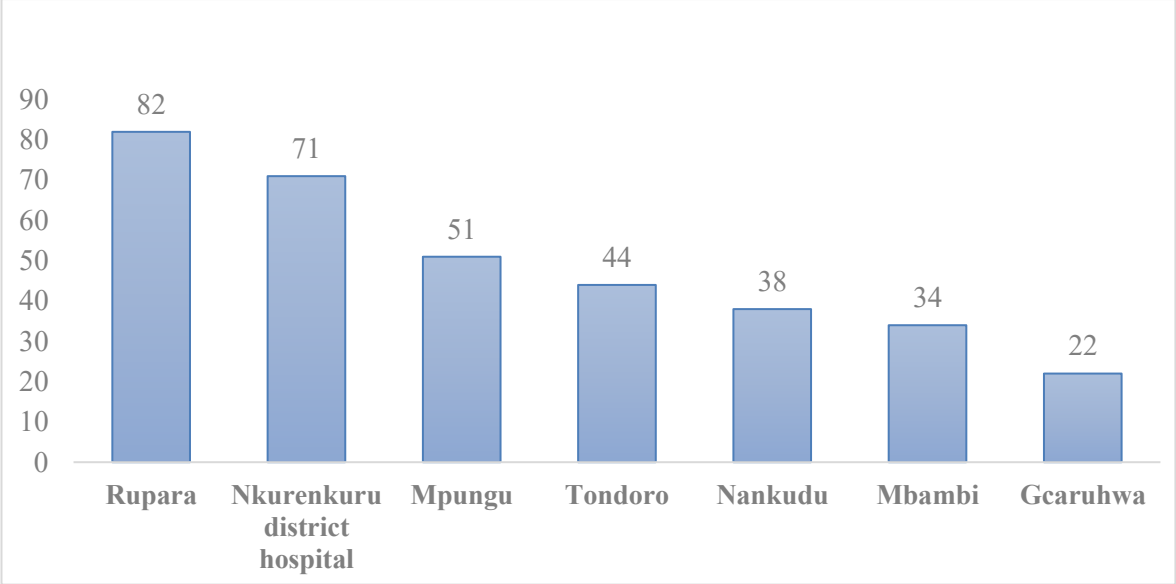

Figure 3 -4.2.1 Distribution of study respondents by healthcare facilities

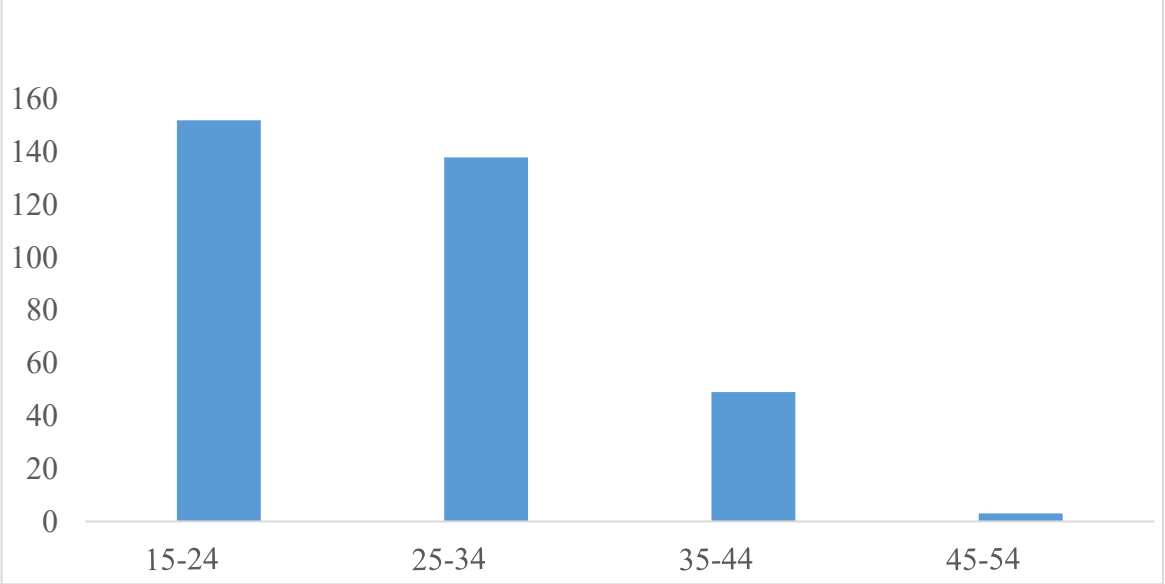

Figure 4 - 4.2.2 Respondent's distribution by age

Figure 5's results indicate that many of the respondents were young breastfeeding women: 152 (44.4%) were between the ages of 15 and 24, 138 (40.4%) were between the ages of 25 and 34, 49 (14.3%) were between 34 and 44 years of age while only 3 (0.9%) participants were 45 years and above from all respondents. The participant's average age is 26.87, with a standard deviation of ±6.66 years.

4.2.2 Respondents' demographic

Table 1 4.2.2: Sociodemographic information of the respondents

Variable	Frequency	Percent	Cum. Percent	Wilson 95% LCL	Wilson 95% UCL
Marital					
Married	42	12	12	9	16
Single	300	88	100	84	91
Employment					
Employed	19	6	6	4	9
Self-Employed	31	9	15	6	13
Unemployed	292	85	100	81	89
Education					
Primary	138	40	40	35	46
Secondary	159	46	87	41	52
Tertiary	45	13	100	10	17
Partner education					
Primary	134	39	39	34	44
Secondary	153	45	84	40	50
Tertiary	55	16	100	13	20
Parity					
1-2	163	48	48	42	53
3-4	103	30	78	26	35
5+	76	22	100	18	27

The study found that single women made up most of the respondents; 300 (88%) and 42 (12%) were married women. The employment status indicated that 292 (85%) participants were not employed, 31 (9%) were self-employed, and only 19 (6%) were employed. The participants have various levels of education. The majority have gone up to secondary education level 159 (46%), followed by primary education 138 (40%), while only 45 (13%) participants have a tertiary education level.

The study also ran the frequency of parity for participants. The results show that most participants are women with at least two children: 163 (48%), while those with 3-4 parity were 103 (30%). The number of participants was very low among women with more than five parities: 76 (22%).

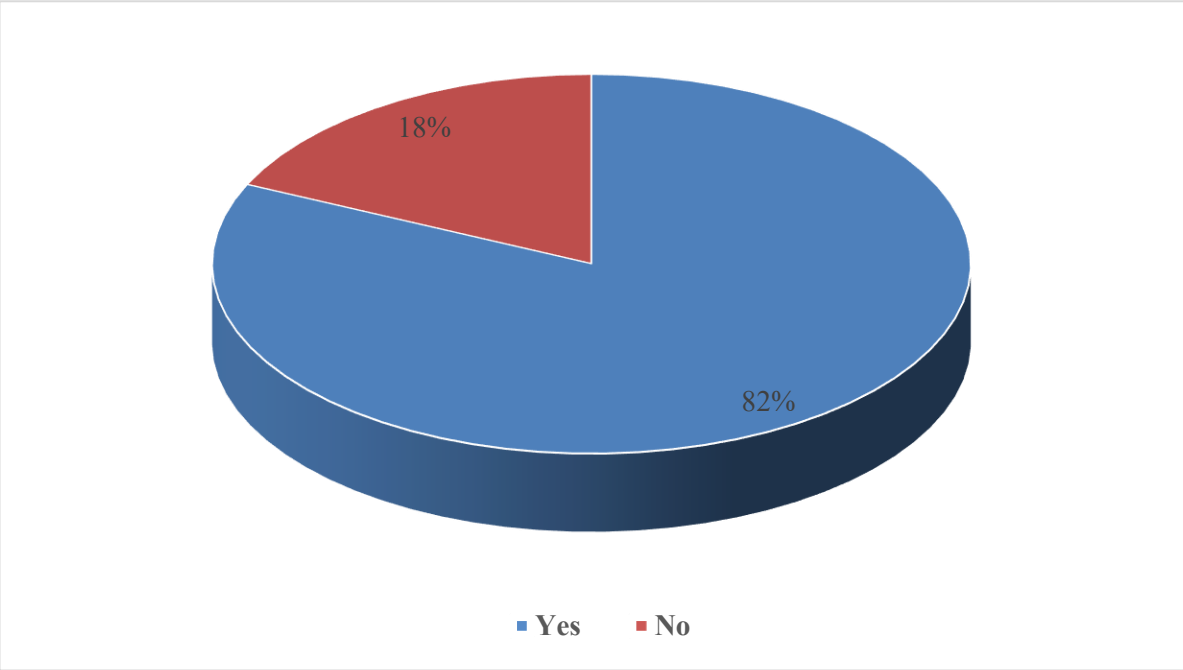

Figure 5- 4.2.3 Respondents HIV retest uptake at 3 months

Out of 342 participants, only 280 (82%) retested for HIV after three months of delivery, while 62 (18%) did not uptake the HIV retest at three months Because various reasons.

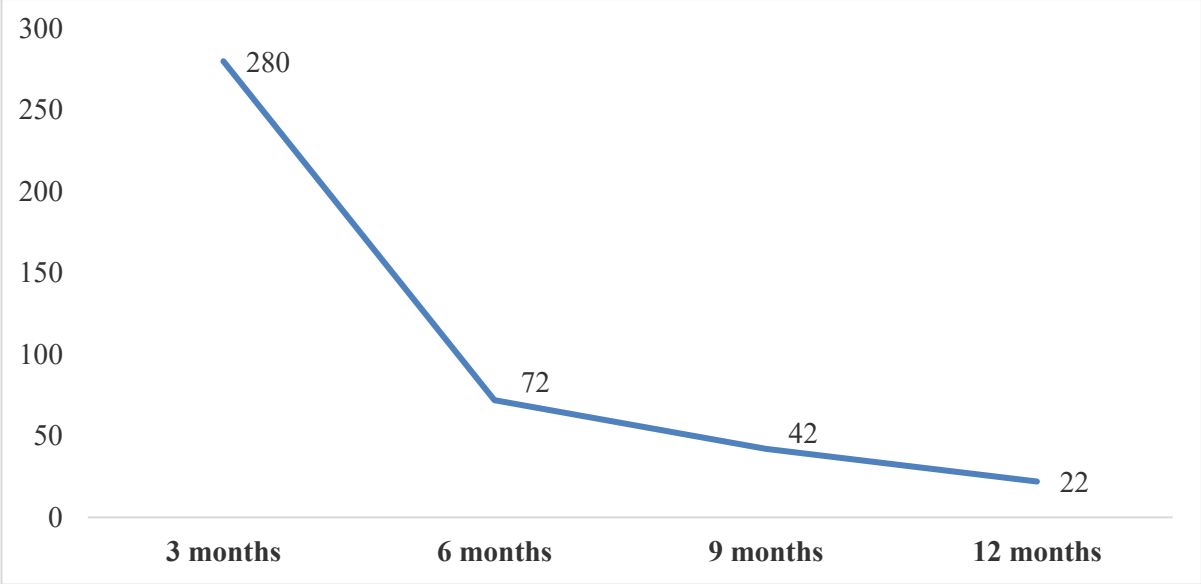

Figure 6 - 4.2.3 Respondents HIV retest uptake at various follow-up intervals

The study finds that the retest for HIV among breastfeeding women was lacking consistency; women were not turning up for the retest every three months as prescribed by the PMTCT guidelines. The number of women who uptake the HIV retest has been decreasing with months of breastfeeding. Most respondents took HIV retest three months after delivery. However, the number has significantly reduced to 208 (26%), and by month 12, only 22 (7%) of those who started the testing followed up.

4.2.4 Factors influencing the uptake of HIV retest

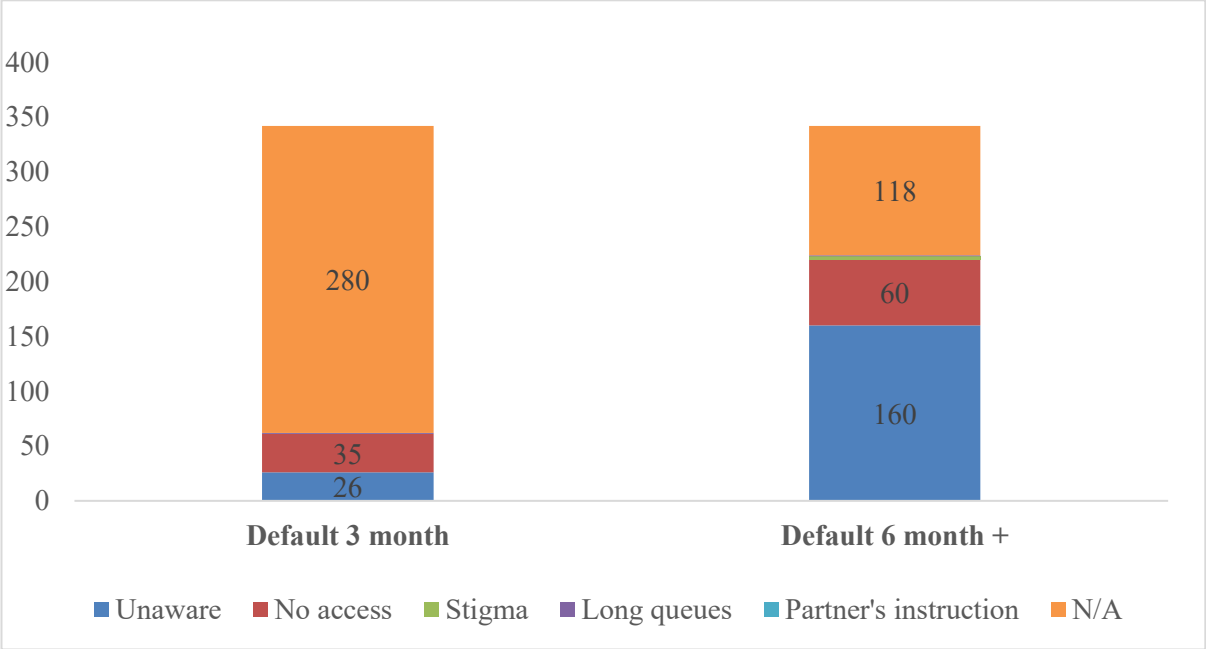

Figure 7- 4.2.4 HIV retest influencing factors at various follow-up intervals

Participants have indicated various reasons as to why they did not take the HIV retest at 3 months, 6 months, and other times of follow-up. At 3 months after delivery, 280 (82%) mothers were tested, while 61 (18%) were not. Of breastfeeding mothers who were not tested, 35 (10%) were Because not having access to HIV testing centers, while 26 (7.5%) were because they were not unaware if it is required to go for the retest.

Similarly, six months after delivery, only 118 (35%) mothers tested; 60 (18%) defaulted Because no access, and 160 (47%) mothers defaulted because of unawareness. Moreover, of all the participants, none of them missed an HIV retest at either three months, six months, or other points of time Because stigma, long queues, or partner's instructions.

Table 2 4.2.5: Other influencing factors among the respondents

Variable	Frequency	Percent	Cum. Percent	Wilson 95% LCL	Wilson 95% UCL
Uptake awareness					
Aware	239	70	70	65	75
Unaware	103	30	100	26	35
ANC visits count					

1	24	7	7	5	10
2	25	7	14	5	11
3	68	20	34	16	24
4 or more	225	66	100	61	71
ANC HIV Edu Satisfaction					
Not Satisfied	11	3	3	2	6
Partially Satisfied	19	6	9	4	9
Satisfied	91	27	35	22	32
Very Satisfied	221	65	100	59	70
Changed partner					
Yes	83	24	24	20	29
No	259	76	100	71	80
Condom use					
Always	28	8	8	6	12
Never	114	33	42	29	38
Sometimes	200	58	100	53	64
Perceived HIV risk					
At Risk	129	38	38	33	43
Risk Free	213	62	100	57	67

The descriptive analysis revealed that having an awareness of the importance of HIV retesting was consistent with participation in the study of uptake of HIV retesting among breastfeeding mothers. Specifically, 239 (70%) of participants were aware of HIV retesting, compared to only 103 (30%) of those who were unaware. Similarly, according to the study, most respondents attended Antenatal care ANC. 225 (66%) have attended ANC more than four times. Those who have attended three times are 68 (20%), while those who have attended two times are 25 (7%), almost equivalent to those who attended once, 24 (7%). The study indicates that ANC visits it consistently with HIV retest uptake at three months.

Based on frequency analysis regarding health education on HIV among breastfeeding mothers, the majority were satisfied with health education during ANC visits, 221 (65%). In comparison, those who were not happy based on various unknown reasons were only 11 (3%). The participants who only use condoms sometimes are 200 (58%), while those who use condoms always are 28 (8%). Participants who perceived low risk of HIV were the majority, 231 (62%) compared to those at risk.

Table 3 – 4.2.6: Bivariate analysis of influencing factors

Variable	Yes	No	Chi-square	P value
Marital status				
Married	36 12.86%	6 9.68%	0.48	0.49
Single	244 87.14%	56 90.32%		
Up take awareness				
Aware	218 77.86%	21 33.87%	46.66	**0.00**
Unaware	62 22.14%	41 66.13%		
HIV perceived risk				
At Risk	96 34.29%	33 53.23%	7.75	**0.05**
Risk Free	184 65.71%	29 46.77%		
Changing of partner				
Changed partner	81 28.93%	2 3.23%	18.25	**0.01**
Not changed	199 71.07%	60 96.77%		

The bivariate analysis revealed that having an awareness of the importance of HIV retesting was consistent with the uptake of HIV retesting among breastfeeding mothers. Specifically, 239 (70%) of participants who were aware of HIV retesting opted to retest, compared to only 103 (30%) of those who were unaware ($\chi2 = 46.66$, $p < 0.001$). Moreover, the study also found an association between HIV retesting uptake at three months among breastfeeding mothers and HIV perceived risk ($\chi2 = 7.75$, $p < 0.005$). Participants who perceived a low risk of HIV showed a higher likelihood of retesting (66%) compared to those who did not receive such education

(34%). Changing partners may cause a risk of HIV transmission; however, the participants who did change partners after giving birth and during breastfeeding were more likely to take up the HIV retest at three months compared to those who did not change ($\chi 2 = 18.25$, $p < 0.001$).

Table 4 – 4.2.7: Influencing factors multivariate analysis

Variable	Yes	No	Chi-square	P value
Education level				
Primary	93 33.21%	45 72.58%	35.38	**0.00**
Secondary	142 50.71%	17 27.42%		
Tertiary	45 16.07%	0 0.00%		
Employment status				
Employed	19 6.79%	0 0.00%	5.36	0.06
Self-Employed	27 9.64%	4 6.45%		
Unemployed	234 83.57%	58 93.55%		
ANC Visits count				
1	5 1.79%	19 30.65%	71.48	**0.00**
2	17 6.07%	8 12.90%		
3	58 20.71%	10 16.13%		
4 or more	200 71.43%	25 40.32%		
Parity				
1-2	150 53.57%	13 20.97%	36.44	**0.00**
3-4	65 23.21%	38 61.29%		
5+	65 23.21%	11 17.74%		
Condom use				
Always	26 9.29%	2 3.23%	3.43	0.17
Never	89 31.79%	25 40.32%		

Sometimes	165 58.93%	35 56.45%

After running the multivariate analysis, the study found that education level was significantly associated with increased HIV retest uptake among breastfeeding mothers ($\chi 2 = 18.25$, $p < 0.001$). The study has also revealed that regular attendance of (ANC) was strongly associated with increased HIV retesting ($\chi 2 = 18.25$, $p < 0.001$). The increase in parity among the participants has also scored a consistent association between parity and HIV retest uptake at three months ($\chi 2 = 36.44$, $p < 0.000$). The study did not show any association between HIV retest uptake at three months and some common socio-demographic factors such as condom use employment status as well as marital status ($\chi 2 = 3.43$, $p < 0.17$), ($\chi 2 = 5.36$, $p < 0.06$), ($\chi 2 = 0.48$, $p < 0.49$).

Table 5 – 4.2.8: Logistic Regression Analysis

Variable	Odds Ratio	95%	C.I.	Coefficient	S.E.	Z-Statistic	P-Value
Education level	3.12	1.42	6.87	1.14	0.40	2.82	0.04
Number of Parity	1.26	0.76	2.09	0.23	0.26	0.91	0.36
ANC visit count	2.13	1.49	3.06	0.76	0.18	4.12	0.00
HIV Retest Awareness	7.86	3.73	16.56	2.06	0.38	5.43	0.00
Changing partner	8.35	1.88	37.16	2.12	0.76	2.79	0.05
Perceived HIV Risk	0.54	0.26	1.13	-0.62	0.38	-1.64	0.10
CONSTANT	*	*	*	-2.18	0.62	-3.54	0.04

Convergence:	Converged
Iterations:	6
Final -2*Log-Likelihood:	207.05

Cases Included:	342		
Test	**Statistic**	**D.F.**	**P-Value**
Score	111.79	6	0.00
Likelihood Ratio	116.71	6	0.00

The researcher qualified the associations in bivariate and multivariate analysis by running a logistic regression analysis. The logistic regression analysis confirmed all the factors found to be statistically significant in the bivariate analyses as dependent variables quantified the most critical factors and mitigated the effect of confounders. The multivariate logistic regression shows that there are still associations between HIV retest uptake and education level, counts of ANC visits, HIV retest awareness, and changing of partners.

4.3 Chapter 4 Summary

Chapter 4 presents the study findings. Tables, charts, and graphs present the study respondent's socio-demographics in accordance with this study objectives.

CHAPTER 5: STUDY RESULTS DISCUSSION & CONCLUSION

5.1 Overview

Chapter 4 presented the descriptive analysis of this study results. The tables, charts, and graphs presented the data of the study. This chapter aimed to decode Chapter 4 and give it more meaning by discussing the study results. Illustrations of this study linkage/similarities and contradiction with reviewed literature were point out. This chapter comprises of four sections: section A describes the study respondents' socio-demographics, section B discusses the respondents' uptake for postnatal HIV retesting, and section C-D discusses the study results by addressing the study last two objectives.

5.2 Section A: Study socio-demographic profile of breastfeeding mothers

This study's first objective was to describe the socio-demographic factors of breastfeeding mothers in Nkurenkuru district. This section discusses the study results.

The study focused on breastfeeding mothers in Nkurenkuru district. Most mothers (24%) were from Rupara Health Centre, followed by Nkurenkuru District Hospital (21%), and the least mothers (6%) at Gcaruhwa Health Centre. The participation per facility was based on facilities population. Most of the breastfeeding mothers that participated in the study were young: 152 (44.4%) were between the age of 15-24, 138 (40.4%) were between the age of 25-34, then 49 (14.3%) were between 34 - 44 years of age while only 3 (0.9%) respondents were 45 years and above. Most respondents were single women; 300 (88%) and 42 (12%) were married women.

This study finding suggests early childbearing in the study population and that the younger age mothers are well informed about the HIV retesting during the breastfeeding period and it suggest efforts towards older age and married mothers not to be overlooked. Similar study done in Tanzania also found that mothers of median age (25 years) are more likely to return for the test as compared to older mothers[1] .

Most mothers were unemployed, 292 (85%), 31 (9%) were self-employed, and only 19 (6%) were employed. Furthermore, 59% of the mothers had at least secondary education, and 61% of their partners had also attained secondary education, which means that a greater portion of the study respondents were educated, and this allowed them to understand the purpose of this study. Most mothers are women with at least two children 163 (48%), while those with 3-4 parity were 103 (30%), and those with ≥ 5 parities were 76 (22%).

This study is validating Nungu et al.,[1] findings which stated that employment status and educational level as significant factors in the HIV re-testing uptake. The study findings are contradicting with Minja [19] findings that reported parity of 3 and more to be associated with increased HIV re-test uptake. On contrary, this study found the uptake to decline with parity. This can be attributed to differences in the settings of the two studies. The study findings indicates that single women are more likely to uptake the test as compared to married women. The findings suggest strengthened efforts towards all breastfeeding mothers regardless of parity and marital status.

5.3 Section B: Uptake of postnatal HIV retest and influencing factors

The postnatal period is crucial in fighting paediatric HIV. In the absence of prevention measures, about 10 to 20% of MTCT of HIV happens during this period18.In this study, 82% (280/342) of breastfeeding mothers were tested 3 months after delivery. However, the percentage has significantly declined at different months of follow-ups, whereby by month 12, only 7% (22/342) were tested. Similarly, a study conducted in Tanzania among 668 women reported a low postnatal HIV retesting uptake of 30.4% (203 women) [1].

Although Namibia is now on the path towards the new HIV targets of 95-95-95, this study reported an uptake of HIV retest of 82% at 3 months, which is way below the first 90 of the 90-90-90 UNAIDS targets [10]. This study revealed the uptake of HIV retest among breastfeeding mothers in Nkurenkuru district to be poor and inconsistent. This poor and inconsistent uptake of HIV retest among breastfeeding mothers finding implication to the study setting and to Namibia as whole can

translate to failure to attain the country annual HIV testing targets as well as an imposed transmission risk to the infants.

The study findings concur with Minja[19] study which also reported a low postnatal HIV retest among mothers. Nungu et.al [1] stated that poor uptake of PMTCT services in developing countries can be a reason of the high MTCT of HIV prevalence. Rusberg [20] indicated that without interventions, breastfeeding could lead to an extra 10% of MTCT of HIV during 6 months after delivery and 17.5% during 18-24 months after delivery. In this study, the 82% uptake of HIV retest at 3 months can be attributed to the health education received during the ANC visits, as mothers can still recall the health education received. However, as the breastfeeding period progressed, the mothers tend to loss to follow-up. This finding calls for consistent enforcement strategies of HIV re-testing among breastfeeding mothers throughout the lactating period.

In sub-Saharan Africa, more than 50% of MTCT infections were contributed to breastfeeding [12]. From 6 months, it is the time mothers can become sexually active after healing from childbirth. Therefore, the declining uptake of HIV retesting among breastfeeding mothers at different months of follow-ups found by this study is of great concern.

The study second objective was to identify factors influencing the uptake of HIV retest among breastfeeding mothers in Nkurenkuru district. Section C discusses the study results.

The decline in the utilization of service was attributed both to mothers-related factors 50% (4/8), other factors 25% (2/8), and health system factors 25% (2/8) in this study. **S**ignificant influencing factors at different points of follow-up were the mother's education level, access to service, uptake unawareness, ANC visits count, HIV education satisfaction during ANC, changed partners, condom use, and perceived HIV risk. The identified factors call for postnatal HIV retest service integration as this will ensure consistent uptake, early seroconversion detection which is the goal in MTCT of HIV. These findings are like a study done in Namibia that reported an

overall 61% MTCT of HIV-modified factors related to mothers, and 10% to the health system [39].

On the other hand, the study found stigma, long queues or partner's instructions, employment status as well as marital status not to influence the uptake of HIV retest. The finding is in contradiction to similar studies, for instance, Nungu et al.[1] and Minja[19], that reported stigma to be part of the factors that discourage HIV testing and retesting. In this study, this is not the case.

Mothers' sexual behaviours (changed partner & condom use) and perceived risk of HIV infection influenced the mother's trust in their initial test results and need for retesting [1]. Although 91% (very satisfied & satisfied) of the mothers reported being satisfied with the service, access to service and HIV education during ANC could be related to the decline in the uptake of HIV retest from 3 months, uptake unawareness, and ANC visits count. Therefore, to ensure guidelines compliance, efforts in the promotion of postnatal HIV retesting should target both the mother's education level, access to service, uptake unawareness, ANC visits count, HIV education satisfaction during ANC, changed partners, condom use, and perceived HIV risk.

5.4 Section C: Study socio-demographic factors and uptake of HIV retest association

The last objective of this study was to analyse the association between HIV retest uptake and breastfeeding mothers' socio-demographic factors in the Nkurenkuru district. This section discusses the study results.

The results indicate mothers' level of education is significantly associated with increased uptake of HIV retesting ($\chi 2 = 18.25$, $p < 0.001$). Breastfeeding mothers with secondary and tertiary education levels were more likely to uptake HIV retest than those with primary levels. Mothers with secondary and tertiary education are more exposed to information, which allows them to make informative and individual decisions in compliance with procedures and guidelines. The study finding is relatable to similar community-based studies [1,19] that reported that mothers with high education levels are likely to go for testing.

This study revealed an association between HIV retest uptake and ANC attendance (ANC visit counts) and parity ($\chi2 = 18.25$, $p < 0.001$), ($\chi2 = 36.44$, $p < 0.000$), respectively. Breastfeeding mothers who had four or more ANC visits and had more than one child been likely to uptake HIV retest at three-month intervals. The observation agrees with another study done in Tanzania, which found women with more children and older tend to opt for HIV retesting as compared to younger women, and this can be attributable to previous birth experiences with ANC attendance[19].

This study findings indicates a no significant association between HIV retest uptake among breastfeeding mothers and the following variables: employment status, marital status, and condom use ($\chi2 = 5.36$, $p < 0.06$), ($\chi2 = 0.48$, $p < 0.49$), ($\chi2 = 3.43$, $p < 0.17$). These variables p-values were higher than this study set criterion for statistical significance (p-value ≤ 0.05). The finding is in contradiction to several studies; for instance, Nungu et al.[1] reported an association between mothers' employment status, condom use, and HIV testing. The study used logistic regression analysis to investigate the uptake of postnatal HIV retest and influencing factors among mothers with prenatal HIV-negative results through odds ratio and 95% confidence interval. It reported an association between mothers' employment status, condom use, and HIV testing.

5.5 Study theoretical framework application

Stable relationships and lack of awareness on HIV retesting among breastfeeding mothers may lead to mothers to underestimate their risk of acquiring HIV postnatally. Hence, negatively impacting the uptake of postnatal HIV retesting among mothers. A positive healthcare services experiences during pregnancy encouraged the uptake of HIV retesting among mothers. Distance to health facilities and lack of service enforcement strategies were some of uptake barriers.

5.6 Study Conclusion

This study concluded as follows:

This study's findings offer valuable insights into the surrounding topic under investigation. The uptake of postnatal HIV retesting among breastfeeding mothers in Nkurenkuru district is slightly acceptable at 3 months, but it declines following the following retesting intervals. The identified factors influencing the uptake were the mother's education level, access to service, uptake unawareness, ANC visits count, HIV education satisfaction during ANC, changed partners, condom use, and perceived HIV risk. The study found a significant association between the uptake of HIV retest among breastfeeding mothers and the following variables: education level, ANC visit counts, changed partners, and parity. The uptake for postnatal HIV retesting among breastfeeding mothers in Nkurenkuru district is influenced by the mother and health system related factors.

5.7 Chapter 5 Summary

Chapter 5 provided the study results detailed discussion. The researcher highlighted this study similarities and differences compared to other studies. The researcher also concluded the study by providing the study results judgements.

CHAPTER 6: STUDY LIMITATIONS & RECOMMENDATIONS

6.1 Study limitations

The scope was one of this study limitations. The study scope was limited to State settings for Kavango West region, specifically to Nkurenkuru district only. However, the study population was large and representative.

The second limitation of this study was the language barrier because not all respondents could understand English. Respondents may have given responses to questions they may not fully understand. However, the study questionnaire was kept simple so that the interpreters could understand the questions and translate them to respondents whenever needed.

6.2 Study Recommendations

This study recommendations are based on the study results. The following are the study recommendations to MOHSS, breastfeeding mothers and further research:

6.2.1 Ministry of Health and Social Services recommendations

In Nkurenkuru district, the study found that postnatal HIV retest uptake is high at 3 months but declines throughout the breastfeeding period. In terms of continual teaching and practice, the study recommends MOHSS to strengthen postnatal HIV retest uptake health education teaching on the importance and benefits of consistent retesting among breastfeeding mothers at discharge, at 6 weeks after delivery, as well as during every immunization visit. The teaching and continual sensitization should address the mothers and health system related factors as this will improve both the mothers and infants' quality of life. There is also a need to amend the PMTCT programs towards preventing MTCT of HIV during breastfeeding, by integrating postnatal HIV testing with immunization services.

6.2.2 Breastfeeding mothers' recommendations

Breastfeeding mothers must adhere to national guidelines by ensuring that they are tested for HIV every 3 months for as long as they are breastfeeding. Adherence to postnatal HIV retesting will ensure the diagnosis of seroconversion, early ART initiation and prevention of possible MTCT of HIV cases.

6.2.3 Further research' recommendations

The study investigated factors influencing uptake of postnatal HIV retesting among breastfeeding mothers in Nkurenkuru district, Kavango West, Namibia. There is more be unpacked around this topic; hence further research is recommended to should focus on postnatal HIV seroconversion among breastfeeding mothers. Further studies should investigate other districts in Namibia too.

6.3 Chapter 6 Summary

In Chapter 6, the researcher highlighted limitations to the study and mitigations. The chapter also provides recommendations to the MOHSS, breastfeeding mothers, and future researchers in terms of strengthen teaching, service integration practice and further research.

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ANNEXURE 1: RESEARCH ETHICAL CLEARANCE (UNAM)

ANNEXURE 2: RESEARCH PERMISSION LETTER (UNAM)

ANNEXURE 3: RESEARCH APPROVAL (MOHSS)

ANNEXURE 4: RESEARCH PERMISSION LETTER (KW REGIONAL DIRECTOR)

ANNEXURE 5: RESEARCH QUESTIONNAIRE

FACTORS INFLUENCING THE UPTAKE FOR POSTNATAL HIV RE-TESTING AMONG BREASTFEEDING MOTHERS IN NKURENKURU DISTRICT, KAVANGO WEST REGION, NAMIBIA

Student name: Saara Andreas **Student number:** 201157543

Course: Masters in Public Health (MPH) **Year**: 2023

Supervisor: Dr. Alfeus Anna (UNAM) **Co-supervisor:**Dr. Hermine Iita(UNAM)

DEMOGRAPHIC INFORMATION

Date…… Study number……

Health Facility……. Physical address……

Section 1: SOCIO-DEMOGRAPHIC CHARACTERISTICS

1. Age (in complete years) ……

2. Parity (total birth) …….

3. Marital Status: 1) Married☐ 2) Single☐

4. What is your education level?

1) ☐Primary

2) ☐Secondary

3) ☐Tertiary

5. What is your partner's education level?

1)☐ Primary

2) ☐ Secondary

3) ☐ Tertiary

6. What is your employment status?

1)☐ Unemployed

2) ☐ Employed

3) ☐ Self-Employed

SECTION 2: HIV RE-TESTING UPTAKE

7. How old is your baby (in complete months)?.....

8. Where you tested for HIV at 3 months after giving birth?

1) ☐ Yes. 2) ☐ No

If **NO**, answer question 9, if **YES**, jump to question 10.

9. Why where you not tested?

1) ☐ Unaware

2) ☐ No access

3) ☐ Stigma/discrimination

4) ☐ Long queues

5) ☐ Partner's instruction

10. After testing at 3 months, where you tested again at 6/9/12 months etc? (More than one answer is possible)

1) ☐ 6 months

2) ☐ 9 months

3) ☐ 12 months

If **NO**, answer question 11, if **YES**, jump to Section 3.

11. Why where you not tested?

1) ☐ Unaware

2) ☐ No access

3) ☐ Stigma/discrimination

4) ☐ Long queues

5) ☐ Partner's instruction

SECTION 3: RE-TESTING INFLUENCING FACTORS

12. Are you aware that you need to be going for 3 months interval HIV retesting for as long as you are breastfeeding?

Yes ☐ No ☐

13. When you were pregnant, how many times did you come for ANC visits?

1) ☐ Never

2) ☐ 1

3) ☐ 2

4) ☐ 3

5) ☐ 4 or more

14. By rating, during your ANC visits, how was the HIV education and counselling sessions?

1) ☐ Very Satisfied

2) ☐ Satisfied

3) ☐ Partially satisfied

4) ☐ Not satisfied

3) ☐ Very disappointed

If **partially to very disappointed**, answer question 15, if **very satisfied to satisfied** jump to 16.

15. Why were you not satisfied by the service?

1) ☐ Inadequate health education

2) ☐ Lack of confidentiality

3) ☐ Health provider attitude

4) ☐ Delay in testing

16. By self-assessment, how do you regard yourself at risk of HIV infection?

Yes ☐ No ☐

17. Are you still together with your baby's father?

Yes ☐ No ☐

If **no** answer question 18, if **yes** jump to question 19.

18. Are you currently involved with someone else?

Yes ☐ No ☐

19. By rating, how is the usage of condoms in your relationship?

1) ☐ Always

2) ☐ Sometimes

3) ☐ Never

20. Do you know your partner's HIV status?

Yes ☐ No ☐

19.

Investigator's Name: ……. Date……

…….

Investigator's Signature

Thank you very much for your time.

ANNEXURE 6: RESEARCH INFORMATION LEAFLET & CONSENT

TITLE OF THE RESEARCH PROJECT: Factors influencing the uptake for postnatal HIV re-testing among breastfeeding mothers in Nkurenkuru District, Kavango West Region, Namibia.

REFERENCE NUMBER: SoNPHHDB/23/18/30

PRINCIPAL INVESTIGATOR: SAARA ANDREAS (92080700456)

ADDRESS: P.O BOX 467, WINDHOEK, NAMIBIA**.**

CONTACT NUMBER: +264 813791410

PURPOSE

You are being invited to partake in a research study. The study is about factors influencing the uptake of postnatal HIV re-testing among breastfeeding mothers. Please read the information on this form and for clarity, please feel free to ask the researcher any questions regarding the study that you may have before agreeing to take part in the study. It is important that you clearly understand what this study entails and how you could be involved. Also kindly be informed that your participation is **entirely voluntary**, meaning you have the rights to decline and withdraw any time during the study despite agreeing without any penalty.

This study has been approved by the University of Namibia (UNAM) Decentralized Ethical Committee (DEC) and the Ministry of Health and Social Services (MoHSS) research committee. And it will be conducted by applying all relevant ethical principles (privacy, confidentiality, anonymity, autonomy, justice, beneficence, and non-maleficence) throughout.

1. **About studying**

The study aims to investigate factors influencing postnatal HIV re-testing uptake among breastfeeding mothers with previous negative status at six weeks post-delivery in Nkurenkuru district, Kavango West region. The findings of the study will provide necessary information for the interventions aimed to prevent MTCT of HIV during breastfeeding cases that are avoidable.

2. **Study Procedure and duration**

The study will take place at the current place. If you consent to participate in this research, you will be asked questions related to influencing factors for postnatal HIV re-testing uptake. The researcher would use a questionnaire to record your answers to the questions. It should take you approximately 15-25 minutes to answer the study questionnaire.

3. **Reason for your selection as a participant**

You are selected to be part of this study because you are a breastfeeding mother who tested HIV negative at 6 weeks post-delivery and delivered in Nkurenkuru district during the selected study period (January-December 2022). Hence, your participation in this study will provide us with information that will of great help in understanding the low postnatal HIV re-testing uptake among breastfeeding mothers and investigate influencing factors.

4. **Participant responsibilities**

You are expected to answer the questions as presented to you by the researcher to your best of your knowledge and as truthful as possible.

5. **Risks and discomforts**

There are no risks or discomforts associated with the current study to the participant. However, may you feel tired during the procedure, you may request for a break.

6. **Benefits of participation**

There will be no direct individual benefits from participation in this study. However, the findings will benefit the MOHSS in determining the postnatal HIV re-testing uptake among breastfeeding mothers and influencing factors, for informed decision making towards reduction of MTCT of HIV during breastfeeding cases that are avoidable in future.

7. **Participant remuneration and involved costs.**

You will not be provided with any kind of monetary remuneration for participating in the study. And there are no costs involved in this study.

8. **Confidentiality of data obtained.**

The participants' information will be kept strictly confidential. The data collection procedure will be anonymous, whereby your names will not be written on the questionnaire or on any other paper where your answers would be written down. Instead, study numbers will be allocated to each participant questionnaire for identification purposes. Hence, there is no way your identity will be revealed during this study or from the generated study report. All the study raw data would be stored in a secure place and only shared with the supervisors/ research team, and they will be destroyed upon study completion. Data to be entered and kept onto researcher personal computer (laptop), that is locked with a protected password.

9. Voluntary participation

Participation in this study is voluntary. You are free to decline and withdraw at any time, without giving a reason and at no cost or penalty.

10. Contact information

For any clarity or questions at any time regarding the study or its procedures please contact Saara Andreas (study investigator) on cell: 0813791410 or email: saaraandreas09@gmail.com.na.

You can also contact the UNAM Centre for Research Services for more information or because you have a comment or complaint about this research or about me, please call (+ 264 61) 206 4673, or write an e-mail to research@unam.na. Please provide specific information.

You will receive a copy of this information and a consent form for your own records.

Consent

Declaration by participant

By signing below, I …….……. agree to take part in a research study entitled**:** Factors influencing the uptake for postnatal HIV re-testing among breastfeeding mothers in Nkurenkuru District, Kavango West Region, Namibia.

I declare that:

a) I have read or had read to me this information and consent form and it is written in a language with which I am fluent and comfortable.

b) I have had a chance to ask questions, and all my questions have been adequately answered.

c) I understand that taking part in this study is **voluntary** and I have not been pressurized to take part.

d) I may choose to leave the study at any time and will not be penalized or prejudiced in any way.

e) I may be asked to leave the study before it has finished, if the study doctor or researcher feels it is in my best interests, or if I do not follow the study plan, as agreed to.

Signed at (*place*) .....…..……. on (*date*) ……...……. 2023.

..... **.....**

Signature of participant Signature of witness

Declaration by investigator

I……. declare that:

- I explained the information in this document to …….
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above.
- I did/did not use an interpreter. (*If an interpreter is used then the interpreter must sign the declaration below.*

Signed at (*place*) .....…..……. on (*date*) ……...……. 2023

..... **.....**

Signature of investigator Signature of witness

Declaration by interpreter

I…… declare that:

I assisted the investigator (*name*) ……. to explain the information in this document to (*name participant*)…….……. using the language medium of (Oshiwambo, Otjiherero, Afrikaans etc.)……