

Factors influencing HIV infection of children born to mothers living with HIV in Sierra Leone: Review of Literatures and best practices of service delivery.

Factors influencing HIV infection of children born to mothers living with HIV in Sierra Leon: Review of Literatures and best practices.

By

Iye Kallon

Sierra Leone

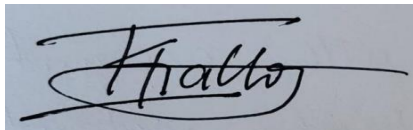
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A thesis submitted in partial fulfillment of the requirement for the degree of Master of Science in Public Health.

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Abstract

Introduction: Despite increased efforts worldwide to prevent mother-to-child HIV transmissions (PMTCT), there are still many pediatric HIV infections in resource-constrained environments like Sierra Leone. The magnitude of HIV transmission to a child from an HIV infected mother increases during delivery. The existing PMTCT interventions has low quality with a limited coverage. As a result, maternal adherence to antiretroviral therapy (ART) is low which is causing high level of HIV transmission to children and maternal mortality. Therefore, this study reviewed factors influencing the HIV transmission from mother to child and gaps of existing PMTCT interventions.

Methodology: This study is conducted from relevant Literature reviews about HIV/AIDS/PMTCT in Sierra Leone, Neighboring countries, and sub-Sahara Africa with the derivation of the results from the use conceptual framework and a zoom in to analyse the best practices of PMTCT for better services implementation.

Results: The PMTCT service is negatively influenced by inadequate knowledge of service providers on mother-to-child transmission, low ANC visits, low ART adherence, and inadequate early infant diagnosis coverage, low immunization coverage, mixed feeding unavailability, and inaccessibility of Nevirapine from the health workers in Sierra Leone and best practices implementation for PMTCT services.

Discussion: Sierra Leone continues to advance in reducing mother-to-child transmission despite obstacles. To lower mother-to-child HIV transmission, prenatal care must be strengthened, strengthen Counselling on ART adherence, and women must receive guidance on proper newborn feeding practices. There is a need to address laws and policies that are not made to cater to the need of women and children living with HIV.

Recommendations: Using the free health care initiative and thorough implementation of the national HIV/AIDS guidelines, effectively integrate HIV/AIDS and PMTCT services into reproductive, maternal, neonatal, and child health services with perpetual observation and assessment must be attain by the ministry of health.

Key words: Children with HIV, PMTCT, MLWHs, Sierra Leone, Sub-Saharan Africa

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List of Abbreviations.

AIDS	Acquired Immunodeficiency syndrome
ANC	Antenatal Clinic
ART	Antiretroviral Therapy
ARV	Antiretroviral Virus
CD4	A cluster of Differentiation 4
CHW	Community Health Workers
CPT	Cotrimoxazole Prophylaxis Therapy
EID	Early Infant Diagnosis
EMTCT	Elimination of Mother to Child Transmission
FHC	Free Health Care
HIV	Human Immunodeficiency Virus
LBW	Low Birth Weight
MLWHs	Mothers Living with HIV/AIDS
MOHS	Ministry of Health and Sanitation
MTCT	Mother To Child Transmission
NAS	National Aids Secretary
NAC	National Aids Commission
NACP	National Aids Control Program
NVR	Nevirapine
PITC	Patient Initiative Testing and Counselling
PMTCT	Prevention Mother to Child Transmission
RMNCHS	Reproductive, Maternal, Neonatal and Child Health Services.
SL	Sierra Leone
SLDHS	Sierra Leone Demographic Health Survey
SSA	Sub-Sahara Africa
SRHR	Sexual and reproductive health and Rights
UNAIDS	United Nations Aids
UNICEF	United Nations International Children's Emergency Fund
WHO	World Health Organization.

Definition of key terms.

Antiretroviral (ARV) drug: The drug prescribed for HIV infection(1).

Antiretroviral therapy (ART): The administration of three or more ARV medications in combination to treat HIV infection. ART requires ongoing care(1).

Exclusive breastfeeding: Apart from oral rehydration solution, drops, or syrups of vitamins, minerals, or medications, the infant exclusively consumes breast milk and no other liquids or solids, not even water(1).

HIV: The AIDS virus, often known as HIV. HIV comes in two different forms, HIV-1 and HIV-2. Globally, HIV-1 is present in the great majority of patients with HIV infections(1).

HIV-exposed infant: A child or newborn born to a mother who is HIV positive until the infant or child is conclusively determined not HIV positive(1).

Mixed feeding: Other liquids and/or meals are provided to a baby who is under six months old in addition to breast milk. This could be any solid food, such as water or different types of milk(1).

Prevention of mother-to-child transmission [PMTCT] of HIV: Previous WHO recommendations referred to several methods for avoiding the transfer of HIV from mother to child as "options A, B, and B+." The 2013 WHO guidelines consolidated on the use of ARV medications recommended either of two strategies: either (option B) providing ART during pregnancy and breastfeeding to women who would not otherwise be eligible for ART or (option B+) providing lifelong ART to all pregnant/breastfeeding women living with HIV regardless of CD4 count or clinical stage(1).

Replacement feeding: A baby who is not getting any breast milk with a diet that has all the nutrients kids need until they can eat exclusively from family meals. This should be done for the first six months with commercial infant formula milk, an appropriate breast milk alternative. After six months, it is recommended to use a good breast milk substitute in addition to supplementary foods made from well-prepared nutrient-rich family foods that are given three to five times per day(1).

Vertical transmission: Transmission of HIV from an HIV-positive mother to her child. This might take place during pregnancy, during labor and delivery, or after delivery through breastfeeding(1).

Early Infant Diagnosis: Early infant diagnosis is the testing of newborns to establish their HIV status after potential HIV exposure during pregnancy, delivery, and postpartum through breastfeeding(2).

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Dedication

To my dear best Friend, late Felani Tembo [R.I.P]

Introduction.

As a young physician working in Sierra Leone from the Rokupa Government Hospital, I have first-hand knowledge of the difficulties the healthcare system faces particularly for children. What better method or solutions may be applied to improve the health outcomes for maternal mortality in my country with an effective healthcare system has been one of the perplexing concerns, I have been asking myself. Having taken part in this master's program on health development, where the idea of Sexual and Reproductive Health and Rights including HIV/AIDS was introduced. I was further inspired to learn more about the theories underlying the factors of HIV transmission among mothers and children in Sierra Leone and other Sub-Saharan nations by my experiences working in a pediatric hospital in Sierra Leone. How can moms protect their kids from HIV when they lack the psychosocial resources and expertise to deal with their own HIV status?

This issue has received attention since HIV/AIDS continues to be one of the diseases that harms women's and children's health and it supports the call for rightful maternity and child healthcare services. Sierra Leone's disproportionately high rate of HIV/AIDS among children born to mothers who are HIV-positive is attributed to many factors like low uptake in the implementation of PMTCT services in the free health care initiative, low early infant diagnosis, breastfeeding knowledge, Vaccination care and the inadequate knowledge about PMTCT among women and many more. The Sierra Leone government unveiled a five-year National Strategic Plan (NSP) on HIV/AIDS that sought to boost PMTCT services, increase the frequency of HIV testing and increase access to antiretroviral therapy (ART).

But, still, in the local HIV care continuum, obstacles are impeding the UNAIDS 90-90-90 target goal. UNAIDS has supported the political declaration to eradicate AIDS as a public health crisis by 2030 and has set new goals for the battle against the pandemic for 2025. Even with the outstanding efforts of the Sierra Leone health system, studies have indicated that there are still several gaps in achieving improved maternal and child health outcomes and that women and children continue to bear a disproportionately large burden of diseases like HIV/AIDS. This Thesis will help me to aid in enhancing the healthcare system by analysing the different factors that cause HIV in children born to MLWHs in Sierra Leone.

The thesis is organized and presented in 6 main chapters as a literature review. The first section gives background information about Sierra Leone, including the geography of the nation, socio-economic factors, the health system in Sierra Leone, HIV overview, and PMTCT services in Sierra Leone. The problem statement and justification and Objectives for this study are described in the second chapter. The third chapter gives a descriptive study and conceptual framework to utilize the shape of the study's findings/results. The fourth chapters present comprehensive results in a well-organized manner, and they are followed by a discussion section that analyzes the study's outcomes. The last Chapter gives a conclusive result on the paper and adequate recommendations for the Ministry of Health

Chapter 1: Background

1.1. Sierra Leone Country Profile

Sierra Leone is a little country in West Africa bordered by Guinea, Liberia, and the Atlantic Ocean. It is organized into 16 districts and contains 5 areas (Western Area, North-West, Northern, Eastern, and Southern). Freetown is the largest city, the economic center, and the location of the central government lies in the western area. There are 8 million individuals in the country population (3). Sierra Leone is a fast-expanding country with a land area of 27,699 square miles (71,740 square kilometers), ranking 103rd in terms of population and 120th in terms of size(4). The majority of Sierra Leoneans speak Krio, which is the common language among the country's 15 to 20 ethnic groupings. English, however, is the official language(5). The ten-year war battle, which concluded in January 2002, wreaked havoc on most of Sierra Leone and caused enormous suffering among Sierra Leoneans(6). Sierra Leone was rocked by an Ebola outbreak in 2014, which killed over 700 people and caused the nation to declare a state of emergency(4). Literacy rates and educational attainment rise as household wealth rises. For instance, women and men in the lowest wealth quintile (14 % and 27%, respectively) are less likely than those in the top wealth quintile to have finished at least some secondary education)(7). Figure 1 shows the Map of Sierra Leone.



Figure 1(6). Map of Sierra Leone showing provincial and district levels.

1.2. Socio-Economic Factors.

Even though Sierra Leone can be a wealthy country, the people's economic and health conditions have remained poor. Civil strife, economic stagnation, and poor governance have all wreaked havoc on the social sectors. The majority of Sierra Leoneans, particularly in rural regions, lack access to basic social services, as evidenced by shocking socioeconomic statistics (6). According to the World Bank, more than

80% of the population lives in poverty. Between 1992 and 2021, the GDP per capita declined by 5.1% year, to US\$ 130 per year, compared to US\$ 470 for Sub-Saharan Africa. Sierra Leone is the world's poorest country, according to the UNDP Human Development Report 2017)(6)(8).

1.3. Health Care System in Sierra Leone.

As the nation progressively evolves toward sustainable peace and development, the Ministry of Health and Sanitation, which oversees SL's health system, works to enhance the population's health and social welfare. The primary healthcare idea is the foundation of the national healthcare system, the public health delivery system consists of three levels: first-line primary health care is provided by peripheral health units (community health centers, community health posts, and maternal and child health posts); secondary care is provided by district hospitals, and tertiary care is provided by regional or national hospitals(9).

There were 1280 operational health institutions in the entire nation as of July 2015, including 632 Maternal and Child Health Posts, 233 Community Health Posts, 51 Hospitals, 45 Clinics, and 233 Community Health Centers (MCHP)(9). Additionally, the nation has up to 13,000 Community Health Workers (CHW) deployed at the local level to offer a variety of services for health care and promotion. Free medical treatment was made available for children under the age of five, women who were pregnant or nursing, and Ebola survivors in the wake of the terrible 2014 epidemic(7)(9)(10). With between 1165 and 1360 deaths per 100 000 live births, Sierra Leone has the highest maternal mortality rate in the world compared to the average rate for LDC countries (7). The average lifespan is 50.1 years. In Sierra Leone, communicable diseases are the main cause of illness and death, with malaria being the major cause of death, responsible for 38% of all hospital admissions(11). Injuries and illnesses including chronic respiratory diseases, cancer, diabetes, and cardiovascular diseases are increasingly to blame for early death and disability(11). Table 1 shows the different health facilities in the district.

Table 1: number of facilities by health districts (11).

Organisation unit	MCHP	CHP	CHC	Government Hospital	Private Clinic ⁵	Private Hospital	Total
Bo	69	24	28	1	2	3	127
Bombali	55	32	15	1	5	3	111
Bonthe	15	26	14	1	4	2	62
Kailahun	18	42	14	1	1	1	77
Kambia	40	15	13	1	2	1	72
Kenema	60	33	26	1	2	2	124
Koinadugu	43	18	10	1	2	0	74
Kono	44	25	16	1	1	0	87
Moyamba	55	26	18	1	2	1	103
Port Loko	70	21	15	2	1	2	111
Pujehun	49	14	13	1	0	0	77
Tonkolili	75	15	12	1	1	2	106
Western Area	39	28	39	11	22	10	149
Total	632	319	233	24	45	27	1280

1.4. HIV overview In Sierra Leone.

In 1987, ten HIV-positive persons among sex workers were recorded as the first known cases of People living with HIV in Sierra Leone. Since then, the prevalence rate in the country has continuously increased, peaking at 14.9% during the civil war years (1990-2001)(12). Sierra Leone's HIV pandemic has been described as "mixed, widespread, and diverse." HIV has many diversified transmission patterns that affect distinct demographic subgroups and all sectors of the community(13). Sierra Leone's HIV prevalence to 1.7% of the general population (SLDHS 2019)(7).

In 2019, 689,237 persons were tested and obtained results, including both the general population and pregnant women undergoing ANC and PMTCT programs(9).The WHO test and treatment recommendations have been accepted by the country. In 2019, 32,438 people living with HIV (PLHIV) got antiretroviral therapy (ART), while 4,129 pregnant women received ARVs to minimize the risk of HIV transmission from mother to child(14)(6). In 2019, it was projected that 8.5% of children delivered to HIV-positive moms received an HIV virological test within two months after delivery(3).

According to research published in 2020, commercial sex workers, their clients, and their clients' partners account for 39.7% of new HIV infections, customers of sex workers account for the highest (25.6 percent), sex workers 13.7%, and new infection partners accounting for the remaining 0.37 percent. Fishermen make up 10.8% of the workforce, traders 7.6%, transporters 3.5%, and mining employees 3.2%. MSM and People Who Inject Drugs (PWID) are also at a higher risk of contracting HIV, accounting for 2.4 percent and 1.4% of new infections, and mother-to-child transmission accounts for 3.4% (13).

1.5. PMTCT services in Sierra Leone.

The Prevention of Mother-to-Child Transmission (PMTCT) program was launched in Sierra Leone in 2004 to obtain countrywide coverage, however only 46% of the coverage goal has been met through the Maternal, Newborn, and Child Health (MNCH) care program, services focused on identifying pregnant WLHIV, included ART therapy for women and children (0-14 years old), counseling support for appropriate newborn feeding, provision of obstetric care, and family planning services were primarily implemented and accessible during prenatal, delivery, and postnatal care(15)(16)(17).

The nation adopts the UN's four-pronged approach to providing PMTCT services, which entails primary HIV prevention among women and girls of reproductive age, prevention of unintended pregnancies among HIV-positive women, prevention of HIV transmission from HIV-positive women to their children, and treatment, care, and support for families of women living with HIV and their children(18).

Following the global call in 2009 for the complete eradication of MTCT and new pediatric HIV infections by 2015, which, when successfully implemented, will reduce MTCT rates to less than 2% in populations that are not breastfeeding and 5% in populations that are breastfeeding, SL adopted the elimination strategy and began its implementation process. Currently, option B+ is used in Sierra Leone's PMTCT program to stop vertical transmission of HIV from pregnant women with the virus to their unborn children, pregnant women with HIV are put on a lifetime regimen of triple ARV and prophylaxis (19)(20). The country uses integrated public health approaches to provide targeted HIV programs to important groups. In 2014, there is also PLHIV livelihood support and a successful ART defaulter tracing to offset the impact of EID on treatment services(18). According to the World Bank's collection of development

indicators, the percentage of pregnant women in Sierra Leone who are receiving antiretroviral medication (PMTCT) was reported to be 46% in 2020(17). Figure 2 shows the PMTCT coverage as of 2020.

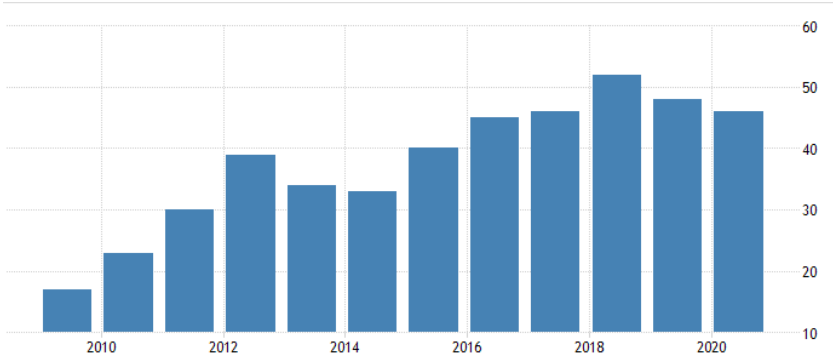


Figure 2: Antiretroviral therapy coverage for PMTCT in Sierra Leone (percentage of expectant women with HIV)(17).

Early Infant Diagnosis uses DNA-PCR to isolate viral nucleic acid in newborns who have been exposed to HIV (HEI) within 6 weeks of birth and up to 18 months of age, giving a virological foundation for the start of lifelong treatment(2). All children who are exposed to HIV must be tested to be able to access the adequate treatment that will keep them alive and healthy, even though mother-to-child transmission prevention services significantly reduce the number of children contracting HIV(3)(15). EID was developed and ramped up, currently, 19 district hospitals offer pediatric care services(15). EID and the provision of pediatric care services were taught to healthcare professionals with coverage of 8.5% in 2019(3). The First Lady and UNAIDS collaborated to launch the PMTCT campaign, "Give birth to live without HIV"(3)(15). Figure 3 shows the percentage of EID coverage in 2019.

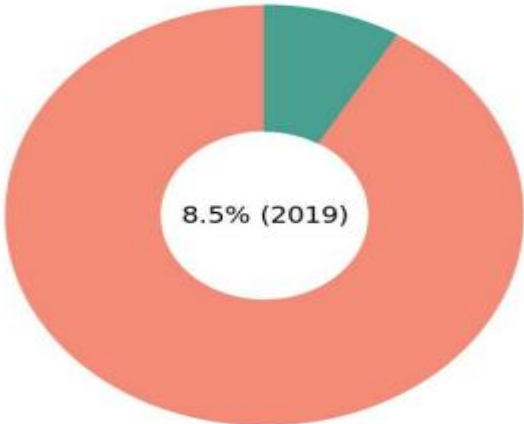


Figure 3: Percentage of children delivered to HIV-positive mothers who have an HIV virological test within two months of delivery[2019](3).

1.6. HIV/AIDS Control Program on a National Scale in Sierra Leone.

The National AIDS Commission (NAC) and the National HIV/AIDS Secretariat (NAS) have been established to provide leadership in the coordination, monitoring, and mobilization of resources for the national response. NAS provides strategic direction for the national multi-sectoral and decentralized response in the programmatic areas of HIV prevention, treatment of HIV and other associated illnesses, care and support, policy, and advocacy, with the help of key partners(18).

The National AIDS Control Programmed (NACP), which is housed within the Ministry of Health and Sanitation, is tasked with assisting the national response's health programming and service delivery(18). The government response is governed by Sierra Leone's National Strategic Plan for 2011-2015, which lays out a plan for the country to meet the Millennium Development Goal of halting and beginning to reverse HIV/AIDS transmission. It is multi-sectoral, with a long-term goal of zero new infections, discrimination, and AIDS-related fatalities(18)(21)(22). To lower the prevalence of HIV among children born to mothers who are HIV positive from 13% in 2015 to less than 5% by 2020, to achieve the 2020 goal of an 80% reduction in HIV-related mortality for both adults and children and by 2020, boost domestic funding for the HIV response to 30%(18). See Figure 4 for National Develop Strategy.

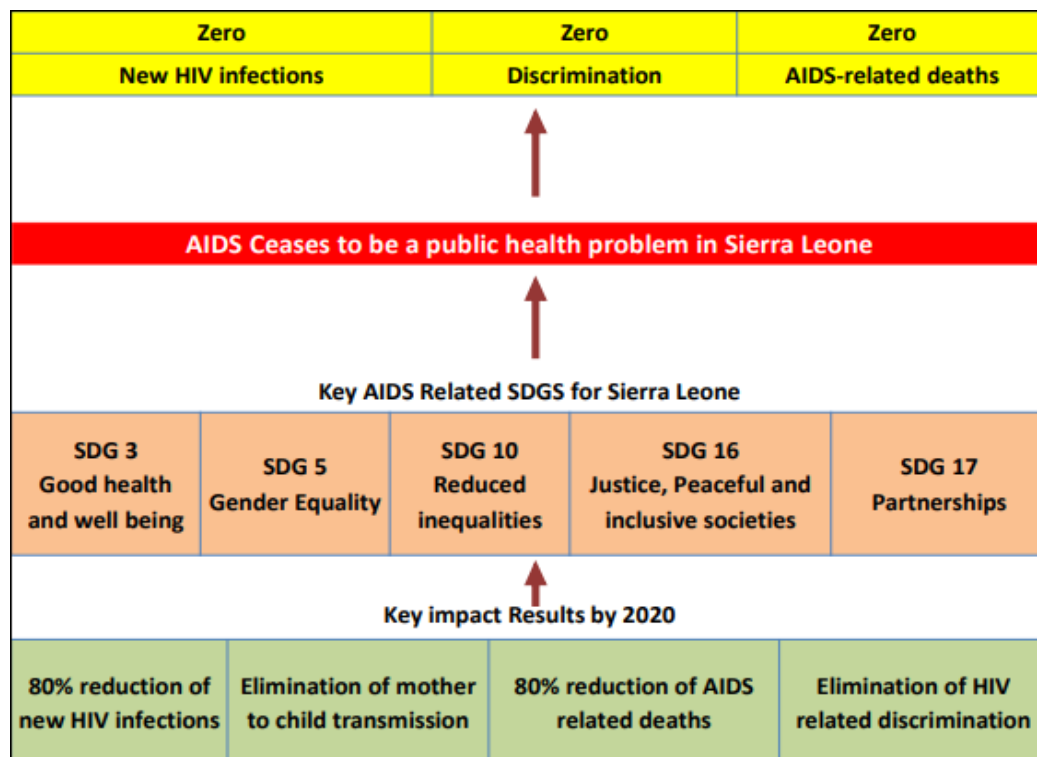


Figure 4. The national development strategy, the Agenda for Prosperity 2013-2018, and the global Sustainable Development Goals for 2030 are all in line with the National strategic plan(18)

Chapter 2.0. Problem statement, justification, and objectives

2.1. Problem Statement

Despite the substantial progress made, there are still several obstacles to the implementation of PMTCT. For instance, there are inconsistencies in HIV screening during ANC, adherence, and retention in care, all of which contribute to the increase of mother-to-child transmission in SL(18). HIV-positive children in SL increase from 8,800 in 2001 to 11,000 in 2020, with only 13% of them receiving antiretroviral therapy [ART](23). A 1.32 percent compound annual growth rate. Without combination antiretroviral medication (ART), the probability of HIV transmission from infected women to their children ranges from 25% to 40%, with 10% to 25% of transmission happening during pregnancy, 35% to 40% after childbirth, and 35% to 40% during lactation(24). HIV-positive infants and children are not being detected early enough to get life-saving therapy(25). An increasing number of HIV transmissions occur during breastfeeding. This pattern points to ongoing challenges in several areas, including the high rates of new HIV infection among breastfeeding women in many high-prevalence countries, the late (or non-existent) initiation of antiretroviral therapy (ART) for pregnant women living with HIV, and the need to keep HIV-positive mothers in treatment and care(26)(27).

Lack of EID access continues to be a substantial barrier to the health and well-being of young children. In 2017, the EID program tested 243 babies; 11.9% were HIV positive(3)(28). HIV-positive infants and children are not being detected early enough to get life-saving therapy. To close the pediatric treatment gap, UNICEF is collaborating with the National AIDS Secretariat and the National AIDS Control Program to expand early infant diagnosis so that all newborns are tested within the first six weeks of life and pediatric cases are identified through proven interventions like mandatory HIV testing for all children who are very acutely malnourished (25). In 2019 the Pediatrics HIV Program in Sierra Leone has several severe issues, including inadequate treatment coverage for children living with HIV, late treatment beginning, poor psychological support, and a lack of specialized HIV service delivery for adolescents living with HIV(23). Prevalence of HIV among pregnant women accessing antenatal clinics (ANC) has also decreased, from 4.4% in 2007 to 3.5% in 2008 to 3.2% in 2010, however, this is twice as high as the national prevalence of 1.5%(13).

HIV infection has an extremely high chance of having negative consequences in infants and young children. In the absence of any intervention, up to 52% and 75% of children die before the age of two and five years, respectively(29)(30)(31). Children who were infected during pregnancy are increasingly reaching adolescence. This is related to the "bimodal progression" of vertically infected children (fast and slow progressors). Disclosure and declaration of HIV status to one's self and family can be challenging, and shame in sexually infected youth, as well as a tendency to blame parents if vertically afflicted, necessitate extra care and treatment(32).

According to the Sierra Leone National HIV/AIDS strategic plan, the main challenges and gaps affecting the National AIDS response are the insufficient behavioral impact of prevention interventions for children and adolescents, low condom use and early sexual debut, large coverage gap for testing, services to prevent mother-to-child transmission, and antiretroviral therapy for children. Persistent stigma and discrimination, gender inequality, and violence against women continue to plague health and community systems, including procurement and supply management(9)(33).

The government has fully implemented the Option B+ method to treat all HIV-positive pregnant women and provide mothers with lifetime antiretroviral therapy but there is a significant coverage gap for HIV

testing, mother-to-child transmission prevention programs, and antiretroviral medication for adults and children(16)(18). The ability to confirm HIV status in HIV-exposed newborns is currently lacking, only 13% of HIV-exposed newborns in PMTCT programs obtained EID promptly (16)(9). Procurement and supply management remains inadequate in the health and community sectors. Persons who evaluate positive for HIV have an extremely poor retention rate in ongoing care and ART enrollment.

Despite tremendous success in improving access to PMTCT treatments and ARV medication, the possibility of HIV infection among Sierra Leone's children, particularly in the west Area region, where transmission is most widespread, remains a major cause of concern (34)(35)(7). The government of SL has set a target of zero new infections, discrimination, and AIDS-related fatalities in 2015(36). The key approach will be to evaluate, treat, and keep everyone safe. Combination prevention, which offers several HIV prevention services focused on individuals and areas where they make the most impact, as well as eradication of mother-to-child transmission and HIV treatment as prevention, will be used to accomplish this difficult goal(9).

2.2. Justification.

There has been very little written about the HIV pandemic in Sierra Leone, and the factors linked with HIV prevalence and HIV testing in Sierra Leone's general population have never been thoroughly investigated(12). Identifying HIV infection determinants in children aids in understanding why transmission rates are high despite widespread use of ART as per Option B+, as well as regaining child survival successes that HIV/AIDS has destroyed. Identification of variables linked to HIV MTCT will be critical in meeting the United Nations AIDS aim of zero new HIV infections among children(37)(38).

Priority approaches in the country include integrating HIV testing and treatment into regular maternal and child health programs, strengthening community approaches, including family-based HIV testing of children, and bringing point-of-care technology to primary health care levels for early HIV infant diagnosis and dual HIV/syphilis testing has not been reached which makes SL falling short of the UNAIDS objectives of 95-95-95 by 2025, as well as the 2030 Sustainable Development Goals (SDGs) particularly SDG-3, "Ensuring health and supporting the welfare of individuals at all ages(39)(3).

According to the NACP and UNAIDS, ART coverage among pregnant and postpartum WLHIV has increased, leading to considerable progress toward lowering MTCT in Sierra Leone. Nonetheless, to minimize vertical transmission to global standards, it is still necessary to understand the frequently interconnected influencing variables in the acceptance of PMTCT services(40)(22). Identifying HIV infection determinants in children aids in understanding why transmission rates are high despite widespread use of ART as part of Option B+, as well as regaining child survival successes that HIV/AIDS has wiped out. Identifying characteristics linked to HIV MTCT will be critical to meeting the UN AIDS objective of zero new HIV infections among children(41)(42).

The study findings will help create recommendations, strategies, and plans that are based on fact when considered by decision-makers, MOHs and implementers will successfully be carrying out such measures, Sierra Leone can advance in its declaration to eliminate AIDS by 2030, as well as the worldwide EMTCT objectives and improve the lives of children born to mother living with HIV.

2.3. Objectives.

2.3.1. Overall Objectives.

This study aims to explore Factors influencing HIV infection in children born to mothers living with HIV in Sierra Leone and analyse the best practices for the uptake of PMTCT in order to produce recommendations for the Ministry of Health.

2.3.2. Specific objectives.

1. To explore how socio-economic and demographic factors influence HIV infection in children born to mother mothers living with HIV in Sierra Leone.
2. To explore how child factors and maternal health-related factors affect children born to mothers living with HIV in Sierra Leone.
3. To analyze the clinical and obstetric factors through the uptake of PMTCT services.
4. To Analyze the best practices to improve the implementation of the uptake of PMTCT services from Sierra Leone and other countries.
5. To develop important recommendations from this study to the Ministry of Health and Sanitation.

Chapter 3.0. Methodology.

This research paper provides a descriptive literature review with the involvement of the National AIDS secretary [NAS] and the National HIV/AIDS control program in Sierra Leone for relevant information. Peered reviewed articles and grey literature were searched from 2000 to 2022 in an electronic database including ResearchGate, PMC, PubMed, BMJ, BMC, academia, Libraries (VU library), and Google scholar. Websites for MoHS, WHO, UNAIDS, UNICEF, and the World Bank were utilized to obtain papers and other resources. Snowballing from chosen pair-reviewed papers and grey literature in-text citations and references. Documents on the transmission of HIV from women to their children through PMTCT services in Sierra Leone and Sub-Saharan Africa. Key words use Sierra Leone, sub-Saharan Africa, Africa, Low-Middle Income Countries, West Africa, children living with HIV, pregnant/breastfeeding women, PMTCT, HIV in children, MLWHs, Factors, Risk factor, contributing factors. Using the Boolean operators AND, OR the search method will combine relevant search phrases [see full search table below].

Table 2: Relevant literature search using keywords and general combinations.

AND			
	Objectives 1 & 2	Issues	Region
OR	socio-economic and demographic factors influence HIV infection in children born to mother mothers living with HIV Child factors and maternal health-related factors affect children born to mothers living with HIV	Age at delivery, weight at delivery, occupational status, income, marital status, and educational status of the mother and partner. Infant feeding, gestational age at delivery, birthweight, Nevirapine Prophylaxis, and vaccination status. Nutritional status, Breast condition, Knowledge on MTCT of HIV, syphilis result, mother support group, partner involvement.	Sierra Leone, Africa, Sub-Saharan Africa, Low- and middle-income countries, West Africa
	Objective 3 Obstetric and clinical factors through the uptake of PMTCT services	Pregnancy plan, ANC follow-up, Place of delivery, mode of delivery PMTCT during ANC. Stage of HIV, Disclosure of serostatus, time of knowing serostatus, Art Adherence, Cotrimoxazole prophylaxis therapy, and adherence	Sierra Leone, Africa, Sub-Saharan Africa, Low- and middle-income countries, West Africa
	Objective 4 best practices to improve the implementation of the uptake of PMTCT services in Sierra Leone	Community and health care system	Sierra Leone, Africa, Sub-Sahara Africa, Low- and middle-income countries, West Africa.

Eligibility Criteria

Table 3: Eligibility Criteria

Inclusion criteria	Exclusion Criteria
<ul style="list-style-type: none"> • Publish in 2000 upwards • Describe the population of children in Sierra Leone • Sierra Leone-specific, with a country setting that is comparable to Sierra Leone. • Inclusion of peer-reviewed literature. • Inclusion of English Language. • SSA research that compared PMTCT services to those in Sierra Leone • HIV Negative under five children. 	<ul style="list-style-type: none"> • Other Languages were not included. • Studies before 2000 • Study proposals. • Not conducted in SSA • Studies that did not compare the number of women of reproductive age who used any PMTCT services. • other abstracts without access to the full text

3.1. Limitations:

Only English-language literature was included in the review, Inconsistency in overall reports and details arises because of different methodology and study designs, and selection bias due to lack of studies from my study population. Due to limited studies of children from Sierra Leone born to HIV-positive moms, most materials are often from neighboring countries and the sub-Saharan Africa. Literature in languages like Portuguese and French was not included in this research.

3.2. Conceptual Framework

To conduct this research and learn more about the variables that affect infants born to HIV-positive mothers. The investigation was guided by a search of numerous literatures for appropriate conceptual frameworks. While investigating, I came across a framework published by Beyene et al in 2018 that was used to assess the determinants of infants born to HIV-positive mothers in Ethiopia, and this conceptual framework is seen to be a good fit for my study(41). Ethiopia is a Sub-Saharan African country with a comparable standard of living, economy, and cost of living to Sierra Leone. This conceptual model will be utilised to investigate factors influencing infants born to HIV mothers in the public health system(41).

MTCT of HIV during pregnancy, delivery, and the post-natal period is determined using a variety of parameters including sociodemographic, child, maternal, obstetric, and clinical related factors. Understanding the factors that contribute to HIV infection in children will help restore the gains in child survival that HIV/AIDS has obliterated and explain why the transmission rate is high despite widespread use of ART as per Option B+ (43)(40). The model, which included five boxes is determined to be the

greatest fit for achieving the study's goals. Although there are connections between the several levels, each will be examined independently and address one or more of the specific goals of this research.

Socio-economic and Demographic Factors: This box is in line with the objective one, which comprises the factors like age of delivery, weight at delivery of the child, income, marital status, educational status of the mother, and educational status of the partner. These show how they are interlinked with children born to MLWHs.

Child and Maternal Related factors: These corresponds to objective number two which focuses on the child factors like infant feeding, gestational age at delivery, birth weight, Nevirapine Prophylaxis, Use of CPT, and Vaccination status. **Maternal-related Health factors:** nutritional status, Breast Condition, Knowledge of MTCT of HIV, Partner involvement, Syphilis test result, and Mother-mother support program.

Obstetric and clinical factor also corresponds to objective number three, and they include factors like Pregnancy plan, ANC follow-up, Place of Delivery, Mode of Delivery, PMTCT during ANC, stage of HIV, Disclosure of Serostatus, Time of knowing serostatus, ART Adherence, Use of CPT, and CPT Adherence.

Moreover, Objectives 1-3 are interlinked to the conceptual framework in describing the several factors whilst four is zooming in into other factors, like best practices to improve the uptake of PMTCT implementations in Sierra Leone and other countries. See Figure 5 for conceptual framework.

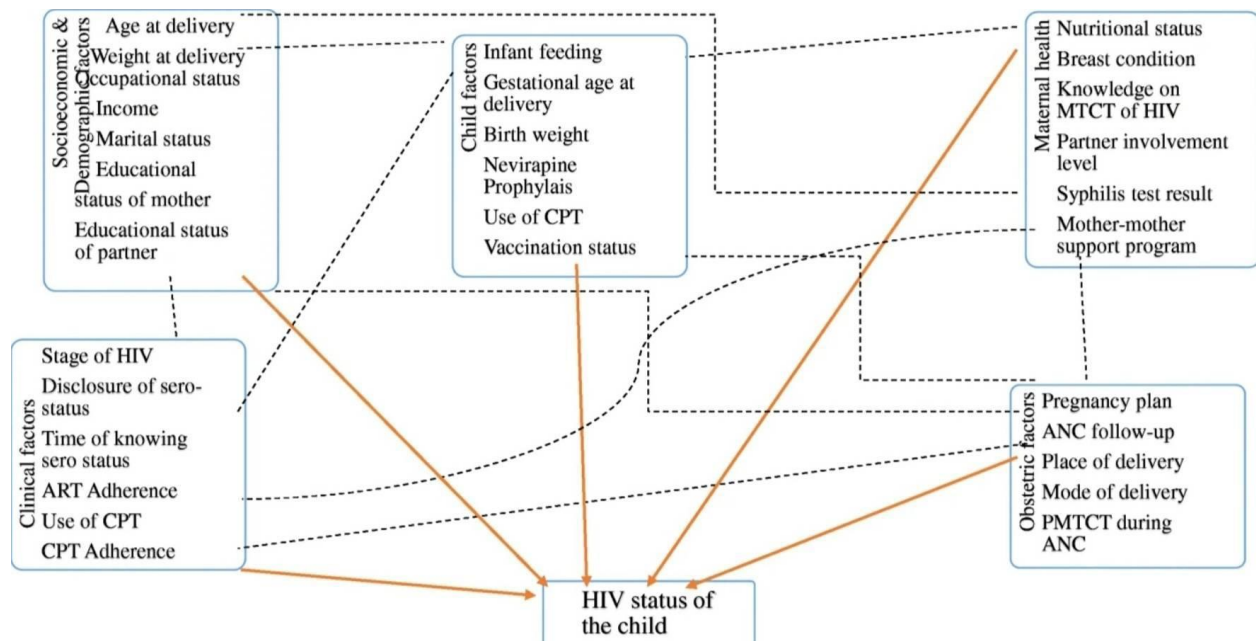


Figure 5: Conceptual framework outlining factors that influence the risk of HIV in children delivered to moms receiving PMTCT(41).

Chapter 4.0. Findings/Results.

This chapter will give a thematic overview of the factors influencing the transmission of HIV among children born to mothers living with HIV with the use of Beyene et al conceptual framework to describe the different variables.

4.1. Socio-economic and Demographic factors

4.1.1. Age at Delivery.

The age of women is positively correlated with the uptake of MTCT and PMTCT. Studies consistently demonstrate that compared to older women, teenage and young moms experience worse HIV and maternal health outcomes(44). Because of higher rates of unintended pregnancies, inconsistent usage of contraceptives, insufficient use of prenatal and postnatal care, decreased availability of accurate information on MCT and HIV prevention, poor adherence to treatment, and less suppression of viral load these result in decreased rates of patient retention and ART non-adherence(44)(45). In Sierra Leone, younger women were more likely than older women to experience HIV risk factors. This is comparable to other research that has found that age is related to inconsistent or non-condom use and STI(46)(12).

Poorer ARV uptake and increased follow-up loss from PMTCT programs among young women, 24 years old or younger, these studies found that teenage girls who were 19 years old or younger had poorer ARV coverage and increased rates of mother-to-child HIV transmission(47). When compared to older women, adolescents had less comprehension of MTCT, which suggests restricted exposure to HIV testing messages and lower testing rates(47). Other obstacles include the need for parental consent for HIV testing, unwelcoming HIV testing environments in health facilities, a lack of knowledge of where and how to get an HIV test, no access to comprehensive sexual education, fear of learning one's HIV status, stigma and discrimination in homes, schools, and communities. In a different study, married teenagers were shown to have superior maternal health outcomes than their unmarried peers. However, most teenagers in SSA who are in multiple partnerships or with less educated males are severely impacted by power dynamics and frequently need their husbands' consent before accessing ANC/PMTCT services(47).

4.1.2. Weight at Delivery and Age at Delivery.

The progression of an HIV infection is unaffected by pregnancy. HIV, however, has an impact on birth outcomes(48). Studies conducted in Africa and other nations including Sierra Leone found that mothers who were HIV-positive had a higher risk of having children that were low birth weight, stillborn, or born prematurely(48)(49). When compared to children born at a gestational age of 37 weeks or later, the likelihood of becoming LBW in infants born before that point was 7 times greater in HIV+ mothers. A study in Ethiopia shows a 17.7% LBW among HIV + mothers and 10% whereas it was 10.1% in mothers who had HIV-(48). This is consistent with a study conducted in Nigeria, where LBW was 9.4% vs 3.3% among women who were HIV+ and HIV-negative, respectively(50).

The difference in birth weight between mothers who are HIV+ and HIV- mothers may be caused by the mother's weakened immune system, which increases her risk of opportunistic infections and contributes to the occurrence of adverse birth outcomes, or it may be caused by exposure to highly active antiretroviral medication [HAART], especially NVP-based HAART, which increases the risk of preterm birth compared to EFV-based HAART, or it may be caused by undernutrition secondary to chronic medical conditions (HIV)(51)(52). And these children tend to develop medical complications and

comorbidities like stunted growth, malnutrition, and even tuberculosis in association with HIV(53)

4.1.3. Income and Occupational Status.

The adoption of PMTCT is further hampered by socioeconomic constraints. For women of low socioeconomic class and those who live in rural areas, poverty is strongly correlated with less formal education, restricted access to awareness messages, and poor utilization of PMTCT services since these groups were more influenced by the social norms of their surroundings(54)(18). Due to distances, lack of transportation, poor road conditions, and a lack of awareness of the value of obtaining care, women in rural or underprivileged regions, including teenagers from lower socioeconomic groups, had difficulty getting to health facilities. Additionally, they were more likely to seek treatment from untrained medical personnel or in locations without adequate PMTCT facilities(54).

Studies have indicated that MLWHs with poor socioeconomic levels have few options for providing their at-risk newborns with the greatest nutrition and feeding options(13). These women find it more difficult to comprehend the advantages of continuing to follow the PMTCT regimen and are frequently inconsistent with one feeding option for HIV-exposed infants, MCT since they lack support (financial, psychosocial) mechanisms. Most mothers struggled to provide themselves with food that was nutritious enough(55). Financial vulnerability might cause people to hide their HIV status out of fear of being stigmatized and/or losing financial and/or social support(56). According to a study conducted in Sierra Leone, moms of HIV-positive children who were traders made up (44.4%), whereas 25.0% of the mothers were students. Mothers who are traders, and students with HIV status all had a statistically significant connection (57).

4.1.4. Marital status.

Reports state that, one reason for the higher HIV prevalence seen in women is their marital status, HIV transmission is a concern even for women who have only had one partner, because of social norms that support extramarital and pre-marital sexual encounters among men and women's inability to negotiate safe sex practices with their partners(58). Women and girls are viewed as socially inferior in many communities and nations. In each of these scenarios, women's unwillingness to insist on the use of condoms amounts to a "trade-off" of their unalienable rights for financial gain(58). These results may be explained by factors such as a lack of financial independence, illiteracy, and ignorance of HIV transmission and prevention, which may lead to poverty or the inability to negotiate safe sex(58). Additionally, about adolescent pregnancy and access to PMTCT, married teenagers were shown to have superior maternal health outcomes than their unmarried peers. However, most teenagers in SSA, especially those with less educated males, are greatly impacted by ability and frequently need their spouses' consent before accessing ANC/PMTCT services(59).

Educational status of the mother and partner: See knowledge on PMTCT and partner involvement.

4.2. Child Factors and Maternal Related Health Factors.

4.2.1. Child Factors

4.2.1.1 *Infant Feeding*

While breastfeeding is advised as the best and safest method of feeding a baby, it continues to be difficult for mothers who have HIV. WHO recommendations on HIV and infant feeding encourage exclusive breastfeeding for the best possible balance between preventing malnutrition and lowering the risk of vertical HIV transmission in communities with inadequate resources(1)(60). Therefore, as the danger of HIV transmission declines, the support provided to women who are HIV-positive regarding

infant feeding practices is anticipated to have a major impact on HIV-free survival as well as the long-term health of newborns and children exposed to HIV(61). In a review and analytic study on infant feeding counseling in sub-Saharan Africa to improve express breastfeeding [EBF] by HIV-positive moms, it was discovered that the desire to encourage child survival was crucial to EBF adherence(62).

In Sierra Leone, Formula feeding is costly and inconsistent, and maintaining steady supplies of infant formula in nations with poor transportation and storage infrastructure is challenging. Even when the formula is willingly given, it may not be socially or culturally acceptable, and this frequently puts the mother at risk of having her HIV status revealed to her family and community (63)(64). Furthermore, research has indicated that antiretroviral medications (ARVs), whether administered as prophylactic antiretroviral therapy (ART) or lifelong antiretroviral therapy (ART), can lower the risk of breastfeeding transmission to as little as 1 percent (63)(64). Due to detrimental cultural traditions, the predominance of breastfeeding, a lack of safe drinking water, poverty, nondisclosure, peer and family pressure, and illiteracy are challenges facing MLWHs in terms of breastfeeding in most African contexts including Sierra Leone (65). A report found that despite being advised on their best options, mothers frequently lacked autonomy when it came to making decisions on how to feed their infants. There was a chance that the baby would be fed on other liquids or solids by another family member while she was away due to the communal nature of childcare due to this, newborns exposed to HIV were at an increased risk of vertical transmission and undernutrition(63).

4.2.1.2. Birth weight.

Early childhood mortality is thought to be more common among children who are reported to be very little or smaller than average at delivery or who weigh less than 2.5 kilograms (kg)(7). There are currently no accurate national statistics on the prevalence of maternal HIV in Sierra Leone regarding childbirth weight, this could be caused by the high incidence of home births, where many baby weights may not be recorded, and the high prevalence of teenage births, where the mothers' physical and psychological readiness for childbirth may be poorer, lack of comprehensive ANC coverage, which includes services like health education on nutrition, getting iron supplements and immunizations. (66). However, according to the SLDHS birth rates were recorded as average or bigger than average in 84%, average or smaller in 8%, and very small in 5% of cases(7).

There is evidence from earlier studies that maternal HIV infection and birthweight are positively correlated however, other others claimed there was no real connection between birth outcomes and maternal HIV(67)(68). HIV infection may further increase LBW vulnerability because of obstetric problems such as anemia, high CD4 counts, and rising viral load in the placenta which can independently limit birthweight among children. A study conducted in Malawi shows LBW was present in 13% of newborns born to HIV-positive mothers, in that study, the prevalence of LBW among HIV-negative women in the cohort was 8% (69). The results are consistent with those of a study from Zambia that quantified the relationship between maternal viral load and infant birth outcomes and discovered that a more severe form of the HIV-1 disease, known as peripheral viral, was linked to lower infant weight and higher rates of infant mortality and morbidity(69).

4.2.1.3. Nevirapine Prophylaxis.

In many countries including SL, the lack of adequate antiretroviral (ARV) formulations for treating and preventing HIV infection in newborns and young children continues to be a problem(70). To increase child survival, it is crucial to identify infants who have been exposed to HIV and to provide them with ART and ARV prophylaxis. The information on the child health card (CHC) that is given to the mother during ANC services may be used to identify an infant who has been exposed to HIV(15).

Due to a constrained health care system and lack of time for adequate ART adherence counseling,

patients are less informed about the importance of adhering to medication and prophylaxis, this is corroborated by the fact that children born to mothers receiving long-term ART were probably more likely to adhere to prophylaxis than those born to mothers receiving shorter-term ART(71). Some studies have shown a connection between home delivery and disregard for newborn prophylaxis, home births have also been linked to mothers not obtaining the baby's nevirapine syrup from the nurse or midwife now of delivery. For several reasons, women who give birth at home might not be able to go back to the hospital to pick up the baby's medicine because they will give birth without the assistance of a trained birth attendant or health professional, women who give birth outside of a hospital are also less likely to receive counseling on the significance of their newborn sticking to prophylaxis(72).

4.2.1.4. Use of Cotrimoxazole Prophylactic therapy [CPT].

Numerous infants and kids who are HIV-positive pass away from HIV-related causes without their HIV status is known or receiving care. Almost one-third of all HIV-infected newborns die by age one, and about half of all HIV-infected infants die by age two without access to cotrimoxazole prophylaxis, ART, and supportive care, beginning at 4 to 6 weeks, cotrimoxazole prophylaxis is continued if the newborn has HIV infection, or it is stopped if it is not (73)(74).

In Sierra Leone, co-trimoxazole prophylaxis should begin six weeks after birth and last until 6 weeks after the infant has stopped nursing but there are limited resources and the implementation of Cotrimoxazole therapy is challenging, for example, the capacity to administer co-trimoxazole prophylaxis to children effectively depends on the availability of pediatric co-trimoxazole oral formulations(18)(13). Even though the medication is free in SL, most public health institutions frequently run short of important medications, including co-trimoxazole. These findings indicate that co-trimoxazole supply management, among other vital drugs, needs to be well-coordinated to ensure availability(15). Sub-Saharan Africa has experienced poor adherence to the WHO recommendation on CPT use in HIV-TB co-infected children due to unpredictable drug supplies, inadequate knowledge of the benefits of CPT among health care workers, inadequate training and supervision, and an absence of proper recording and reporting of CPT usage in health facilities(75).

4.2.1.5. Vaccination Status of The Children.

Outside of emergencies, parents may postpone or refuse to vaccinate their kids for a variety of complex personal, cultural, social, and vaccination-related reasons. In Sierra Leone during and after the Ebola epidemic, many community engagement initiatives that involved working with affected communities to thoroughly understand problems and develop solutions were implemented to strengthen health systems and regain public confidence in health services, including childhood immunization (76)(77).

Children in Sierra Leone receive routine vaccinations against a variety of infectious diseases, according to the SLDHS 2019 a total of 56% of children aged 12 to 23 months and 51% of children aged 24 to 35 months had received all recommended vaccines, with 49% of children aged 12 to 23 months and 40% of children aged 24 to 35 months have done so(7)(78). But unfortunately, in many African countries' including SL the coverage of recommended childhood immunizations is still insufficient to reach the goals outlined in the Global Vaccine Action Plan (GVAP)(79).

Additionally, research has revealed that children with HIV infection and exposure have a significantly higher risk of morbidity and mortality from a type of disease that can be prevented by vaccination. Studies by Eley and Seste et al show that HIV-infected and HIV-exposed uninfected children are at risk for low immunization coverage(80). And another study reveals that children of HIV-positive women had a more than two-fold likelihood of being under-immunized compared to children of mothers who are not HIV-positive(81). Infants of women living with HIV may be more susceptible to contracting various

vaccine-preventable diseases due to low vaccination rates, this may be because of unnecessarily long implementation times for treatment plans, non-integration of services, and inadequate information about immunizations services (37)(82).

4.2.2. Maternal factors

4.2.2.1. *Nutritional Status of Mothers Living with HIV.*

Despite the requirement for increased calorie intake during pregnancy, women in developing nations are frequently exposed to food instability and chronic malnutrition, which can negatively impact the fetus's growth and development(83)(84).

Because a substantial portion of pregnant women in Africa is responsible for family income and during pregnancy their potential for income gain decreases, there is a period of vulnerability. In many cases, food insecurity also results in depression, which is a factor that negatively affects the health of both mother and child(83)(84). Much data has not been generated among mothers' MLWHs for nutritional status factors in sierras Leone.

4.2.2.2. *Breast Conditions of the mother.*

There are few publications on the anticipated prevalence of (or preventative measures for) such illnesses(85). From a study conducted in South Africa, the prevalence of mastitis and breast abscess among breastfeeding moms ranged from 2% to 33% (85). Subclinical mastitis and severe breast diseases that cause bleeding and inflammation have both been linked to postnatal HIV transmission. Between women with and without HIV, there were no appreciable variations in the frequency of any breast health issues, this is not unexpected considering that practical issues, such as ineffective milk evacuation brought on by improper breastfeeding technique, rather than bacterial infection, cause most breast health issues(86).

4.2.2.3. *Knowledge of MTCT in HIV*

Many pregnant women in Sierra Leone lack adequate information, attitudes, and behaviors regarding HIV prevention(7). According to the SLDHS, between the ages of [15-49], 60% of women and 40% of men know HIV transmission and prevention, due to the provider initiative testing and counseling integration into the PMTCT program made available during ANC, even though women are more likely than men to receive an HIV test(7)(46). Most women receiving prenatal care are unaware of their HIV status. Unsafe sexual behaviors, such as having several sexual partners and inconsistent condom use, continue to be key factors contributing to new HIV infections among women in SL given that HIV transmission is predominantly heterosexual and women are at higher risk(7). Due to inadequate retention and adherence to ART, Sierra Leone has not met its EMTCT targets despite PITC's contributions to the HIV treatment cascade for expectant and nursing MLWHs and minimizing vertical transmission(3). Additionally, 43.7% of the women were uneducated and had an incomplete understanding of HIV transmissions with no access to mainstream media (newspapers/magazines, TV, radio, and the internet)(87). This plays a significant role in the spread of HIV among women.

While maternal understanding of MTCT of HIV/AIDS and its prevention is minimal, varying from 34.9% in Ethiopia to 78% in Nigeria, 90% of babies who contract the disease from infected mothers are found in SSA(88)(89). For women of reproductive age, knowing the facts about HIV, including mother-to-child transmission (MTCT), is essential because it alters behavior and promotes the adoption of self-protective attitudes like increased perceived vulnerability, condom use, HIV testing, and seeking medical advice to prevent MTCT(87). According to a study done in Sierra Leone, fewer women than males were aware of the existence of HIV among the country's general population, they found that just slightly more than 30% of the general public knew where to acquire a condom and had heard of ART, but half of those with

HIV are uninformed of their condition, making it difficult for them to receive treatment or alter their behavior(87)(7).

4.2.2.4. Partner Involvement Level.

Partner participation is viewed as socially and logistically difficult even though male opinions toward pregnant women seeking prenatal care and PMTCT programs are largely favorable(90)(91). In SSA, including Sierra Leone, barriers to male participation include sociocultural factors like gender inequality and traditional social roles that restrict male participation, knowledge gaps regarding HIV or ANC, non-disclosure of partner HIV status, a health system infrastructure, or individual factors like age or occupation associated with willingness to engage in PMTCT(92). Due to these gaps lack male participation increases the pressure on women to deal with their HIV status and MCT prevention on their own. The research showed that correct knowledge of MTCT and PMTC was substantially associated with having a partner with secondary or higher education compared to his counterpart(93). This will help in inter-partner disclosure and ART adherence of MLWHs.

Women were unable to cope when they learned they had HIV for the first time, which affected their decision to enroll and stay in care, Insufficient community and relationship support, as well as a lack of economic empowerment, have all been found to be significant risk factors for depression in MLWHs(94)(95)(96). By addressing issues of stigma, discrimination, and gender inequality, developing nations like SL will be better positioned to meet UNAIDS' ambitious 90-90-90 global objective and increase the usage of HIV services(94). Due to the difficulty in getting males to participate in PMTCT programs, not disclosing the mother's HIV status to her partner is correlated with poor EID adoption(97). A father's comprehension of the significance of monitoring HIV-exposed infants for EID may be compromised if he is not informed of his status. According to a Kenyan study, there is better uptake of early infant HIV diagnosis among infants exposed to HIV when mothers have reported their HIV status and their male partners participate in prenatal care(98).

4.2.2.5. Syphilis Test Results.

It is beneficial to screen all expectant mothers during antenatal care (ANC) and follow-up(99).In Sierra Leone and other Sub-Saharan African nations, stigmatization has been highlighted as a significant barrier to voluntary testing for HIV and sexually transmitted illnesses [syphilis] in general(99)(100). 7 percent of women delayed seeking treatment until the sixth or seventh month of pregnancy, while the number of women who had an ANC visit in the first trimester dropped from 45% to 44%. As a result, many women are likely to continue until delivery without being tested for HIV and syphilis(7).

The affordability of testing and the comparatively frequent ANC follow-ups, the lack of treatment options or reinfection from an untreated sexual partner, stockouts of testing supplies, and unskilled medical personnel may all contribute to the continually high incidence of syphilis(101)(102). Health institutions in sub-Saharan Africa had a sub-optimal distribution of syphilis testing and treatments, which varied by nation. For instance, most ANC clinics in Zimbabwe offered syphilis testing and treatment (83%). Contrarily, syphilis testing and treatment were scarce in ANC institutions throughout West African nations (Benin 10%, Burkina Faso 2%, Mauritania 4% Senegal 14%, Sierra Leone 5%, and Togo 13%)(103)(102).

4.2.2.6. Mother To Mother Support Group.

For pregnant women to access services, obtain testing, and receive treatment to maintain optimal health and stop HIV transmission, including to their unborn children, community-led improvement projects can be very helpful(97). To achieve the greater objectives of preserving the health of women

and their unborn children and maintaining the unborn children HIV-negative, strong community-level participation that promotes individual health-seeking behaviors for ANC and HIV services, for example through activities, is essential(97). According to research conducted in Nigeria, well-run mother support groups greatly enhanced early infant diagnosis in rural areas(97)(104). This facilitates testing presentation on time and the provision of emotional support and unmet medical needs.

Mother-to-mother support groups were started in Sierra Leone, although they were not well-established or nationwide. There is no research on the advantages of communities actively participating in PMTCT initiatives(3)(15). Additionally, stakeholders expressed concerns regarding privacy and confidentiality during home or clinic visits from MMs because they were afraid of accidentally disclosing their HIV status and the associated stigma and prejudice(105). These worries affect MLWH's choices for in-person, over-the-phone, or in-clinic support, as well as whether recruited MMs should work in the neighborhoods where they reside(105).

4.3. Obstetrics and Clinical Related Factors

4.3.1. Obstetric factors

4.3.1.1. *Pregnancy Plan.*

Regardless of whether a person has HIV, many pregnancies in Sierra Leone are unplanned. Family planning lowers the incidence of unwanted births among HIV-positive women, hence decreasing the likelihood of MTCT(106)(107). Many women discover they are HIV positive after becoming pregnant, which renders uptake of ART before becoming pregnant low(108). A research conducted in Malawi, women who had ART for a longer period had a higher likelihood of getting pregnant(106). Young people, especially in Sierra Leone, have limited access to and usage of condoms and other forms of contraception(109). According to (SLDHS) 2019, 1.0% of women aged 15 to 24 used condoms, and 23 percent used any type of modern contraception(7). Insufficient comprehensive sexual education and risk perception, a lack of negotiation skills, accessibility, availability, and lack of power are all factors that affect young people's use of condoms and other forms of contraception(109).

The overall testing coverage in Sierra Leone was still well below the country's target of evaluating all adults and adolescents without exception. The Sierra Leonean National Guidelines for HIV testing and counseling encourage a wide range of strategies, such as widespread HIV testing campaigns, prenatal care clinics, mobile clinics, client- and provider-initiated initiatives, and more for all women of reproductive age(110). This study is in line with one done in Mozambique, the Ministry of Health advises couples to get tested for HIV before pregnancy(97). Couples who test HIV-negative are urged to be faithful to one another or use condoms during all sexual interactions, to get tested for the virus every six months, and to talk to a doctor before getting pregnant(97). Couples with a positive pregnancy test from either partner or both are urged to use dual protection, which combines condoms and another cutting-edge approach, and to adhere to lifelong antiretroviral medicine but still, the testing uptake is low due to Pregnancy-related decisions, not wanting to tell male partners or others about their HIV status (97). Because an HIV test is not a part of their family planning, most women only discover they are HIV positive during the first antenatal appointment.

4.3.1.2. *PMTCT during ANC and ANC follow-up.*

Women frequently arrive between 19 and 25 weeks of gestational age late for their first ANC appointment. In contrast to when ART is initiated early in pregnancy, the risk of vertical transmission dramatically rises when a woman begins ART late in pregnancy(97). Pregnant women with greater

socioeconomic status, higher levels of education, thorough HIV knowledge, and access to knowledgeable ANC attendants are far more likely than those with lower socioeconomic status to receive HIV testing during prenatal care(97). This may be anticipated too long distances to health facilities, fear of learning their HIV status as part of the prenatal care process, and later stigma and discrimination because of a positive HIV status.

Eight ANC visits are advised by the current WHO guidelines, with the first visit occurring within 12 weeks of gestation. However, the Sierra Leone data for sufficient ANC visits only included visits lasting four (111). This indicates that four ANC checks for pregnant women are insufficient, and any further visits are not recorded(7). An examination of the current ANC services in Sierra Leone revealed that the greatest barrier to the provision of competent ANC services is inadequate patient-centered care, required supplies, and infrastructure at service delivery locations paired with late first ANC visits(70). PMTCT initiatives in SL have difficulties since most pregnant women of low socioeconomic level attend ANC appointments late in pregnancy and do not meet the necessary eight ANC visits to get continuous care for a safe birth and healthy neonates(70).

In SSA, Prenatal care HIV testing among pregnant women is uncommon, especially in West and Central African nations the high prevalence of MTCT for HIV is a result of weaknesses in the PMTCT programs, especially in screening, and testing, and diagnosing pregnant women. However, It is significant to remember that the dynamics of PMTCT implementation in SSA vary significantly from country to country(112)(111). However, there is evidence that a sizable fraction of women who got ANC in various SSA countries are not tested for HIV, despite the acceptance and execution of the opt-out policy(112). The inability to access a healthcare facility, the perception of a lack of confidentiality, stigma, and discrimination, the cost, illiteracy, the inability to obtain consent from the husband, the attitude and abilities of health workers, and a lack of resources are some of the reasons why pregnant women in the SSA do not test for HIV(112).

4.3.1.3. Place of Delivery and Mode of Delivery.

Deliveries should take place in locations with staff on hand to manage any obstetric or infant issues that may emerge during delivery to lower maternal and newborn mortality. In SL 81% of women gave birth at a public facility, while 2% did so in a private one(7). Traditional birth attendants are the unskilled providers who help births the most (10%) (7). Home births are frequently conducted by untrained TBAs because of the geographic remoteness of some pregnant women and the difficulty in accessing medical facilities before and after labor. In the previous five years, 16 percent of all births were delivered at home, according to the SLDHS(7). Studies report that delivering at home prevents an HIV-positive woman from obtaining PMTCT treatments, such as ARV prophylaxis for the infant, emergency cesarean sections, when necessary, safe delivery procedures, and the use of conventional infection control techniques, during and just after labor and delivery(113)(114). Lack of access to high-quality obstetric treatments is a major issue in low- and middle-income countries (LMICs) for MLHIV, which is particularly given the growing c-section rates across the world(115). 4% of live deliveries in the five years prior included cesarean sections. 1% of C-sections were scheduled before the start of labor, and 3% were chosen after(7). but no data or reports were recorded about the modes of delivery of MLWHs in SL.

4.3.2. Clinical factors

4.3.2.1. Disclosure of HIV Status and Time of Knowing Serostatus

Following the release of World Health Organization (WHO) recommendations on HIV counseling for kids up to age 12, there is a renewed focus on urging MLWHs and other adults to tell kids about their HIV

status(116). There is a rising need for culturally appropriate interventions designed to promote parents' willingness to tell their children they have HIV in many developing nations, including SL(117). In Sierra Leone, Early infant diagnosis of HIV (EID) is critical for timely initiation of treatment. Until recently, human resource capacity in this area was lacking and an estimated percentage of newborns born to HIV-positive mothers who have an HIV virological test within two months of birth from 2018- 2019 increased from 3.45% to 8.5%(3)(118).

EID testing measures the results of PMTCT services and identifies kids who need ART, and the WHO suggests EID at 4-6 weeks and after breastfeeding stops for prompt diagnosis and treatment. Some explanations for why parents choose not to routinely test their infants for HIV include: Being under-informed of the advantages of early pediatric testing and treatment, a lack of faith in one's own partner's, or child's HIV test findings, the youngster not having any symptoms obtaining treatment outside of the established health care system, Fear of disclosure because visiting a health facility with children increases the possibility of disclosing the children's or one's own HIV status, which could cause partners of women to leave them or have other unfavorable effects(97). (EID) services are now a part of PMTCT programs in Sub-Saharan Africa, the program also offers counseling and support services, cotrimoxazole and Nevirapine prevention, and help with newborn feeding(119).

4.3.2.2. Adherence to ART.

Adherence to ART and a lack of retention of pregnant/postpartum MLWHs in HIV care during the peripartum period continue to harm WLWH health and raise the risk of HIV transmission to unborn children and uninfected partners(13)(9). Pregnant women's adherence rates range from 35% to 93.5% depending on the environment (within and across countries)(120). ART side effects, social stigma, depression, non-disclosure of HIV status, unemployment, food insecurity, alcohol/substance abuse, alternative forms of therapy, inadequate follow-ups, stock-outs, work and family obligations, low self-efficacy, low treatment satisfaction, and distance to the clinic are reported barriers to antiretroviral (ARV) medication adherence among MWLHs(121).

In Sierra Leone, ART services face several obstacles. Research from 2011 found that 70percent of HIV patients continue therapy for less than a year after starting ART, with an estimated survival rate of 92%(122). However, this study did not include non-adherent patients, making it impossible to determine the variables influencing adherence to ART(123). The lack of knowledge of the significance of treatment adherence caused by poor relationships and communication between persons living with HIV and medical providers was also one of the major hurdles to adherence to ART. With minimal emphasis paid to examine the health systems and socioeconomic determinants impacting ART adherence, HIV/AIDS research in Sierra Leone has mostly concentrated on characterizing ART adherence in one institution(123)(124).

4.3.2.3. The use of cotrimoxazole prophylaxis therapy [CPT] and Adherence.

All adults and adolescents with HIV infection should begin cotrimoxazole prophylaxis right away (including pregnant women at any stage of pregnancy and breastfeeding)(15). CPT is affordable and often well tolerated. However, despite trials showing effectiveness in a variety of contexts, the adoption of CPT prophylaxis in nations with limited resources has been delayed. Additional obstacles to the use of CPT prophylaxis in pregnant women have included worries about the drug's potential teratogenicity and potential effects on folate metabolism that might result in low birth weight(125). The findings of opportunistic research on the modifications in pregnancy and newborn outcomes following the application of CPT prophylaxis for pregnant women with CD4 cell counts are published in the current edition of the Journal of Infectious Diseases by Walter et al. Within a wider study of mother-to-child transmission, two hundred cells/mL. After CTX prophylaxis was put into place, the incidence of preterm

delivery, clinical chorioamnionitis, and infant death was decreased, with the advantages being most pronounced in women with CD4 cell counts! 100 cells per mL(126)(125).

4.4. Best Practices to improve PMTCT uptake at the community and health system level.

Despite numerous barriers, Sierra Leone has made progress towards the goal of preventing new HIV infections in children born to MLWHs with the connections between the development agenda, the transition strategy, and the international sustainable development goals(18). The nation has embraced the test-and-treat guidelines from the WHO in the act with 4129 pregnant women who received ARVs in 2019 to lower the risk of HIV transmission from mother to child(3). However, the NSP-2016-2020 identified several issues that must be resolved to meet the fast-track target; a large coverage gap for testing, services to prevent mother-to-child transmission and antiretroviral therapy for adults and children, and the community health workers and supply management systems are still in need of improvement, Violence against women, gender inequality, inadequate number of health workers, persistent stigma and discrimination, ineffective resource allocation and insufficient funding absorption(18). It has been demonstrated that communities are aware of the problems that impact them and are motivated and enthused enough to advocate, adopt policies, and effectively create services. Services are made available to individuals in need when communities join in the fight against HIV/MCT, fostering community ownership and ensuring national and health system responsibility(127).

WHO is assisting Member States in the WHO African Region to enhance their health systems to increase the quality of care and scale up priority programs in the uptake of PMTCT the interventions include Repeat HIV testing to confirm positive results in all pregnant/breastfeeding MLWHs, repeating tests on HIV-negative women, test-taking with male partners in an RMNCH services, community participation and mobilization and early detection of defaulters in pregnant/breastfeeding mothers(128). These are all implemented to increase the uptake of PMTCT services. Reported actions were taken at the health system level to increase the uptake of PMTCT. These included enhancing integration and connections across ANC, ART, and testing locations, increasing accessibility to ANC and ART services and promoting PITC(129).

In other contexts, such as decreasing stigma and prejudice, community participation and civil society efforts have been successful in achieving HIV aims. For example, in Nigeria, some treatments have been demonstrated to be successful at the community level in closing the gap in the uptake of PMTCT services and lowering loss to follow-up. Programs expectant women receiving maternal health services from traditional birth attendants, especially in remote areas, collaboration and intervention of partners, couples received education on newborn ART dose and adherence, which enhanced the uptake of ART prophylaxis, acquiring and training health professionals, encouraging pregnant women to seek out services for HIV testing, Congregational-based interventions in the local communities can boost pregnant women's adoption of HTS and ART and campaign for awareness in the communities(130).

Increasing the availability and accessibility of quick HIV testing could have a significant impact on HIV prevention efforts and the dissemination of test results in underdeveloped nations. In Uganda, a program to give HIV test results to individuals in their homes improved the uptake of findings from 10% to 37%(131). Similarly, in Zimbabwe Elizabeth Glaser Pediatric AIDS Foundation [EGPAF] disseminate the 2010 and 2013 PMTCT guidelines to almost all MNCH facilities in the country This intervention supports the implementation of ANC bookings, maternal AZT prophylaxis, CD4 testing, mothers' ART initiation, and EID, all of which result in dramatically improved performance(132).

Ethiopia's updated Health Sector Development Plan III envisions an innovative approach to increasing access to health services through a health extension initiative. By training female health extension workers to work in remote villages, increasing the number of people who can receive ANC and ART services, improving the connections and integration between ANC, ART, and testing facilities, and promoting the Provider initiative HIV testing and counseling Since its implementation, it has become evident that health extension workers are altering the community's health-seeking knowledge and behavior and increasing the health status of expectant mothers(133). Another study done in Kenya integrating services into a family-based approach enhanced outcomes and lessened identified obstacles to treatment utilization, for instance, the MTCT Plus initiative study discovered that men's participation was associated with a rise in the retention of pregnant HIV-positive women in later stages of the PMTCT, including community outreach initiatives and family and community education which demonstrates improvements in mother and newborn health(134).

Chapter 5.0: Discussion.

The study's findings demonstrated that every level of the conceptual framework is affected by factors that are related to HIV infection in infants born to mothers who are HIV positive. They have all been examined, either separately or in combination, at each level of the framework. The study's intended outcome cannot be attained by concentrating solely on one aspect; hence all elements require thorough evaluation.

According to UNICEF and WHO publications on the issues faced by children born to MLWHs in the SSA area, there is an emphasis on reducing mother-to-child transmission, and adherence to ART is getting better. However, there is still a significant gap that these kids must cross to finish the therapy cycle. The difficulties in implementing the PMTCT program appear to be concentrated on regular ART usage, providing ARV prophylaxis and cotrimoxazole to nursing infants, early infant diagnosis, and loss to follow-up care. To inform targeted actions to combat this transmission, it would be essential to identify the extent of these risk variables and their associated factors.

In this study, Sociodemographic factors such as marital status, maternal education, income index, and age at delivery were related to awareness of MTCT of HIV/AIDS and its prevention. A lack of personal understanding of PMTCT and HIV prevention and transmission is low among MLWHs in Sierra Leone, and it is common among teenagers, women from the lower socioeconomic position, and those with less education more likely to experience it. These women mostly live in rural communities where less access to better maternal health care and mass media on information and awareness on PMTCT is inadequate, 68 percent of women have a thorough understanding of mother-to-child transfer, compared to 22 percent who do not; this large difference can be due to insufficient awareness of the transmission. In SL, A Behavioral change communication [BCC] plan was created; however, it has never been updated. Numerous BCC initiatives, including materials like billboards, posters, and T-shirts, media campaigns like radio jingles and television commercials, as well as discussions and in-person interactions on a range of topics, including HCT, condoms, PMTCT, and general knowledge about HIV prevention, are implemented across the country.

Replacement feeding may not be a typical newborn feeding option, therefore advice and assistance for proper infant feeding are essential to reducing HIV transmission via breastfeeding. Moreover, only 10.4 percent of the moms used replacement feeding. The health advantages of sustained breastfeeding for the recommended duration of at least 12 months and up to 24 months or longer were not received by many babies since they were not getting breast milk as advised. The same outcomes were seen in research conducted at a PMTCT in SSA and Kenya. Because of socioeconomic issues, MLWHs receive insufficient replacement nutrition. In particular, the fear of being identified as HIV positive is driving up pressure from family members to introduce new feeding. An in-depth it reveals the difficulties HIV-positive women encounter from family members and husbands in terms of stigma and discrimination. Pregnant women and new moms frequently received conflicting information during newborn counseling, which did not follow the most recent recommendations regarding feeding options, similar study was conducted in some SSA countries. For instance, in Sierra Leone, there are no laws governing the feeding of infants and young children. The Food and Nutrition Implementation plan did not include any provisions for baby and young child nutrition for HIV-positive individuals.

Regardless of CD4 level or clinical stage, co-trimoxazole prophylaxis should be administered to all HIV-

infected babies (6 weeks and older), kids, and teenagers in Sierra Leone with proven HIV infection. Children's caregivers and medical professionals working in public hospitals should evaluate difficulties encountered while administering cotrimoxazole prophylaxis to infants delivered to HIV-positive moms by reviewing PMTCT data during the ANC visit. And one of the factors contributing to the ineffective application of cotrimoxazole prophylaxis was the inadequate availability of cotrimoxazole in healthcare institutions and this attributed to low adherence to CPT among infected children. This outcome is consistent with research done in Guinea and Nigeria.

Furthermore, Infant ART prophylaxis was not followed by babies delivered to mothers who did not get nevirapine syrup from the healthcare provider. Most MLWHs who did not get nevirapine for the infant had non-clinic deliveries, primarily at home. Studies conducted in South Africa, Liberia, and a systematic review for sub-Saharan Africa have shown a link between home birth and a lack of compliance with newborn prophylaxis. Most infected and exposed babies do not receive prophylaxis in most hospitals in Sierra Leone due to unavailability, accessibility, and loss to follow from the MLWHs after delivery and this results in the non-adherence to Nevirapine prophylaxis.

Even though the Free Healthcare Initiative [FHCI] in Sierra Leone aims to remove financial obstacles for all caregivers, there have been identified barriers to getting immunizations in urban Sierra Leone and other locations in sub-Saharan Africa. A study in Sierra Leone found that CHWs were underused in defaulter-tracking initiatives and that community outreach sessions were not held four times a month as the WHO had advised for the African area. It is anticipated that vaccination coverage among HIV-exposed children would be much greater, particularly with frequent, regular clinic visits and pre-scheduled vaccinations. However, the reality on the ground demonstrates that mothers and caregivers of HIV-exposed children face several difficulties, including low socioeconomic status, stigma, discrimination, particularly at the community level, a lack of awareness of the advantages of immunization, and unfavorable attitudes from healthcare professionals.

Mother-to-mother support groups, for example, can be useful community organizations for encouraging women to continue receiving care and therapy for both themselves and their children. These arrangements may help fathers feel included. Most men were unaware of the existence of community organizations focused on improving mother and child health and were not a target of these organizations. Ten African nations now use the innovative South African mothers2mothers (m2m) PMTCT peer support program and Sierra Leone is not included but since the Ebola epidemic, Sierra Leone MOHs, with the help of WHO, have stressed community involvement as a key weapon in the fight to improve maternal and child health outcomes which includes prevention and detection of HIV from MLWHs and their exposed/ infected children in the communities. Similarly, a study done in Nigeria discloses that HIV stigma is reduced by raising community knowledge of the benefits and accessibility of PMTCT interventions through the implementation of M2M support groups helping in the reduction of HIV transmission among mothers and their children.

There remains low coverage for PMTCT interventions throughout Sierra Leone. From 14.4 percent in 2013 to 12.7 percent by the end of 2019, the proportion of newborns delivered to HIV-positive moms who underwent virological testing for the virus within two months of birth fell. For pediatric HIV to be eradicated, the PMTCT cascade must begin and be completed, because MTCT accounts for more than 90% of new HIV infections in babies and young children, PMTCT is still the highest priority. However, a study conducted in Ghana underlines once more how strong the desire to prevent the baby from contracting HIV drives MLWHs to use PMTCT services. This suggests that emphasizing the infant in prevention messages may increase the use of PMTCT services among this vulnerable group.

In Sierra Leone like any other SSA country Multiple social, cultural, and economic, lack of understanding

of the significance of ANC visits awareness of ART's effectiveness, and physical hindrances that could prevent the success of PMTCT interventions have been identified and the use of PMTCT services by teenage and MLWHs was found to be significantly discouraged by stigma. An ongoing initiative has been put in place by Lion Heart Medical Center (LHMC) to enhance and supplement the provision of ANC services. Pregnant women are fully screened as part of this initiative, known as the Healthy Baby Voucher Program (HBVP), once throughout pregnancy to monitor their adherence to ART, counseling, and supervision. Additionally, an examination of the current ANC services in Sierra Leone revealed that the greatest barrier to the provision of competent ANC services is the absence of required supplies and infrastructure at service delivery points paired with late first ANC visits. The benefits of ANC services, such as the prevention of HIV transmission from mother to child (PMTCT), are not realized this, in turn, hindered the unavailability and accessibility to testing like for syphilis, screening, and adequate ART adherence of MLWHs thus increasing the transmission from mother to child.

HIV testing before pregnancy is important to encourage more couples to go for HIV testing jointly and to make it more acceptable; to raise awareness of the benefits of knowing one's status before becoming pregnant, and to give (young) women and their partners the information, abilities, and tools they need to prevent unplanned births, especially for adolescent girls. Due to their lack of information of the significance of ANC visits, they frequently were unable to receive the necessary care when they are pregnant. Additional adequate contraceptive methods should be available and accessible for them, or comprehensive sexual education should be integrated into schools, so prevention of unwanted pregnancy can be attained. A program sponsored by the UK Department for International Development (DFID) aims to "increase knowledge, access, and uptake of family planning, reproductive, and maternal health services throughout Sierra Leone with an emphasis on young people." This includes increased access to family planning supplies, training for healthcare professionals, and community-based programs.

In all situations, maintaining prominent levels of adherence is difficult. Another group that struggles to maintain important levels of drug adherence is postpartum and pregnant women. Despite the urgent necessity for ART throughout pregnancy and the postpartum period, there are not much evidence-based interventions to stop and encourage ART adherence during this time. In Sierra Leone, it was reported that barriers to adherence can be denial and non-disclosure of HIV status, medication frequency, traditional medicine use, financial means for food and transportation, stigma and discrimination, obstacles at work, a shortage of test kits and medications, a shortage of health workers, and a distance to clinics were among the barriers and this will evaluate in the difficulty of reduction of transmission from mother to their children this report is in line with Langenbeek et al the study discovered drug use, ART concerns, care provider satisfaction, stigma, social support, and self-efficacy to be significantly linked to adherence.

Furthermore, the failure to integrate HIV care into newborn and child health services has also been linked to late infant diagnosis and ART introduction, both of which have been linked to HIV fatalities among children. Even though the initiation of Free Health care in Sierra Leone Reproductive, Maternal and Child Health services [RMNCH] for children under five years old has been implemented, including HIV testing for kids who had malnutrition and other indicators of HIV More infants are missed for EID because the guidelines are not updated for integration into immunization program and other child health services to capture children missed for EID. This also missed mothers infected during the postpartum period and promote timely ART initiation for both mother and children.

The uptake of PMTCT services was impacted by disparities in the accessibility, utilization, and caliber of MNCH care as well. When enrolled in PMTCT care, many women in rural areas and those living in with

low income are unlikely to need (eight or more) ANC visits, give birth in a hospital that provides PMTCT services, and/or attend their follow-up appointment this resulting in the discontinuation of PMTCT treatment and ART compliance. Global PMTCT standards are frequently updated, necessitating extra retraining for experienced employees and training for new hires to make up for high staff turnover and ensure proper implementation of new protocols.

Additionally, In Sierra Leone, none of the service providers offering MNCH treatment had any training in PMTCT intervention. As a result, patients may miss crucial information from treatment providers or be forced to switch care settings, which presents several challenges for WLHIV who are pregnant or nursing. The supervision and revision of all activities, as well as regular reviews, were not appropriately financed during the monitoring and evaluation of PMTCT programs. Delivery of PMTCT services was affected by the HIV data disparity, the absence of timely reporting from health facilities, and insufficient accountability.

Furthermore, there were gaps in the accessibility and caliber of MNCH care, which had an impact on how many people used PMTCT services. When enrolled in PMTCT care, many women in rural areas and those living with low income are unlikely to need (eight or more) ANC visits, give birth in a hospital that provides PMTCT services, and/or attend their follow-up appointment even with the FHC initiatives. Resulting in the discontinuation of PMTCT treatment and ART compliance. Although major HIV/PMTCT services in Sierra Leone are still provided in facilities, community-led interventions have been shown to have a positive impact on HIV/PMTCT programs in other SSA settings. As a result, a qualitative examination is required to determine the obstacles to Sierra Leone's adoption of community-based HIV/PMTCT service delivery and adequate training of CHW in the knowledge of PMTCT and services delivery for MLWHs in Sierra Leone.

5.1. Reflection:

The conceptual framework served as an essential platform for reflection on issues that need recommendations, and it was useful for this study. However, some gaps and issues were not included which need to be addressed in the context of Sierra Leone like strengthening National PMTCT policy, community-level factors, religious and cultural beliefs, mental health issues of MLWHs, stigma and discrimination, political commitment and advocacy, methods for tracking clients and family, SRHR services and family support groups. The implementation of HIV and AIDS prevention, treatment, care, and support services are hampered by these problems, this, in turn, raises the danger of HIV transmission.

5.2. Limitations and Strength.

While numerous efforts have been undertaken to eradicate mother-to-child transmission in Sierra Leone, the research has found that there are certain solid arguments drawn from evidence-based literature, the large coverage gap is due to poor maternal-to-child transmission prevention programs, antiretroviral therapy for adults, and pediatric testing which are the various tasks and obligations of the Mohs, NAS, and NACP. Most issues are connected to the general availability of services for kids and MLWHs in the country. To acquire adequate success to these gaps RMNCH services should be strengthened and improved at both the community and health system levels. To confirm the determinants impacting MTCT as found in this paper and identify the advantages and disadvantages of the various interventions, advocacy, and strategies implemented from the 2015–2020 National Strategic Plan, it will be necessary to conduct various studies in the country to reduce the low uptake of services.

Chapter 6.0. Conclusions and Recommendations.

6.1. Conclusion

The MNCH care program has helped Sierra Leone reduce the number of new HIV infections among children throughout the years after the initiation of the FHC services. The child's HIV status affects a variety of socioeconomic, demographic, maternal, obstetric, and clinical aspects, as well as factors that can be helpful or detrimental. When a child is diagnosed with HIV, ART must be started right away to improve their health and outcomes. There are gaps in PMTCT uptake among MLWHs due to a lack of understanding and awareness of how to use PMTC services, as well as a low rate of ANC visits which may have an impact on lowering the prevalence of pediatric HIV in the country. Also, a key call for action in the fight against HIV is to improve the socioeconomic circumstances of MLWHs and the population at risk for HIV. PMCT during pregnancy and lactation increased because most women of low socioeconomic status were at substantial risk of contracting HIV.

Despite exclusive breastfeeding was frequently done by women with HIV. the key indicators for choosing newborn feeding practices that are safer range from maternal characteristics like mode of delivery, to attitudes toward infant feeding, to the disclosure of HIV status to a spouse, household income, and infant illness, therefore, mother and father should be informed of the dangers associated with each newborn feeding option during PMTCT to help them make more responsible decisions. Even though many moms receive nevirapine syrup from the medical staff for the child, nonadherence rates continue to be high in Sierra Leone, this could be due to multiple home deliveries, unavailability, and without having undergone a viral load test while pregnant. Additionally, there is a need to remove the many obstacles preventing children who are HIV-exposed and those who are not from successfully receiving vaccinations, to increase the immunization rate of children exposed to HIV and lower the risk of getting numerous vaccine-preventable infections, a cooperative effort is needed.

Considering Sierra Leone's significance in the African, regional, and international agendas for the prevention and elimination of PMCT Concern is specially raised by the country's consistently poor EID progress. Scaling up ART for HIV-positive pregnant women is thus still a top priority in Sierra Leone. Implementing a variety of strategies, such as peer support in facilities and communities, male partner involvement, economic status, home-based ART initiation, raising awareness of the value of ART, and integrating HIV services into maternal and child health services, may be necessary to improve ART coverage. The following recommendations have been made based on the study's findings; if they are successfully followed, Sierra Leone will be on the road to stopping new HIV infections among children and keeping their moms alive.

6.2. Recommendations.

1. The Ministry of Health should implement community-based approaches to HIV awareness, prevention, and testing this should include having simple access to ANC services that are adequate in terms of information on mother-to-child transmission, adherence to ART, to encourage patient retention and counseling. Decisions should be made by overcoming socioeconomic barriers by educating and empowering MLWHs in both formal and informal settings, giving them more control over health-related decisions, especially throughout the

pregnancy and lactation stages, and including educational initiatives for males to improve their understanding and involvement in the PMTC uptake in the country.

2. The Ministry of Health should expand and implement plans to make sure that mothers' access to nutritional education and counseling on infant feeding is appropriate for the local environment. This would enable women who are HIV-positive to make informed decisions about newborn feeding in addition to encouraging adherence to advised infant feeding practices and the implementation and integration of infant and young child National feeding policy into the RMNCH care services in the country.
3. The Ministry of Health should work in collaboration with International Center for AIDS and treatment Programs [ICAP] to provide the necessary space, personnel, or resources to maintain the regular activities of childhood immunizations by putting in place sufficient outreach services and providing CHWs with the means to contact any children who missed their immunization both in static and outreach locations to guarantee that every child's exposure status is determined.
4. The Ministry should integrate programs for pediatric healthcare, by boosting local and national medication supply management systems to guarantee co-ongoing cotrimoxazole's availability in healthcare institutions and to prevent delays and non-adherence, the healthcare system should think about delivering infant nevirapine syrup to pregnant HIV-positive women before delivery
5. The Ministry of Health should establish mother-to-mother support groups in all communities, and to maximize the efficacy and sustainability of such groups, mobilization efforts should concentrate on identifying and recruiting members of existing community groups with women rather than creating brand-new groups. May be formal or informal, where these women can share ideas, experiences, and information while also providing and receiving support for breastfeeding, childrearing, and women's health.
6. The MOHs should expand equitable access to services and information before pregnancy, during pregnancy, and the postpartum period and implement a comprehensive HIV prevention strategy to stop new HIV infections in children born to MLWHs. This can be accomplished by effectively integrating and implementing HIV and SRHR services, including adequate availability and accessibility of modern contraceptive use in communities and national level with the integration of comprehensive sexual education in schools so adolescents can benefit from that.
7. To combat HIV and SRHR, including PMTCT the Ministry should encourage a gender-transformative strategy. As programs are being planned, implemented, and evaluated, encourage active community involvement. Male participation in pregnancy, labor, and postpartum should be encouraged, and both men and women should share responsibility for these tasks.

8. The Ministry should establish an equitable existing viral load testing centers for EID testing, and programme management should be improved through the streamlining of supply chain management and effective inter-departmental coordination. EID program coverage should also be increased by offering alternative options for service utilisation, services at the grassroots level through the free health care initiative, and by leveraging existing EID testing facilities.
9. To find out what influences PMTCT services and what is effective or ineffective in Sierra Leone, national programs should invest in ongoing research initiatives about factors influencing children born to mothers with HIV. They should also make sure that policies and guidelines are adapted to fit the needs of the entire population, especially HIV-positive mothers.
10. The ministry must establish community-based institutions to increase public knowledge and demand for HIV services, by developing training sessions on minimizing stigma and discrimination in healthcare institutions that may be incorporated into community dialogues for numerous groups and also improve client-centered counseling for both men and women on a variety of topics, including condom usage after birth, adherence to ART after delivery, planning pregnancies, during ARV treatment check-ups, and baby testing at the recommended times.

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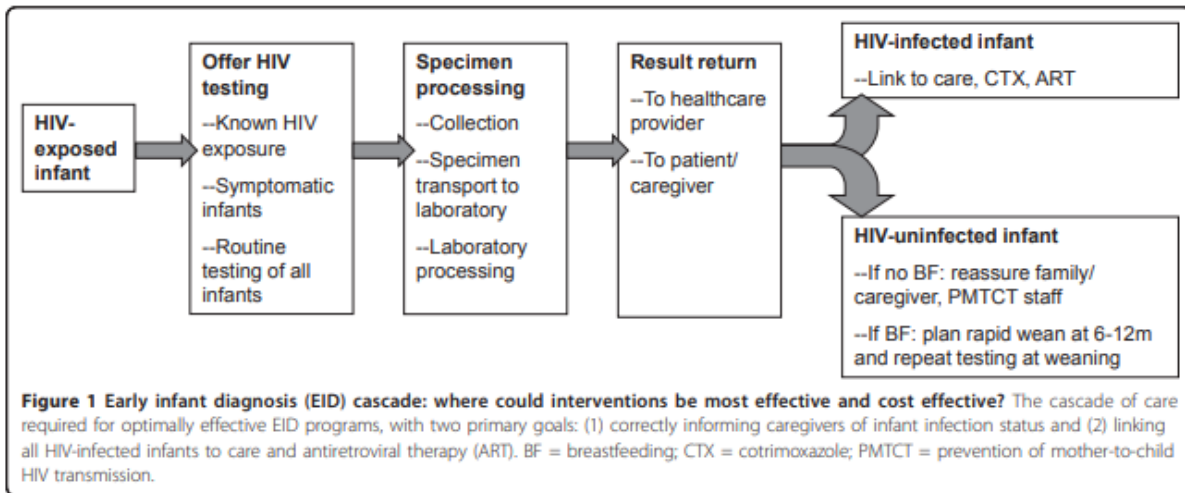
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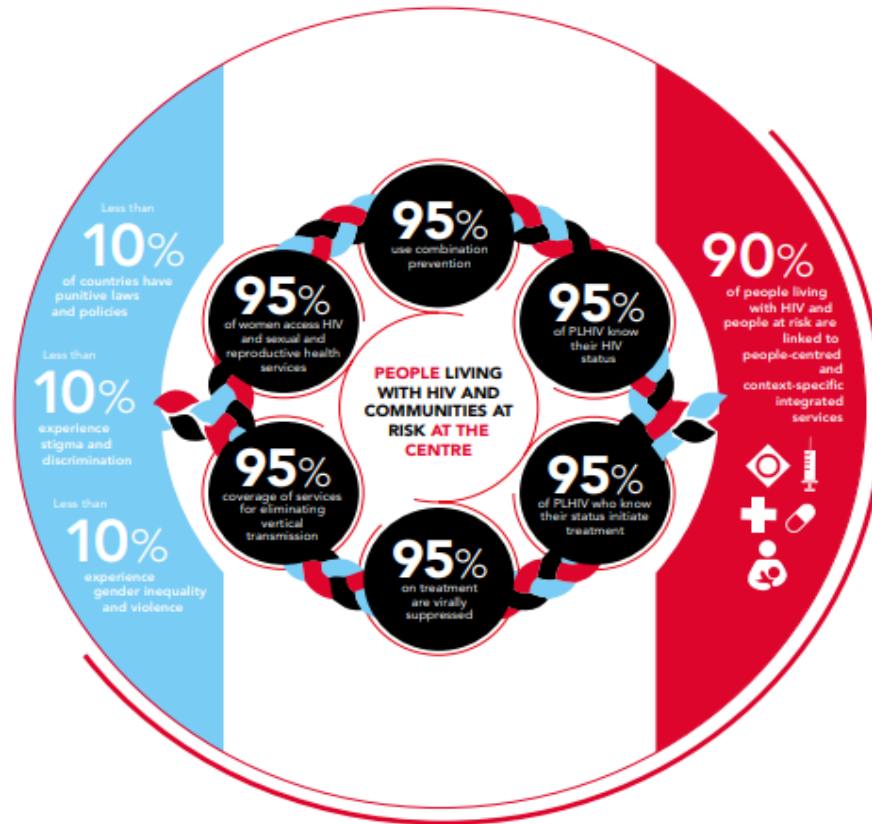
Annexes

Annex 1: WHO Practical Guidelines for Infant Breastfeeding of MLWHs(135).

GUIDING PRACTICE STATEMENTS	
1.	<p>When mothers living with HIV do not exclusively breastfeed</p> <p>If a mother living with HIV does not exclusively breastfeed, is mixed feeding with ART better than no breastfeeding at all?</p> <p>Mothers living with HIV and health-care workers can be reassured that ART reduces the risk of postnatal HIV transmission in the context of mixed feeding. Although exclusive breastfeeding is recommended, practising mixed feeding is not a reason to stop breastfeeding in the presence of ARV drugs.</p>
2.	<p>When mothers living with HIV do not plan to breastfeed for 12 months</p> <p>If a mother living with HIV plans to return to work or school, is a shorter duration of planned breastfeeding with ART better than no breastfeeding at all?</p> <p>Mothers living with HIV and health-care workers can be reassured that shorter durations of breastfeeding of less than 12 months are better than never initiating breastfeeding at all.</p>



Annex 2: Early infant diagnosis (EID) cascade: where can treatments be the most efficient and economical(136).



Annex 3: UNAIDS 2025 top line target(137).