

Factors influencing the uptake of Prevention of Mother to Child Transmission of HIV/AIDS services through the maternal new-born and child health program in Liberia; improving the PMTCT program based on evidence-informed practices

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Vrije Universiteit Amsterdam (VU)

Amsterdam, Netherlands

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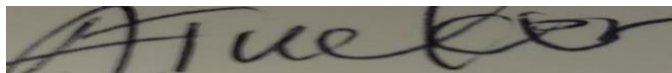
**A thesis submitted in partial fulfillment as a requirement for a
Master in Public Health/International Course in Health
Development**

**By
Antoinette Tucker**

Declaration: I acknowledged the works of other researchers, retrieved from the internet, in printed copies or other sources; and have referenced accordingly in line with the institution's requirements.

The thesis on the factors influencing the uptake of prevention of mother to child transmission of HIV services through the Maternal newborn and child health program in Liberia is my personal work.

Signature:

A handwritten signature in black ink, appearing to read 'Antoinette Tucker', is written over a light-colored rectangular background.

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LIST OF ABBREVIATIONS

AIDS	Acquired Immunodeficiency syndrome
ANC	Antenatal Care
ART	Antiretroviral Therapy
BCC	Behavioural Change Communication
CBO	Communities Based Organizations
CSO	Civil Society Organizations
EID	Early Infant Diagnosis
EMTCT	Elimination of Mother to Child Transmission
EPHS	Essential Package for Basic Health Services
EPSS	Essential Package of Social Services
GDP	Gross Domestic Product
HDI	Human Development Index
HIV	Human Immune Virus
IDU	Injectable Drugs Users
IEC	Information Education Communication
LDHS	Liberia Demographic Health Survey
MCT	Mother-Child Transmission
MOH	Ministry of Health
MOHSW	Ministry of Health and Social Welfare
MNCH	Maternal Neonatal and Child Health
NACP	National AIDS Control Program
NSP	National Strategic Plan
OOP	Out of Pocket
PEPFAR	President Emergency Plan for AIDS Relief
PITC	Provider Initiated Testing and Counselling
PLHIV	People Living with HIV
PMTCT	Prevention of Mother to Child Transmission
SRHR	Sexual Reproductive Health and Rights

SDGs	Sustainable Development goals
SSA	Sub-Saharan Africa
UNAIDS	United Nations AIDS
UNDP	United Nations Development Program
WHO	World Health Organization
WLHIV	Women Living with HIV
VCT	Voluntary Counselling and Testing

Definition of key terms

Antenatal care- is a medical check-up or routine visit for pregnant women to carry out a general examination of the mother and their unborn baby; it also promotes the detection of possible pregnancy complications for timely interventions.

Source: <https://medical-dictionary.thefreedictionary.com/antenatal+care>

Postnatal care - is the care given to mothers and newborns right after delivery up to the first six weeks and is essential for recognizing any unexpected deviation in the recovery after birth to take appropriate actions. While most women consider postpartum as a simple period, it is a crucial period that marks the beginning of a new family life and lifelong support to maintain child's health. Source:

<https://www.open.edu/openlearncreate/mod/oucontent/view.php?id=335&printable=1>

Maternal, newborn, and child health- is the health of women before and during pregnancy, labor, and delivery up to the postpartum period. It also involves the health of newborns during the first 28 days of life up to their fifth birthday.

Source: <https://www.ncbi.nlm.nih.gov/books/NBK361926/>

Prevention of mother to child transmission (PMTCT) of HIV program - offers women of reproductive age living or at risk of HIV a wide range of interventions to promote good health and prevent them from passing on the virus to their infants, before pregnancy, during pregnancy, delivery, and breastfeeding.

Source: <https://www.avert.org/printpdf/node/375>

Elimination of mother to child transmission of HIV (EMTCT)- almost as PMTCT but is an updated version requiring more vigorous evidence-based interventions to reduce MTCT of HIV to below 5% in breastfeeding regions and to less than 2% in non-breastfeeding regions.

Source: <https://www.afro.who.int/health-topics/hiv/aims/emtct>

Continuum of Care - the term has been used for services provided to women from prenatal care through childbirth and parenting. However, it is generally the provision of a variety of care through an individual lifetime according to their different health needs. It now requires health care providers to follow patients from preventive care through medical occurrences, rehabilitative, elderly, and palliative care. Depending on the patient's needs, it might be home care, hospital interventions, long-term care, and synchronized medical approaches to maintain improved health outcomes.

Source: <http://blog.eoscu.com/blog/what-is-the-continuum-of-care>

Vertical transmission - also known as mother-child-transmission is the passing of disease from mother to child during pregnancy, childbirth, and breastfeeding.

Source: <https://apps.who.int/iris/bitstream/handle/10665/259517/9789241513272-eng.pdf>

Sexual Reproductive Health and rights - “Is a state of physical, emotional, mental, and social wellbeing in relation to all aspects of sexuality and reproduction, not merely the absences of disease, dysfunction, or infirmity. Involves a positive approach to sexuality and reproduction, recognizing the part played by pleasurable sexual relationships, trust, and communication in promoting self-esteem and overall wellbeing. All individuals have the right to make decisions governing their bodies and access services that support that right. Achievement of SRH is dependent on the realization of SRR, which are based on the human rights”.

Source: [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(18\)30293-9/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(18)30293-9/fulltext)

HIV Combination prevention - is the UNAIDS definition of combination HIV prevention as rights, evidence, and community-based approaches to prevent HIV transmission among a particular group of people and communities. According to epidemiological information, the goal is to reduce new HIV infections through the combination of biomedical, behavioral, and structural interventions designed and tailored to national and local needs.

Source: <https://www.paho.org/en/topics/combination-hiv-prevention>

Comprehensive Sexuality Education - provides and empowers young people with the knowledge, skills, attitudes, and behaviors they need to make the right decisions concerning their sexual and reproductive health free of discrimination and coercion. It gives them information to enjoy their sexuality physically and emotionally, individually, and in relationships; it is also viewed as a holistic approach to young people’s emotional and social development.

Source: https://www.guttmacher.org/sites/default/files/report_downloads/demystifying-data-handouts_0.pdf

HIV treatment cascade - is a model used to define the levels of care for people living with HIV (PLHIV), starting with the initial diagnosis, linked to care, retained in care, received ART, and reached viral suppression. It outlines the proportion/percentage of PLHIV who are involved at each stage-mainly comprising of three stages. PLHIV who know their status, PLHIV who know their status and on ART, and PLHIV who are on ART and have suppressed viral load.

Source: <https://www.avert.org/professionals/hiv-programming/treatment/cascade>

Integration of health services - is based on strong primary care and public health functions, directly contributing to a better distribution of health outcomes and enhanced well-being and quality of life, which bring economic, social, and individual benefits. It contributes to improved access to services, reduces unnecessary hospitalizations and readmissions, better treatment adherence, increased patient satisfaction, health literacy, and self-care, greater job satisfaction for health workers, and overall improved health outcomes.

Source: <https://www.who.int/docs/default-source/primary-health-care-conference/linkages.pdf>

Serodiscordant couple – “is a couple in which one is HIV positive, and one partner is HIV negative. Although one partner is currently HIV negative, this does not mean that the one who is HIV negative is immunized or protected against getting HIV in the future. It is of importance for serodiscordant couples to avoid transmission to the HIV negative partners. It is possible for couples to stay HIV serodiscordant indefinitely if they consistently practice safer sex using condoms. The positive partner should continue receiving care and treatment services for their health, which is highly effective in reducing the risk of transmission to the HIV negative partner. Combined, treatment and consistent condom use are likely to offer greater protection than either one alone. The couple should receive family planning information and if desiring to have children, the use of ART to make conception safer is important. Serodiscordant couples should be aware of each other’s HIV status to be able to support access to care and treatment adherence, including emotional support to each other and adherence to PMTCT interventions.

Source: <https://www.ncbi.nlm.nih.gov/books/NBK138280/>

Abstract

Background- Liberia's health system has several challenges in meeting the growing demand of the population to control diseases, and HIV remains a significant public health concern. Despite the reverse trends in new HIV infections and deaths, women of reproductive age (15-49 years) endure an immense burden, putting children at risk of HIV through vertical transmission.

Objectives- To provide more result-based interventions, the study identified factors influencing PMTCT uptake and developed recommendations to be considered by policymakers, donors, and implementers.

Methodology- Relevant literature and documents about HIV and PMTCT in Liberia and SSA, including global targets and implementation documents, were retrieved and analyzed using the socio-ecological framework.

Findings/Results- Major factors affecting PMTCT uptake were inadequate empowerment among reproductive-age women to make informed decisions about their SRHR. Communities' socio-economic and cultural factors were stigma and discrimination, gender inequalities, and poverty. The health systems factors that comprise PITC, PMTCT, and MNCH integration have increased the numbers of pregnant women who knew their status. Still, there were challenges in retention and ART adherence, including viral load testing and EID, due to limited funding for efficiently implementing plans. Policies and laws that are not tailored to meet the needs of populations most at risk of HIV infection need to be addressed.

Conclusions- The often-interlinked factors influencing the uptake of PMTCT services were both facilitating and hindering. Despite some significant gains in PMTCT interventions through the MNCH program, there is a greater demand for a holistic approach along the continuum of care for women of reproductive age.

Recommendations- Increase funding and efficiently integrate HIV and SRHR services, prioritize people-centered care, revisit laws to reduce stigma and discrimination, ensure active families/communities' engagement, continuous monitoring and evaluation, accountability, and multi-sectoral collaborations.

Key terms: HIV, PMTCT/EMTCT, WLHIV, pregnant/breastfeeding women, Liberia

Word count:

Introduction

Prevention of Mother to Child Transmission of HIV/AIDS is a significant component in the response to the HIV epidemic, a global concern in the field of public health. Attention has been drawn to this topic because it promotes the call for equitable maternal and child healthcare, and HIV/AIDS remains one of the diseases harming women's and children's health. People living with HIV (PLHIV), including women, face several challenges and inequalities in societies, especially in fragile settings. In Liberia, knowledge, attitude, and practices about HIV transmission and prevention are inconsistent. Most women living with HIV (WLHIV) are not adequately informed and empowered to manage the psychological effects of HIV and live positively. When mothers do not have the psychosocial support and knowledge to deal with their own HIV status, how can they prevent their children from HIV? Studies have shown several gaps in meeting improved maternal and child health outcomes; even with the tremendous efforts of the Liberia health system, women and children still face the more significant burden of diseases, including HIV/AIDS.

The 2019-United Nations program on HIV/AIDS reported an estimated 38 million PLHIV globally, and over 26 million were on Antiretroviral Therapy. Liberia currently has a generalized HIV epidemic with a general population prevalence of 1.9% in 2019, classifying it as a low prevalence country. However, the prevalence remains higher in key populations, including men who have sex with men, sex workers, and injectable drugs users, than in the general population and higher in urban settings than rural areas.

Women and girls (15-49 years) living with HIV make up more than half of the PLHIV, and an estimated 3,600 children (0-14 years) live with HIV. The prevalence of HIV among pregnant women has been gradually declining, from 5.7% in 2006 to 1.9% in 2019. However, mother-to-child transmission is still high (15%) and above the global targets of <5% in regions where breastfeeding is the norm. UNAIDS has set new targets for 2025 to fight against the epidemic and supported the political declaration of ending AIDS as a public health threat by 2030.

This study seeks to understand the factors hindering and facilitating PMTCT services' uptake through Liberia's maternal, newborn, and child health program. The research covers interconnected determinants of MCT at the individual, families, communities, health system, and policy levels relating to implementing various PMTCT programs. The study involves literature/documents that have been linked and contextualized to the Liberia situation. The study provides recommendations from the results and discussions to improve the PMTCT program.

Chapter 1: Background

1.1. Liberia Country profile

1.1.1 Geographical location and demographic profile

Liberia is located on the West Coast of Africa, surrounded by Sierra Leone, Guinea, Ivory Coast, and on the South by the Atlantic Ocean, covering 111,369 km² (43,000 sq. mi)¹. Liberia has 15 administrative counties, each with a capital city and three additional cities summing up to 18 major cities². Montserrado, Nimba, Bong, Lofa, Grand Bassa, and Margibi Counties have a higher population and account for 75% of the country's population. Monrovia is the capital city, the most popular, and home to over 25% of the population^{2,3}. Frequently spoken languages are English (official), Pidgin (Liberian English), and other indigenous languages¹. Table 1 shows some vital statistics about Liberia.

Table 1

Country Profile Vital Statistics^{2,3,16}

Liberia-2021-estimated population	5,151,558	Female employment	61%
Female of reproductive ages (15-49years)	50%	Urban female literacy	52%
Young women (15-24 years)	43%	Rural female literacy	34%
Urban population	53%	Male employment	81%
Rural population	46%	Urban male literacy	75%
Growth rate	2.46%	Rural male literacy	61%
Median age	17.8 years	Poverty rate	64%
Population-practicing Christianity	85.5%	Fertility rate per woman (15-49)	4.18 children
Muslim	12.2%	Life expectancy	64.1years

<https://knoema.com/atlas/Liberia/topics/Demographics/Fertility/Fertility-rate>

https://www.lisgis.net/pg_img/NPHC%202008%20Final%20Report.pdf

1.1.2 Socio-economic situation

Liberia is one of the poorest countries in the world with a Human Development Index (HDI) of 0.480 ranking 175 among the United Nations member states. The Gross Domestic Product (GDP) for 2017 stood at 3.2% and has dropped to 2.5%, according to the 2019 United Nations Human Development (UNDP) HDI reports⁴. Liberia has suffered 14 years of civil unrest (from late 1989-2003), prompted by tribalism and nepotism, destroying lives and properties. Liberia is among the West African Countries that were hard hit by the Ebola

outbreak in 2014, affecting the already fragile health care sector^{2,3}. Liberia is part of the Mano River Union and the Economic Commission of West Africa (ECOWAS) and is second in the maritime registry, accounting for about 11% of ship registry globally. Agriculture, forestry, fishing, and mining, drive the economic sector, and Liberia's rich natural resources include timber, rubber, iron ore, gold, and several others. However, proper infrastructure is lacking as well as coordinated management directed towards economic growth. The country is heavily dependent on development aid, and the health sector is also partially supported through donor funds^{2,5}.

1.1.3. Socio-cultural and gender norms

The Liberian society mixes traditional and Western culture, though the customary norms and values prevail over Western values, even in schools, among religious affiliations and the government. The patriarchal system is deeply rooted within the traditional and cultural beliefs^{3,6}. Men are often prioritized over women, as manifested in the gap between men and women's education, empowerment, decision-making power in the family, and political voices. Men are seen as the head of the home, should provide for their families, and are given the right to control their female counterparts. Women should be submissive, full of pride and dignity, and capable of taking care of the home. The imbalanced gender relations promote negative forms of masculinity and increase violence against women, girls, and vulnerable groups^{6,7}.

1.2. Liberia health system overview

1.2.1 Governance and service delivery

The health system of Liberia is overseen by the central Ministry of Health and guided by the 2011-2021 National Health and Social Welfare Policy and Plan (NHSWPP) and developed to improve the health and social welfare of the population, as the country gradually moves towards sustainable peace and development. Responsibilities of the health system are decentralized to counties and at district levels in the various counties. County health teams supervise general health activities in the counties⁵. In its review of the national health policy in 2015, the central ministry identified improvements regarding coordination, governance, and innovative activities. Yet, there were several recommendations towards strengthening various counties and district health teams⁸. Private and public health facilities, non-governmental and faith-based organizations provide services in the country. In 2015, private facilities made up 22% of the total health facilities, mainly located in Montserrado and Margibi Counties⁸.

The health care delivery system consists of three levels: primary, secondary, and tertiary level of care. The primary level of care consists of station clinics, mobile clinics, health posts, outreach, and community health services, provided by community health assistants and trained traditional midwives. Clinics also offer some essential curative services in addition to preventives services. Secondary levels of care are accessed from health centers and county hospitals⁵. Tertiary health facilities include hospitals in various counties, regional and national referral hospitals. Primary care can also be accessed at any health facility in Liberia, regardless of referral. This means that patients can enter care at any level, and

payment of user’s fees, for primary services and selected services at secondary levels was eliminated by the Government of Liberia, to increase equitable access to health services, including maternal, newborn, and child health services^{5,8}. Table 2 shows the number and types of accredited health facilities in 2015.

Table 2

Nationwide Accredited Health Facility in Liberia

Facility Levels	Facility type	Total
Primary level	Clinics	639
Primary level	Pharmacies	137
Secondary level	Health Centers	51
Tertiary level	Hospitals	35
Total	{--}	862

https://au.int/web/sites/default/files/newsevents/workingdocuments/27027-wd-liberia-investment_plan_for_building_a_resilient_health_system.pdf

1.2.2 Infrastructure

The central ministry assessment (2015) reported that the access to safe water supply at the health facilities was inadequate, a functional incinerator for proper waste management was at 43%, and 45% of the facilities did not have a primary source of electricity, thereby limiting the quality and timeliness of services^{5,8}. The structural design of most health service delivery points, fail to meet design and construction standards, reducing the optimal utilization of services. Access to health facilities remains an issue, especially in sparsely populated rural communities where people live more than 5 kilometers away from the closest health facility, as shown in Figure 1^{5,8}.

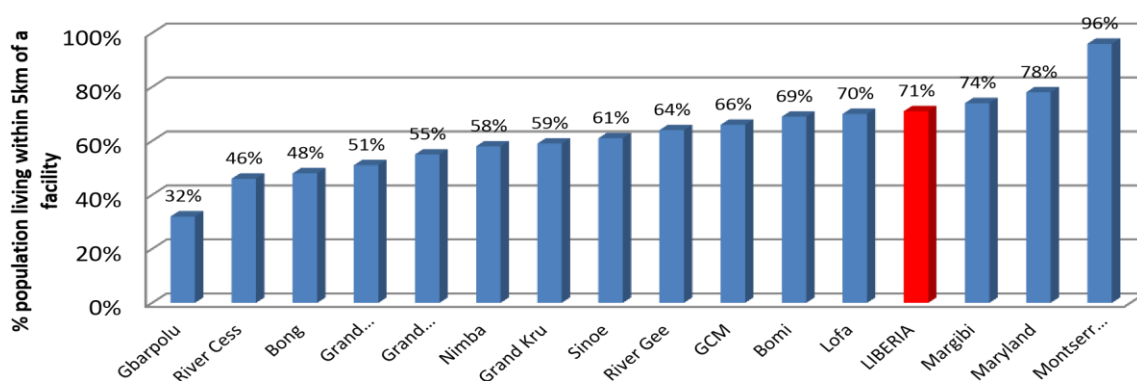


Figure 1. Population living within 5km to the nearest health facilities in 2014/2015 per Counties

1.2.3 Human Resources

There is an inadequate mix of skilled staff to provide health services. The 2015 human resource record shows that 41% of the public health providers were not on the government payroll. Deployment and retention of skilled health care providers in rural areas are still challenging because of several factors, ranging from inadequate salaries to non-motivational conditions, such as poor living conditions, recreational activities, and opportunities for career growth^{5,8}.

A considerable percentage of the health care workforce is either non-clinician or low-skilled, leading to the skills gap and standardized staffing results in under- and overstaffing at various health facilities.

However, there has been a 37% improvement in pre-service training from 2010 to 2015, gradually increasing the number of registered nurses, but not for all cadres. There are still shortages of other professional cadres like physicians, physician assistants, and midwives, and there is no complete data on the staffing available in private health facilities^{5,8}. Figure 2 shows the health workforce per cadre, including primary community health workers in 2015.

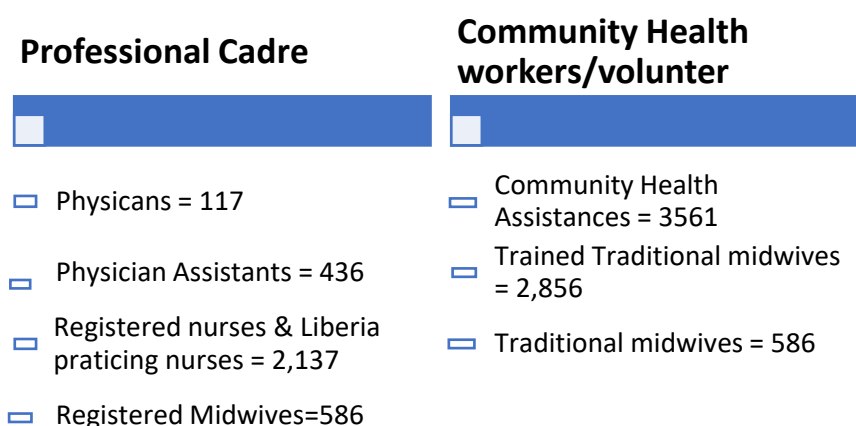


Figure 2. Health workforce in Liberia rendering maternal and newborn services

https://au.int/web/sites/default/files/newsevents/workingdocuments/27027investment_plan_for_building_a_resilient_health_system.pdf

<https://docs.google.com/spreadsheets/d/1zpixhwCpmY6J6SDkElt6PdQ5UEAZPcZGRF0y7QN6LSg/edit#gid=0>

1.2.4 Financing

The National Health and Social Welfare Financing Policy and Plan 2011-2021 (NHSWFPP) directs the health budget, with funding from taxes, donors' support, and users' fees for selected services. NHSWFPP provides direction on the NHSWPP to ensure an affordable and equitable health care system with financial risk protection for all^{8,9}. The 2020/2021 health budget (71.3 million) accounted for 13% of the national budget and is still less than the Abuja target of 15% of national budget allocation to health¹⁰. In 2011-2012, donor funding accounted for 33% of the total health expenditure, with additional international support carried out through vertical programs. The support for HIV/AIDS, tuberculosis, malaria, and other diseases, remains high on the agenda for donor support^{5,8}. According to the National

AIDS Spending Assessment (NASA), international funding covers a huge percentage of HIV/AIDS expenditure, and domestic contribution towards the program between 2010-2020 has not exceeded 15%¹¹.

Even though primary care services are free, there are direct and indirect costs in accessing health care. Out of pocket (OOP) expenditure in Liberia was at 51% in 2012 and continues to increase as donor funding gradually declines⁸.

1.3. HIV overview in Liberia

1.3.1 HIV Epidemiology

Human Immunodeficiency Virus (HIV) is the infection of the immune system leading to acquired immunodeficiency syndrome (AIDS). HIV belongs to a group of viruses called retroviruses. There are two main types: HIV 1 & 2. HIV-1 has caused most infections and AIDS cases worldwide, and HIV-2 is concentrated in West Africa. HIV remains a high public health concern, despite achievements in reducing new HIV infections and providing effective antiretroviral treatment to people living with HIV (PLHIV)¹².

Globally, there are 38 million PLHIV. Over 26 million PLHIV are accessing Antiretroviral therapy (ART), and 1.7 million people became newly infected in 2019. Africa accounted for over half of PLHIV, with 4.9 million PLHIV from Western and Central Africa, of whom 2.9 million were on ART¹³. The UN General Assembly has made a political declaration to end AIDS through the achievements of targets. The 90-90-90 targets were set for 2020, meaning that 90% of PLHIV should know their status, 90% of PLHIV who know their status should be on ART, and 90% on ART should be virally suppressed¹⁴.

1.3.2 HIV in Liberia

Liberia diagnosed the first case of HIV in a female patient in Lofa County in 1986, and transmission of HIV is mainly through heterosexual unprotected sexual intercourse with an HIV-positive partner^{15,16}. HIV spreads through direct physical contact with infected bodily fluids, including mother-to-child transmission, blood transfusion, and sharing of piercing instruments^{17,18}. Liberia currently has a generalized HIV epidemic with an estimated 47,000 PLHIV, including adults and children, and is far back in achieving the second and third targets for PLHIV^{19,20}. Towards the 90-90-90 treatment cascade set for 2020, launched at Mebourne in 2014, at the International AIDS conference²¹, the total PLHIV, who knew their status in 2020 in Liberia, was 58% (45-73) (first 90) of those diagnosed and were on ART, accounted for 33% (second 90)^{19,20}. PLHIV and on ART with suppressed viral load (third 90) were unknown^{19,20}. However, the country is continuously receiving an inverse trend in the number of PLHIV on ART and HIV-related deaths^{18,19,20}. Table 3 gives the status of HIV among different groups in Liberia.

Table 3

HIV Status in Liberia (2019)¹⁹

Sex	Age	Estimate of PLHIV	Antiretroviral therapy	ART Coverage	New infections	Deaths
Female	15 & above	26,000	11,000	43%	1000	<1000
Male	15 & above	18,000	3,660	21%	<1000	<1000
Children	0-14	3,600	763	18%-21%	<500	<500
Pregnant women	15-49	2000 (those tested)	1838	93.2%	[.....]	[.....]

Table 4

HIV Prevalence Among Different Age Groups and key Populations^{19,32}

Adult HIV prevalence	1.5%	Incidence per 1000 population	0.46/1000
Female HIV prevalence	1.9%	MSM prevalence	19.8%
Male HIV prevalence	1.2%	Sex workers prevalence	9.8%
Early Infant Diagnosis	14.7%-22%	Percentage change in new infection since 2010	-35%
Vertical transmission, including breastfeeding	14.52% - 15%	Percentage change in AIDS-related deaths since 2010	-45%

Data on PLHIV, including pregnant/breastfeeding WLHIV in the entire country, who were on ART and had suppressed viral load, are not available in various HIV/AIDS report on Liberia. However, the 2018 Global HIV progress report from three high prevalence counties in Liberia showed that 19% of PLHIV in those counties on ART with suppressed viral load^{19,20}.

Monitoring viral load is essential to identify the risk of transmission and the health outcomes of PLHIV²². Viral load tests determine the amount of HIV in a drop of blood from PLHIV, and are used for diagnosis to guide treatment choices and monitor responses to the HIV treatment. Viral load suppression means less HIV in the blood (<200copies/ml), and the chance of transmission becomes low. Studies show that viral load becomes undetectable when it is below 20-50copies/ml, and HIV becomes non-transmissible among individuals with good treatment adherence over a period²². It is also critical for WLHIV who want to get pregnant and influences MCT^{23,24}. Figure 3 shows the journey from ART initiation to HIV being undetectable.



Figure 3. How to get undetectable and untransmittable²²

1.3.3 National HIV/AIDS control program in Liberia

The National AIDS Commission was established in 2010 by an Act of the legislature, chaired by the President of Liberia overseeing the HIV response in the country¹¹. All HIV activities are headed by the National HIV/AIDS Control Program (NACP), collaborating with other implementing partners such as the U.S. President’s Emergency Plan for AIDS Relief (PEPFAR), founded in 2003 to control the negative impact of the AIDS epidemic around the world^{16,25}. The NACP receives funding from the Global Fund and technical support from the World Health Organization (WHO) and MOH. In 2017, UNAIDS reviewed the progress towards HIV targets and recommended a catch-up plan focusing on the three high prevalence counties (Montserrado, Bassa, and Margibi) to increase the test and treat strategies. The approach improved the number of people knowing their status, doubling within two years, 80% of PLHIV who knew their status were women¹¹. The NACP has developed the 2021-2025 National strategic plan (NSP) to achieve more gains replacing the 2015-2020-NSP. The plan aligns with the UNAIDS Fast Track targets to improve the combination prevention approach (combination of behavioral, biomedical, and structural interventions), test and treat strategies, and increase service retention for PLHIV through evidence-based practice in the entire country^{11,24}. However, this literature review covers the period of the 2015-2020-NSP. The 2015-2020-NSP goal was to eliminate mother-to-child transmission of HIV and reduce new infections in the general population by 50% through implementing the combination prevention approach by 2020, which has not been achieved¹⁶. The 2015-2020-NSP had five components, and the PMTCT program was one of the five high-impact priority HIV activities. The other four focused on behavioral change interventions, condom distribution and promotion, HIV/AIDS programs for key populations, and treatment, care, and support for people infected and affected¹⁶.

1.3.4 PMTCT through MNCH Program in Liberia

Between 2010 and 2020, PMTCT services in Liberia included HIV testing and counseling, ART treatment for mothers and children (0-14years), counseling support for safe infant feeding, provision of obstetric care, and family planning services. Services focused on diagnosing pregnant WLHIV, initiating ART, and activities were mainly implemented and accessible during antenatal, delivery, and postnatal care through the Maternal, Newborn, and Child Health (MNCH) care program. The target populations of the PMTCT program were pregnant/breastfeeding WLHIV and HIV-exposed babies^{7,16,26}. During MNCH, most WLHIV are newly diagnosed; continuous PMTCT services are given for those retain in ART care and treatment before and during pregnancy, and those WLHIV who had dropped out of previous HIV care are captured¹¹. Liberia had progressed in declining HIV prevalence among pregnant women from 5.7% in 2006 to 1.9% in 2019. The number of PLHIV who know their status and are on ART has increased, especially for pregnant and breastfeeding WLHIV¹⁶. Figure 4. shows the ART coverage among pregnant WLHIV.

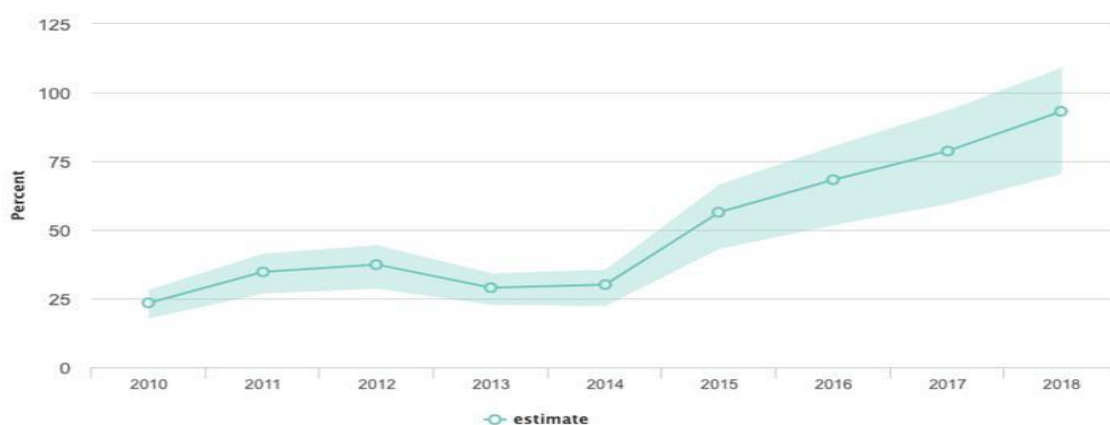


Figure 4. Coverage of pregnant WLHIV who receive ART for PMTCT in Liberia 2018¹¹

In Liberia, every pregnant woman attending Antenatal Care (ANC) is offered provider-initiated testing and counseling (PITC) for HIV, using the opt-out approach during their first antenatal care visit. They are also retested after three months and during labor/delivery^{7,16,26}. The opt-out policy gives pregnant women a choice not to participate in screening after being given relevant information. This approach has led to an increase in the number of pregnant women tested for HIV, compared to the former Voluntary Counseling and Testing (VCT), where patients could opt-in by giving their consent to receive an HIV test^{7,14,27}. PMTCT in Liberia currently operates under option B+ to prevent vertical transmission from expecting mothers living with HIV to their newborns. Pregnant women with HIV seropositive status, regardless of the CD4 count, are placed on lifetime triple ARV and prophylaxis. It also includes the provision of Nevirapine or Zidovudine for HIV-exposed infants from birth to 6 weeks of age, regardless of the infant feeding method²⁶. Option B+ is especially appropriate and beneficial in low-income settings where the availability of CD4 machines is insufficient to identify pregnant women's CD4 count before initiating ARV. Nevertheless, CD4 testing remains vital in the care and treatment of PLHIV^{25,28}.

The option B+ approach promotes lifelong treatment as soon as possible to reduce the risk of mother-to-child transmission during current and future pregnancies in regions with high

fertility rates. It reduces the risk of sexually transmitted infections/HIV from WLHIV in discordant sexual relationships. Early and continuous treatment also leads to undetectable viral load benefitting the health of WLHIV and preventing the adverse effects of stopping and starting treatment^{18,28}.

The NACP has direct oversight over PMTCT activities in Liberia even though the family health division of the Ministry of Health (which oversees maternal and child health programs) shares implementation of interventions. According to the global plan, the 2021-2025-NSP, Liberia is moving towards a more holistic approach towards EMTCT, which reduces new HIV infections in children to below 2%. This is to be achieved by promoting the combination of HIV prevention, addressing the high level of stigma and discrimination, and formulating a more robust intervention for key/vulnerable populations^{11,24}. According to the WHO Guidelines, figure 6. shows the four major PMTCT/EMTCT services for women of reproductive age and infants (<1yr).

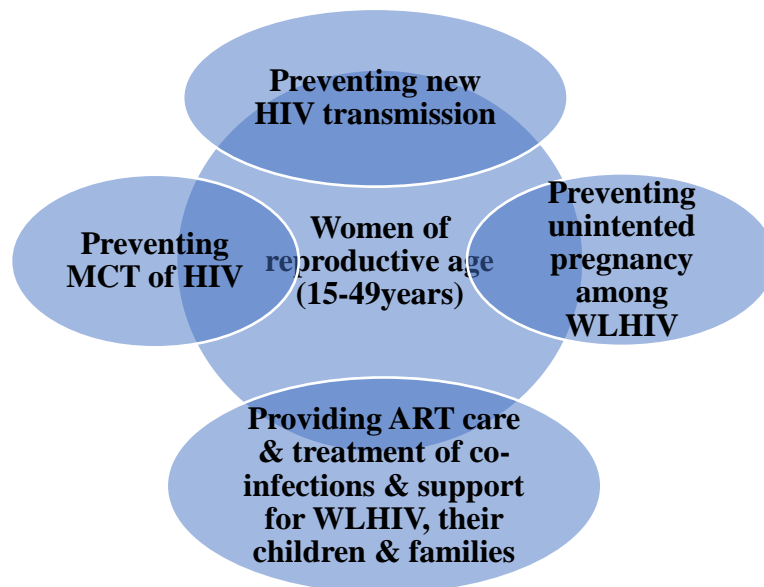


Figure 5. PMTCT/EMTCT activities for women of reproductive age¹¹

Chapter 2. The problem statement, Justification, and Research Objective

2.1. Problem Statement

Despite the significant gains made, there are several challenges in the uptake of PMTCT, such as gaps in HIV testing, enrolment, and retention in care contributing to the vertical transmission of HIV^{11,16}. Hensen et al.²⁷, in their research on universal HIV testing for pregnant women during ANC in Sub-Saharan Africa (SSA), showed that many women have inadequate knowledge about HIV and their HIV status before their first test²⁷. The study also identified several health systems factors that influence PMTCT uptakes, like the perceptions and attitudes of communities and healthcare providers. They have a major influence on initiating HIV counseling and testing, which is the first step in identifying people in need of HIV treatment along the continuum of care. The importance of confidentiality in VCT and a patient-centered service delivery approach will determine people's responsiveness²⁷. Health workers and the general population's stigma manifest in low community/family support towards PLHIV in all age groups, influencing the PMTCT uptake^{7,16}. In addition, studies from Sub-Saharan Africa (SSA) and Liberia found that retaining PLHIV/WLHIV in care and treatment remains a significant challenge^{21,29}. In 2018, about 50% of patients on ART in Liberia were lost to follow-up after 12 months (not attending ART clinic for three consecutive follow-up appointments)¹¹. Those lost to follow-up were more likely to have poor adherence to ART^{18,27,30,31}.

Compared to the Global 90-90-90 targets set for 2020, 73.8% of pregnant WLHIV in Liberia knew their HIV status in 2019^{19,32}. Pregnant women who knew their status and were on ART were 93.2%, and viral load suppression was unknown due to inadequate scaling up of viral load monitoring among all HIV care and treatment sites^{19,20,32}. The treatment cascade (90-90-90) for PLHIV, including pregnant and breastfeeding WLHIV targeted for 2020, is replaced with new targets (95-95-95) set for 2025²⁴. In Liberia, the vertical transmission remains as high as 15%, compared to the global target of 5% or less among breastfeeding regions and less than 2% in non-breastfeeding regions^{20,21,31,33}. In 2019, WHO reported 14.7% and 18%, while UNAIDS reported 22% and 21% for Early Infant Diagnosis (EID) and ART coverage, respectively among children (0-14years)^{19,32}.

Studies and data reported from UNAIDS show that Liberia is one of the low prevalence countries with high (15%) vertical transmission^{17,21}. UNAIDS also reported less than 500 new HIV infections and deaths among children (0-14 years) in 2019¹⁹. Mother-to-child transmission (MCT) through pregnancy, delivery, and breastfeeding is 15%-45% in the absence of effective Prevention of Mother-to-Child Transmission (PMTCT) interventions; and accounts for over 90% of new HIV infections in children^{17,23,30,34}. According to WHO, EID determines the success of option B+ in PMTCT interventions without the need for continuous treatment of the newborn tested negative after the cessation of breastfeeding. They recommend HIV testing for HIV-exposed infants within 4-6 weeks of age, at the end of breastfeeding, and when children with an unknown status are presenting with illness to promote early diagnosis of children living with HIV and immediately initiating lifelong

treatment³⁵. However, there are inadequate functional testing machines (CD4, viral load, EID) at all PMTCT facilities in Liberia, resulting in late diagnosis of children and irregular monitoring of virus load among pregnant WLHIV, who were in PMTCT care^{16,17,20}. Studies have shown that pregnant and breastfeeding mothers on ART with low/undetectable viral load are less likely to transmit the virus^{22,23,25,28}. Nevertheless, monitoring the virus load for PLHIV remains a substantial challenge in Liberia^{16,17,20}. Moreover, insufficient counseling on feeding options and lack of support to constantly provide formula replacement for mothers, who cannot exclusively breastfeed their HIV-exposed infant, usually result in mixed feeding, which increases the chances of MCT during the postpartum period^{16,23}.

The National Strategic Plan (2015-2020-NSP) of Liberia highlighted some challenges in the PMTCT program. These included home deliveries which account for 20% of all births and stigmatizing and discriminatory attitudes (54%) towards PLHIV¹⁶. The global prevention gap report (2016) also reported that 61% of PLHIV suffered self-stigma¹⁸. Stigma and discrimination were highlighted as a major barrier leading to the mother's unwillingness to get tested, HIV positive status denial after testing, lack of disclosure of HIV status to their partner or support person, and poor adherence to ART. In addition, lack of adequately trained staff, limited supportive supervision, inadequate follow-up mechanism for WLHIV enrolled in the PMTCT care were among the health system¹⁶. The poor socio-economic status of many pregnant/breastfeeding WLHIV results in an insufficient nutritional intake and a lack of commitment to follow-up visits¹⁶. Also, cultural and behavioral factors such as multiple sex partners, early marriage, mobility, and alcohol/drugs use were determinants of infection among individuals of reproductive age^{36,37}. The rate of sexual gender-based violence, including rape, sexual exploitation, and intimate partner violence, puts many young people, especially females, at higher risks of HIV infection in Liberia¹⁶. Through NACP and donors (Global fund, PEPFAR), the government has recommended high-impact strategies and initiatives to achieve equitable and sustainable results^{20,25}.

2.2 Justifications

This study aims to analyze the progress and gaps in the uptake of Prevention of Mother-to-Child Transmission of HIV/AIDS (PMTCT) through the MNCH program in Liberia from 2010 up to the present. Identifying the weaknesses in implementing cost-effective interventions and understanding the benefits of fully integrating PMTCT activities with other health services for women of reproductive age will promote equitable SRHR services in Liberia and achieve the fast-track targets for EMTCT^{16,20,25}. Liberia is lagging behind the 95-95-95 UNAIDS targets set for 2025 and the 2030 Sustainable Development Goals (SDGs)²⁴, specifically SDG-3; "Ensuring health and promoting the wellbeing of all at all ages"³⁸. Policymakers need to understand, interpret, and adopt new measures in the HIV/PMTCT policy and programs to be on course with global HIV prevention strategies and achieve the new targets for 2025-2030, ^{14,23-25}.

The NACP and UNAIDS have reported improved coverage for ART among pregnant and postpartum WLHIV, resulting in significant gains towards reducing MCT in Liberia. Nevertheless, there is still a demand to understand the – often interlinked – influencing factors in the uptake of PMTCT services^{18,26} to reduce vertical transmission to global standards (<2% or <5% MCT rate).

To make sustainable programmatic progress towards PMTCT uptake and quality improvement in the HIV continuum of care, policymakers, implementers, supporters, and communities, need to better understand the factors preventing pregnant and postpartum WLHIV from initiating and retaining in PMTCT services^{14,18,24,34}. PEPFAR also proposed scaling up programmatic activities in Liberia towards the comprehensive approach in preventing new HIV infections among women of reproductive age and MCT²⁵. Because HIV prevention, testing, treatment, PMTCT, and Sexual Reproductive Health and Rights services (SRHR) are interrelated, implementing one over the other will not achieve the desired results^{24,25}.

The study results, when considered by policymakers, donors, and implementers, will contribute to developing evidence-informed policies, strategies, and plans. Effectively implementing those plans will contribute to achieving global EMTCT targets in Liberia, the 2016 political declaration of ending AIDS by 2030, and promoting a better quality of life for mothers and children²⁴.

2.3 Overall objective

This research seeks to identify the factors influencing the uptake of PMTCT services in Liberia through the maternal and child health program to make recommendations to policymakers and relevant stakeholders toward eliminating mother-child transmission of HIV.

Specific objectives

1. To identify the knowledge, perceptions, attitudes, and beliefs of Liberian women and men of reproductive age (15-49 years) towards HIV, PMTCT, and ART.
2. To identify the socio-economic and socio-cultural factors of families and communities that influence PMTCT uptake in Liberia.
3. To identify health system-related factors, including policies, strategies, and implementation that influence PMTCT uptake in Liberia.
4. To identify effective interventions and best practices in the uptake of PMTCT services from Liberia and other Sub-Saharan African regions.
5. To develop recommendations towards improving PMTCT uptake through the maternal and child health care program in Liberia.

Chapter 3. Methodology

This study comprises a descriptive analysis of literature on MCT and the PMTCT program in Liberia and SSA. The researcher accessed relevant literature about the topic using key terms and accessing PubMed through the online Vrije Universiteit Library and Google Scholar. The snowballing technique to identify relevant articles, including grey literature, was also applied. The researcher also retrieved information from and/or about Liberia and HIV/AIDS through International websites (WHO, UNAIDS, UNDP, AVERT). The government of Liberia website was accessed for additional policies documents, demographic survey reports, programs report, guidelines, and strategic plans. The criteria for the selection of literature are listed below.

- Peer-reviewed articles, grey literature, MOH, and HIV/AIDS program documents from/about HIV transmission, prevention, treatment, and EMTCT/PMTCT in Liberia and SSA.
- Articles written in English and published after 2010; policies documents published more than ten years ago but having relevant information during the study period were included.
- Documents that discuss PMTCT, MCT, and EMTCT of HIV from mothers to their children.
- Documents that discuss HIV/AIDS transmission and risk factors among women of reproductive age at the individual, socio-economic, socio-culture, health systems, policies, and interventions levels.

Table 5

Key terms and general combinations used to search for relevant literature

Objective 1	Objectives 2	Objective 3	Objective 4
HI/AIDS and PMTCT individual knowledge, perceptions, prevention, belief, misconceptions, age, reproductive age, adolescents, education, pregnant and breastfeeding women and their partners, reproductive retention in care and ART adherence, self-stigma	Socio-cultural and socio-economic barriers, stigma and discrimination, support/network group for PLHIV/WLHIV, religious influences, families and communities' interactions, male involvement, poverty, education,	Availability, accessibility, affordability, quality care, prevalence, incidence, transmission, prevention, PMTCT, MCT, ART adherence, lost to follow-up, policies, laws, financing, rights-based, SRHR, maternal and child health, integration Monitoring, evaluation	Interventions and best practices improving PMTCT services uptake at individual, community, health system, and at national levels. EMTCT/PMTCT targets, coverage, challenges.

3.1 Limitations of the study

- There was insufficient research about PLHIV/WLHIV from Liberia; hence, most literature is generally from SSA.
- The research is a collection of various literature with different methods, and some methods are prone to biases, rendering bias in the analysis and interpretation of their findings.
- The conclusion from some studies also stands a chance of potential bias even though there are significant differences and gains made.

3.2 Conceptual Framework

The Socio-Ecological Model (SEM) was identified to analyze and discuss the influencing factors in PMTCT uptake in Liberia. The framework was modified and used to carry out a study in Malawi on understanding the barriers and facilitators of HIV services' uptake among pregnant and breastfeeding women. Figure 6. shows the framework with the areas of focus in this study.

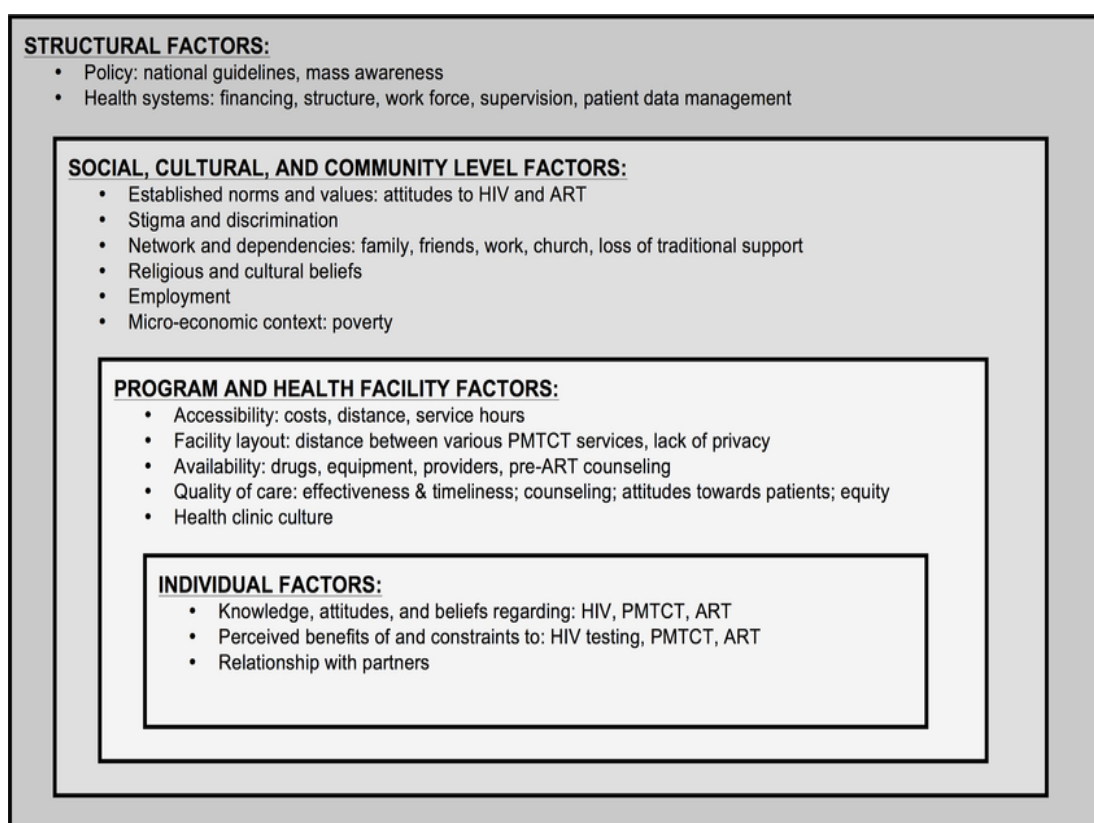


Figure 6. The modified socio-ecological framework to understand the influencing factors of PMTCT uptake in Liberia (developed by MacPherson et al., and mugavero)

https://www.researchgate.net/figure/Socio-ecological-framework-to-understand-barriers-and-facilitators-of-uptake-and_fig3_295682652

The model comprised four layers and was found to be best suited to achieve the study objectives. The various layers are interconnected, but each will be discussed separately and will address one or more of the specific objectives of this research. Table shows how the framework will be used.

Table 6

Discussion on the use of the framework

Objective 1	Objective 3	Objective 2	Objective 3	Objective 4
Layer-1 corresponds with 1.	Layers-2 and 4 correspond with 3.	Layer-3 corresponds with 2	Layer-4 also corresponds with 3	
At the individual level, the innermost layer, individual factors such as knowledge, attitude, beliefs, and perceptions about HIV, PMTCT, and ART in women and men of reproductive age, are discussed. It also includes perceived benefits and constraints to HIV testing, PMTCT, ART initiation, and adherence at the individual level.	-The second and fourth layers focus on the PMTCT program and health system factors to meet objective 3. -Layer 2 includes accessibility (costs, distance, waiting-time), -facility layout (distance between various PMTCT services, confidentiality), -availability (drugs, staff, pre-ART counseling), -quality-timeliness, effective and appropriate services, health workers attitude, and equity).	The third layer concerns the social, cultural, and community-level factors. It will discuss community norms and values regarding HIV, PMTCT, and ART, stigma and discrimination, support/network groups, interaction with work, church, and families, economic status and employment, and the relationship with partners male involvement.	The fourth layer will discuss structural factors (Country and Regional PMTCT policies, national guidelines, and public awareness). It will also discuss health financing for PMTCT, workforce, monitoring and evaluation of PMTCT program, and data management.	Identifying effective interventions and best practices will be discussed at each level of the framework from objective one to three.

Chapter 4. Factors influencing PMTCT uptake through the MNCH programs in Liberia.

4.1. Individual knowledge, perceptions, beliefs, and attitudes

4.1.1 Knowledge, attitudes, and practices regarding HIV

In Liberia, many sexually active individuals have insufficient knowledge, attitudes, and practices about HIV and HIV prevention^{7,16}. The LDHS⁷ showed that 33% of women and 35% of men, aged 15-49 years, have comprehensive knowledge about HIV transmission and prevention⁷. People seem not fully empowered to take control of their health, and there are widespread misconceptions around HIV^{16,20,36,37}. However, there was a lack of explanation about the misconceptions in those studies.

The LDHS also reported that 7% of women (15-49 years) had more than one sexual partner, 36% had sex with an unstable partner, and only 15% used a condom during their last sexual intercourse before the survey⁷. Given that HIV transmission in Liberia is mainly heterosexual and women are at greater risk, unsafe sexual practices, including having multiple sexual partners and not using condoms correctly and consistently, remain major factors causing new HIV infections among women^{20,26}.

In SSA, some PLHIV, including pregnant and breastfeeding WLHIV, enrolled in HIV care, are not adherent to treatment regimens^{23,29,39-41}. Knettel et al.'s review on retention in HIV care during pregnancy and postpartum showed that WLHIV, who have limited knowledge on HIV transmission and prevention, often show HIV status denial, less treatment adherence, and non-retention in care⁴¹. A study from Nigeria showed that, despite awareness and knowledge about HIV/AIDS and sensitization on safe practices to promote HIV prevention, knowledge on care, treatment, and prevention remains low²⁹.

4.1.2 Perceptions, beliefs, and attitudes regarding PMTCT/ART

The LDHS reported that 53% of women and 43% of men of reproductive age (15-49) knew about MCT, and 54% knew about MCT prevention through taking special medication⁷. Knowledge of one's HIV status is the first step towards the treatment cascade for pregnant and breastfeeding WLHIV and their partners^{23,27}. Pregnant women who knew their HIV status in Liberia were 73.8% which is below the 95% target on knowledge of one's HIV status for PLHIV^{19,20}. This is despite women being more likely to get an HIV test than men, because the PITC has been integrated into the PMTCT regimen available during ANC. Most women only get to know their HIV status during their first test at ANC visit²³. A study from Nigeria on the opt-out approach of PITC and cited by Avert showed that 97% of women

attending ANC had received HIV tests and results. 48% of those women indicated that the hospital offering PMTCT services was the first source for comprehensive information on HIV/PMTCT and HIV testing²³. PITC has contributed to the progress in the HIV treatment cascade for pregnant and breastfeeding WLHIV and decreasing the vertical transmission^{23,14,34} but not achieving EMTCT targets in Liberia because of poor retention and adherence to ART^{16,23,26,27,40}.

Some women were found to have personal motivations to initiate and retain in the PMTCT care because they wanted to stay healthy and prevent their unborn child from getting infected. Many women could easily accept ART if they are having co-infections and believed that ART could help them^{30,39-41}. A report also found some women stop ART when they feel better after a few months of treatment or if they experience side effects^{29,39,40}. Other reasons for the challenges in accepting one's HIV status, initiating, and adherence to ART for WLHIV were the fear of their partner's reaction, relating to self-stigma and stigma and discrimination from others^{18,20}. The HIV prevention gap report in 2016 found that 67% of PLHIV in Liberia suffer from self-stigma, which was the highest among the West African countries that were part of the study¹⁸. Moreover, women needed time to accept their seropositive status⁴⁰. Results showed that women who tested positive before their first ANC visit had more time to accept their HIV status, discuss their HIV status with their partners and remain adherent to ART^{30,41}.

4.1.3 Mothers' age, education, and awareness

Mother's age and education were also found to be a determinant for HIV testing many studies in Sub-Saharan Africa (SSA). It can be seen as an individual factor, though it is related to socio-economic/cultural factors. Adolescents were reported to suffer greater levels of stigma and discrimination and receive less social support, resulting in lower retention rates in care and non-adherence to ART. Results also showed lower testing coverage among adolescents than older women, despite being at higher risk of HIV^{18,41,44,45}. Their low testing coverage was due to poor/late ANC attendance and lack of comprehensive knowledge on HIV/MCT^{7,26,44,45}. It also might be because they have fewer children and have less access to the correct information about HIV prevention and MCT^{44,45}.

Adolescents are known to visit different health facilities and prefer different kinds of health providers that can suit their perceived needs; more often, the health facilities they visit might not offer PMTCT services⁴⁵. Adolescents from disadvantaged socio-economic groups and those who get pregnant before marriage account for a significant proportion of adolescent HIV testing gaps, and their pregnancies often result in school dropout and low education^{44,45}. Many misconceptions from their peers surround their knowledge about sexuality and reproductive health. They have limited access to Comprehensive Sexuality Education (CSE) from their schools or communities to make the right choices about their health^{16,20,46}. In Liberia, CSE has not been fully adopted into school, and discussing sexuality, especially with adolescents, remains a taboo in most African societies^{16,18,45,47}.

Stephane (2017) reported a significantly slower decline of new HIV infections among children in West and Central Africa (WCA), as compared to South and East Africa (SEA)⁴⁵. Related factors were due to the high rate of early marriages and adolescent fertility rate in WCA and yet gaps in PMTCT coverage among adolescents⁴⁵. Reports also showed that one in three new HIV infections are in adolescents, and females are mostly affected^{26,46}. Pregnant adolescents and their neonates are at greater risk of maternal and neonatal complications, including MCT among HIV-positive mothers^{16,20,46}. In another report, married adolescents are shown to have better maternal health outcomes than their counterparts who are not married. But most adolescents in SSA, who are in inter-generational relationships or with less-educated men, are highly affected by power dynamics and often require permission from their husbands before seeking ANC/PMTCT services⁴⁵.

4.1.4 Best Practices to improve PMTCT uptake

Lisa et al.⁴⁸ reported patient-level intervention that carried out activities targeting mothers, which were proven to have positive effects. The intervention included monthly baby showers in participating churches in Nigeria, where expectant mothers participated in educational programs and games; they also received mama and baby kits and were given follow-up contact persons. This intervention resulted in women who were more linked to services and receiving ART⁴⁸.

Additionally, studies have recommended more attention to counseling and men's participation during PMTCT/ANC services and preparing women who tested for HIV during pregnancy to increase ART adherence during and after pregnancy^{23,41,48}. Individuals should have adequate knowledge and are empowered to prevent HIV, especially women of reproductive age, even before they get pregnant, through comprehensive sexuality education, promotion of safe sex and access to treatment for STIs, HIV testing, and treatment⁸.

4.2. Socio-economic and socio-cultural factors of families and communities that are influencing the uptake of PMTCT services in Liberia

4.2.1 Gender norms

Several studies identified social and cultural factors as significant barriers to the success of PMTCT in SSA^{29,43}. These cultural factors are interrelated with each other and influence the different levels in the framework. For example, the attitude of men and women regarding PMTCT can be affected by community norms. Gender norms and inequalities pose women at risk of disparities in educational and economic opportunities and impact their ability to make decisions concerning their health, such as condom use to prevent STI, HIV, and unwanted pregnancy^{6,7,26,49}. Gender roles and norms also discourage men from engaging in ANC activities and other maternal and child health services. Men who visited the health

facilities with their partners were considered jealous, overprotective, or controlled by their partner^{6,14,43,49}.

4.2.2 Stigma and discrimination

Almost all the studies reviewed listed stigma (both internal and external) as a major factor in HIV testing and treatment adherence. It is a cross-cutting issue at every point in the HIV continuum of care. WLHIV fail to disclose their HIV status to partners, enroll in care, and are non-adherent to PMTCT regimens due to perceived/actual stigma^{29,43,50,51}. A study on the impact of PMTCT in Liberia revealed that WLHIV feared social rejection because of their experiences with stigma and discrimination from community members.

Some WLHIV were also displeased over the confidentiality of health care providers in disclosing their test results to partners/others²⁶. Additionally, the UNAIDS¹⁹ Liberia report showed that 52% of the Liberian population has discriminatory attitudes towards PLHIV, which influences the kind of support provided for PLHIV/WLHIV at the community level¹⁹. The high level of stigma and discrimination are associated with inadequate knowledge on HIV transmission and ART/PMTCT, especially among populations with low HIV prevalence and those with limited education and less access to awareness messages⁵².

4.2.3 Support/network groups for WLHIV

International organizations, including the WHO, have recognized the increased need for care and support for PLHIV concerning ART adherence, especially in SSA. HIV does not only affect those infected but also puts a burden on families both financially and psychologically. A study on the impact of HIV on care work reported that about 70-90 percent of support is provided by family members⁵³. The HIV response progress report on Liberia (year), showed that mother-to-mother support groups were initiated but not strong enough and did not cover the entire country. No study was found on the positive effects of communities' active engagement in PMTCT activities^{20,26}. Most of the support given to WLHIV was from families, friends, or community health workers, and this support could fill gaps in unmet health care needs and providing emotional support. Community health providers or family members were often neither trained nor paid to support PLHIV/WLHIV⁵³.

Likewise, the vital role of caregivers at homes remains unrecognized by policymakers, and the kind of care given does not adequately produce the intended results. The burden of unpaid work continues to generate extra costs for both caregivers and PLHIV who do not receive any financial support or recognition in plans and implementations of programs⁵³.

4.2.4 Interactions with work and religion

Another community-level factor is religion⁵⁴, and Liberia is classified to be highly religious^{1,3}. Religious communities, both Christians and Muslims, have a critical role in changing the power imbalances and reducing violence against women, which remains prevalent in Liberia and contributes towards HIV transmission. Religious leaders address their congregation during worship service at the various churches or at prayer time in the mosques; notwithstanding their respect and authority over their communities, religious leaders are less capacitated in promoting PMTCT activities at their places of worship⁶.

Another study found that many people, including pregnant and breastfeeding WLHIV, found their religion or religious head as a source to cope with their HIV status and stay committed to care⁵¹. There were other contrary results towards HIV control and PMTCT. For example, the religious community in SSA did not promote condom use among sexually active individuals, neither sexuality education for adolescents and PLHIV. Some religious leaders perceive HIV infections as a punishment for sin, which promotes stigmatizing behavior⁵⁴. In the HIV progress report from Liberia, poor ART adherent was more common among PLHIV/WLHIV who were attending faith healing facilities/traditional healers, and those people were not aware of their HIV status²⁶.

4.2.5 Interactions with families and male involvement

Despite men being classified as the head of the home and having more authority, their insufficient attendance/involvement in the SRHR needs of themselves and their partner creates an additional challenge to support their pregnant and breastfeeding partners in PMTCT care. Lack of partner support was a major barrier to treatment adherence and was identified in several West and East Africa studies. Most women could hide their HIV status and ART from their partners because of men's perceived/actual negative behaviors towards WHIV^{30,40,41,49}.

Even though facilities were not motivating men to participate in all services provided to their partners during pregnancy, delivery, and postpartum. Most men consider childbearing and rearing solely the responsibility of women^{6,43,49}. Most men have conflicting times regarding work schedules and hours when ANC is provided, and they concluded that finding money to support their partner was more necessary. Men also expressed fear about how family and friends would consider them when they accompany their partners. Women also perceived men's roles as providing financial support and did not expect their physical presence at ANC, yet women, when asked, expressed that they would like their partners to accompany them for ANC services^{6,14,43,49}.

Studies found partner support as crucial for the mental wellness of pregnant and breastfeeding WLHIV who are already experiencing rapid changes in their body during pregnancy and postpartum periods^{30,50,51}. The gap in male involvement puts more pressure on women to bear the burden of coping with their HIV status alone and preventing MCT. As it is shown that upon receiving an HIV-positive test result for the first time, women were unable to cope, which influenced their enrolment and retention in care^{41-43,49,51}. Depression among WLHIV has been strongly associated with poor support from partners and communities and a lack of economic empowerment. An unfavourable mental health status also affects viral load suppression and PMTCT outcomes^{50,51}. Ashaba et al.⁵¹, a qualitative study on understanding coping strategies among pregnant and breastfeeding WLHIV in rural Uganda, concluded that despite the ART and PMTCT care being available, women are still faced with several mental health issues because of a lack of psychological support, which influenced the PMTCT uptake⁵¹.

Additionally, studies found that men with experience of previous HIV testing had HIV knowledge and were less likely to stigmatize their partners and were supportive in PMTCT activities. Men with fewer children could participate in VCT, share responsibilities of preventing HIV to their unborn child and prepare for fatherhood^{23,43,49}. Other studies showed that being in a stable relationship also promotes male participation in PMTCT, and their involvement was also associated with education, age, and socioeconomic status⁴⁹.

4.2.6 Poverty and Education

In addition to socio-cultural factors, socio-economic barriers also pose challenges to PMTCT uptake. Poverty is highly associated with limited formal education, poor access to awareness messages, and poor utilization of PMTCT services for women of low socio-status and rural dwellers, as they were more influenced by the social norms surrounding them^{18,29,39-44,51}. Women in rural or disadvantaged communities, including adolescents from poor economic classes, could not easily access health facilities because of long distances, lack of transport, bad road conditions, and limited awareness of the importance of seeking care. They were also more likely to seek care from unskilled health workers or in areas where adequate PMTCT services were not available^{16,26,43-45}.

Replacement feeding, according to studies, has shown to be the best option for at-risk infants among mothers with unknown/not suppressed viral load, but WLHIV with low socioeconomic status have limited choices for good nutrition and best feeding options for their at-risk babies⁴⁴. Due to the lack of support (financial, psychosocial) systems, these women find it more challenging to understand the benefits of remaining adherent to the PMTCT regimen and are often non-consistent with one feeding option for HIV-exposed infants MCT^{43,44,55}. Most mothers could not afford a diet with adequate nutrition for themselves. A KAP study on nutrition among PMTCT clients in Liberia reveals that 79% of patients reported less nutritional diet in relation to the six food groups, and 81% had less than three meals daily⁵⁵.

Muyunda B. et al.'s⁴⁴ study in Zambia revealed that educational attainment for mothers of child-bearing age before and during pregnancy was a predisposing factor for HIV testing and adherence to treatment protocols and promoting good health outcomes⁴⁴. Educated (tertiary & secondary levels) pregnant and breastfeeding women are more likely to have ANC/PNC visit early, attend their required (four or more) ANC visits and give birth at health facilities than those who had primary or no education^{7,26,42,44}

4.2.7 Best Practices to improve PMTCT uptake at the family and community level

Vrazo C. et al.'s⁵⁶ study reported findings on activities at the family level to improve PMTCT services uptake through the analysis of several studies on interventions that work best from LMICs, including a survey on the Rapid Result Initiative (RRI) carried out in Kenya. The intervention focused on increasing the male partners' attendance at the HIV counseling and testing site, educating CHWs on PMTCT, and community mobilization. Another approach was the Partners plus intervention, where infant ART dosing and adherence education were given to couples, resulting in an improved ART prophylaxis uptake. Mothers in the intervention group were more likely to report giving their infants ARV regularly (74%) than mothers in the control group (46%)⁵⁶. Lisa et al.⁴⁸ evaluated the mother's adherence and retention in relation to a cash transfer program for pregnant/breastfeeding WLHIV up to eight weeks post-partum. Results showed that women in the intervention group were more retained in care and adherent to PMTCT regimens than women in the control group⁴⁸.

Also, findings from the prevention gaps report in African countries showed that the communities' engagements and civil societies activities have proven fruitful in the achievements of HIV targets in other settings, including reducing stigma and discrimination. For example, in Uganda, the Communities Health Alliance carried out a pilot project, which included providing transportation for WLHIV, recruiting and training health workers through local associations of PLHIV, awareness campaigns, and mobilizing local community leaders. During the project period, the number of pregnant and breastfeeding mothers attending ANC increased. Similar interventions were conducted in Botswana by a project called Communities to Control HIV (CATCH) through household screening, joint planning, and community-driven activities, which resulted in positive results. More communities were adopting the approach¹⁸.

4.3. Health system-related factors and national policies

Health system factors are determined by national policies, strategies, and plans. In addition, how well programs are implemented, monitored, and evaluated is critical in identifying gaps and making quality improvements. Therefore, this level will focus on factors at the health system and national levels that influence PMTCT uptake.

4.3.1 Availability and Accessibility of PMTCT services

Factors affecting service utilization were related to the inaccessibility of health facilities providing PMTCT activities and the quality of services offered. Firstly, to identify pregnant and breastfeeding WLHIV who need treatment, they must present at ANC visits⁴². Several studies from Sub-Saharan Africa have reported poor utilization of maternal health services, especially for disadvantaged women^{42,44,45,50}. The new WHO guideline for ANC recommends eight ANC visits, and the first visit should be by 12 weeks gestation^{42,57}. However, the Liberia data, for adequate ANC visits, recorded for four or more visits, which means pregnant women attending four ANC visits, are considered adequate, and the number of visits above four is not reported^{7,47}.

Though about 87% of pregnant women attended four or more ANC visits, the timing of initiating the first visit needs to be earlier to ensure continuous/possible visits to achieve better health outcomes^{7,42}. In Liberia, most pregnant women of low socioeconomic status and young girls could attend ANC visits late in pregnancy and do not reach the recommended eight ANC visits; to get continuous care for safe delivery and healthy newborns, which poses challenges in PMTCT programs^{16,18,26}. Reasons for women not attending ANC visits were inaccessibility of health facilities, unavailability of drugs & medical supplies, and health workers barriers such as poor patient-centered care^{23,26,43}.

In 2015, about 71% of the population of Liberia lived within 5km to the nearest health facility, which varies among counties, with rural counties having fewer people living closer to the nearest health facility⁸. The geographic location of pregnant women and the inaccessibility of health facilities before and during labor also contributed to home deliveries usually conducted by unskilled (Traditional Birth Attendants -TBAs/ Trained Traditional Midwives -TTM) birth attendants^{16,26}. The LDHS reported 20% home deliveries of all births in the last five years⁷. This was mainly found among disadvantaged families, created missed opportunities for women to get tested/retested, and identifying pregnant and breastfeeding women and HIV exposed infants who need PMTCT services^{16,26,43,44,45}.

In addition, the community' health volunteers (CHVs) and TTMs provide primary care in the communities, like distributing flyers/posters and giving health education on behavioral change to increase awareness on disease prevention, including HIV, and do referrals for maternal and child health problems. Yet, they have not been trained to carry out specific HIV activities (like ARVs distribution and following-up mothers to care) in the

communities^{16,20,26}. A study on HIV response in Liberia reported resource constraints by Civil Societies Organization (CSO)/Communities Based Organizations (CBO) and weak organizational capacity to manage and deliver services at the broader community level. Some of the Faith-Based Organizations (FBO) and CSOs were not recipients of the Global Fund, and neither did they effectively measure the result of their activities nor report to the national HIV program^{16,26}.

4.3.2 Workforce, equipment, and quality of care

In Liberia, there was limited availability of the functional testing machine and adequate staff trained in HIV management, including counseling, monitoring virus load, and CD4 count^{16,26}. Studies on undetectable virus load among PLHIV pointed out the importance of maintaining virus suppression, which reduces/stops the transmission of HIV-meaning, undetectable equals untransmittable (U=U)²². However, virus load suppression among PLHIV/WLHIV, who were on ART, has not been reported because most HIV care facilities, including PMTCT sites, have not been upgraded to monitor virus suppression^{16,26}. Also, transporting the patient's specimens to sites where CD4 machines and viral load monitoring were done was challenging, and if the test was done, getting results to mothers was sometimes not possible due to loss of follow-up^{16,26}. The most common reason for lost follow-up (LTFU) was stigma & discrimination, long-distance to ART site and/or receiving alternatives care at informal service provider^{16,20,26} (faith-based healing facilities, spiritual/traditional healers).

Additionally, the 2015-2020-NSP reported inadequate mechanisms to follow WLHIV and HIV exposed infants lost to follow-up, despite the adoption of the options B+ requires life-long ART for pregnant/breastfeeding WLHIV¹⁶. Less follow-up also resulted in insufficient testing and treatment coverage for children (0-14years)^{16,19,20,26}. The progress report in 2016 also stated that, due to the Ebola virus outbreak, EID activities were paused because the site was used for Ebola testing²⁶. EID testing measures the outcomes of PMTCT services and identifies children who need ART, and WHO recommends EID at 4-6wks and after the cessation of breastfeeding for timely diagnosis and treatment^{28,33}. Studies showed inadequate EID coverage in many SSA countries, mainly in WCA, including Liberia, and Liberia had 21% coverage for EID for HIV-exposed infants¹⁹. Barriers to late EID were similar to that of CD4 and viral load monitoring. Reasons included unavailable/limited functional testing machines, lack of reagents, inadequate laboratory capacity, poor transport system, failure to identify infants during immunization visits, and inadequate follow-up of HIV exposed infants^{23,26,33,58}.

In 2015, Liberia reported numbers of health workforce below the SDGs index set at 4.45 per 1,000 population; even though progress has been made between 2010 and 2015, mainly with the increase in the number of nurses – other cadres are still very low in numbers^{5,8}. In 2015, the total health workforce per cadre who were directly or indirectly rendering PMTCT services included 117 physicians (0.03 per 1000 population), 436 physician assistance (0.08 per population), 659 midwives (0.12 per 1,000 population), among others. There was no complete data available on the staffing in the private sectors; maldistribution exists across

various levels and urban and rural disparities and remains an issue^{8,20}. Liberia, among many LMICs, has a lack of human resources for health, and tasking shifting has been used to improve HIV care coverage. While other mid-level professionals are trained/mentored and working in treatment sites, the quality of care remains a challenge due to the increased workload for staff, who multi-task to provide care in various areas for the population²⁰. Staff shortage also created long waiting times for patients to get the needed services, causing an interruption in treatment. Some patients could not get tested when the staff responsible for PMTCT services felt overburdened or was absent¹⁶.

According to Dunlap et al. 2014, ANC provides a good opportunity for counseling and testing women and their partners. Yet, there were limited strategies for male attendance for ANC visits at health facilities in SSA, even though men have had positive attitudes towards pregnant women attending ANC and PMTCT services⁴⁹. Men also reported dissatisfaction with services offered to their partners, unwelcoming attitudes of some health workers, long waiting times, and lack of space to accommodate them during ANC⁴⁹. A survey among health workers found that men were restricted to attend labor and delivery even though there was overall knowledge on male involvement. Additionally, testing men who are HIV is important to identify women who are HIV negative and in relationship with HIV positive partners; to prevent acquiring HIV during pregnancy and breastfeeding when women are at higher risk¹⁸. But in Liberia, HIV testing among men remains lower than HIV testing among women. It is also due to the gender roles as men being strong and providing for the family, which prevent them from seeking appropriate care at health facilities^{6,16,18}

Health workers' attitudes during initial visits also determine how often pregnant and postpartum women, especially adolescents, will attend ANC visits. Fewer visits result in fewer opportunities to carry out PMTCT interventions and the poor uptake of PMTCT services^{40,43-45}. A study in Nigeria found that WLHIV experienced stigma and discrimination from health care workers, including physical abuse, non-consented medical procedures, denial of care, and non-dignified care. Some health providers were even reported using double gloves, bleach, and covering their mouth and nose when rendering care for WLHIV; they even prevented women from coming close or touching things around them to protect themselves from getting infected. Due to limited skills, no punitive measures, and inadequate equipment in providing efficient services for WLHIV, most health workers could engage in stigmatizing behavior either knowingly or unknowingly, given their risk of occupational exposure²³.

Knettel et al.'s⁴¹ study in SSA on factors associated with retention in HIV care for pregnant and breastfeeding mothers found inadequate counseling from health workers. Their inability to address the patient's ambivalence and preparedness to start and remain committed to live long ART resulted in newly diagnosed pregnant/breastfeeding mothers feeling pressured to start ART. Although immediate treatment was necessary to prevent MCT, the readiness of mothers was not given adequate attention⁴¹. Also, most health providers did not fully consider motherhood's psychological changes and stresses during the postpartum period, contributing to the increase of non-retention in care and non-adherence to ART⁴¹.

Additionally, a study in Nigeria and Malawi on barriers to the successful implementation of PMTCT programs⁴³ and a survey on improving education programs at PMTCT sites in Liberia⁵⁵, showed were not correctly informed on feeding options (exclusive breastfeeding or replacement feeding) due to inadequate counseling. WLHIV believed that once the child takes medication, they will not become infected, and women become confused about choosing one feeding option. Most health workers were not fully informed on the advantages and disadvantages of the different feeding options. They often did not consider breastfeeding mothers' local environment, perceptions, and circumstances regarding feeding options^{43,55}.

4.3.3 PMTCT policies, guidelines, and financing

Even while the constitution prohibits stigma and discrimination against PLHIV, punitive laws and policies prevent the easy access of HIV services for those most in need^{16,20,26}. Such laws, include penalizing willful transmission of HIV and criminalizing same-sex relationships, which promote the high level of stigma, discrimination, and violence against PLHIV/WLHIV and populations at risk^{16,20,26}. The WCA catch-up plan was created in 2017 to meet the 90-90-90 targets for PLHIV by 2020 and end new HIV infections. UNAIDS and partners called for speedy interventions in WCA, including Liberia, to meet the fast-track 2020 targets. The plan was supported by WHO new guidelines in 2016, emphasizing using ART as both treatment and prevention, and recommended the test and treat strategies⁵⁹. In line with the recommendations, Liberia created the Country's catch-up plan, focusing on the three high HIV burden counties (Montserrado, Grand Bassa, and Margibi), to promote EMTCT, increase HIV testing, and treatment among men, children, adolescents, and key populations.

This resulted in the country's commitments in the 'start free, stay free, AIDS free' initiatives. Although the catch-up plan has made significant gains in HIV and PMTCT care, there was an inadequate decentralization of activities in the catch-up plan⁶⁰. The WCA catch-up plan also reported the over-medicalization of HIV services with limited community participation for PLHIV/WLHIV and OOP spending for health care created barriers⁶⁰. Primary care for maternal and child health services was free. Still, payments were required for selected services at secondary and tertiary level¹⁵, coupled with the lack of drugs and medical supplies as reported by the HIV progress report in Liberia, which also influences the PMTCT uptake¹⁸.

The WCA plan also reported a lack of political will to take ownership of HIV/PMTCT programs and limited domestic funds for HIV response in WCA countries. Which impeded the implementation of HIV/AIDS control strategies; and stressed that strong political leadership is needed to increase domestic spending and achieve sustainable goals⁵⁹. In Liberia, most of the government funds towards HIV/PMTCT programs go towards personnel costs. The program is mainly supported by international development partners, including Global Fund (GFATM), which provides the largest percentage of the funds. Support also comes from the UN Joint Program on HIV/AIDS and bilateral donors^{16,20,26}. Insufficient

funding and challenges in multi-sectoral collaborations among various ministries (Health, Education, Gender), religious communities, and civil societies were factors preventing HIV/PMTCT programs from meeting the needs of the population^{20,46,47}.

4.3.4 Monitoring and evaluation, supply chain, and data management

PMTCT services' success is determined by the achievements of targets/indicators, including a lower rate of MCT. It requires proper monitoring and evaluation of program activities through every phase of the implementation process. Several studies have found that MCT of HIV was higher in the post-partum period. Attrition in care was higher among women who started treatment late during pregnancy and at post-partum visits. These factors have been attributed to the health system challenges in SSA towards providing and monitoring comprehensive postnatal services^{23,30,41}.

A study in Zambia, cited by Avert, found that about 76% of pregnant women enrolled in care and adherent to ART during pregnancy, reduced to 53% during the post-partum period²³. Research in Ethiopia showed weak tracking mechanisms, including inadequate information on patient locations and limited support for field visits to follow-up WLHIV lost to care²³. Liberia's HIV progress report in 2016 also mentions similar challenges in the PMTCT programs, such as gaps in data collection for non-clinical HIV/PMTCT activities that were communities based. Also, reports from facilities-based interventions have some discrepancies due to the lack of electronic patients' registry at all health facilities offering PMTCT care²⁶.

In addition to the use of proper data for decision making, it is also required for timely procurement of drugs and medical supplies for MNCH, including PMTCT uptake. Reports from Liberia HIV programs found shortages in HIV/PMTCT supplies, which were attributed to the poor data collection and quality reporting, coupled with the COVID-19 pandemic^{20,26}. The shortages of supplies (test kits, ARVs, and reagent) at some time, gaps in quality of care, and the failure to achieve the intended results of PMTCT services are also due to the inadequate supply chain management procedures and practices, poor roads network, limited technology, inadequate storage capacities, insufficient staff trained in data management, inadequate inventory and information dissemination^{8,20,26}.

4.3.1 Best practices at the health system and structural levels

Liberia has created the next HIV/AIDS NSP for 2021-2025 and is on course with a test and treat and the retesting strategies among pregnant and breastfeeding women. According to Drake L. et al., a review of national HIV retesting guidelines, to inform EMTCT efforts; Liberia is among countries carrying out HIV retesting for pregnant women in their third trimester, during delivery and postpartum, which has contributed to the increase in the number of pregnant WLHIV on ART³⁵. However, the NSP-2021-2025 stated many factors that need to be addressed to achieve the fast-track targets¹¹. According to the world AIDS

2020 report, a people-centered approach in HIV services delivery is one of the major factors contributing to improving HIV/PMTCT services²⁴. HIV policies and guidelines should not focus on a single approach for service delivery, but rather a holistic approach, addressing the challenges of PLHIV, including health system and legal barriers. It has been shown that communities understand the issues affecting them and have the passion and enthusiasm that drives effective advocacy, policy development, and service design. When communities participate in the control of HIV/MCT, services are brought closer to those in need, thus promoting community ownership and ensuring accountability at the health system and national levels²⁴. For example, Eswatini and Botswana have achieved the 90-90-90 targets, including comparable testing cascade for men and women. Botswana has thrived towards fulfilling the principle of shared responsibilities in the HIV response and has increased domestic resources that covered nearly two-third of HIV expenditure in 2017. Zimbabwe has also organized domestic resources through a dedicated national trust fund that contributed to the country's HIV treatment program; and achieved 73% for viral suppression among PLHIV²⁴.

Vrazo C. et al. reported interventions at the health system level that works best to improve PMTCT uptake⁵⁶. These included expanding accessibility to ANC and ART services, strengthening integration and linkages between ANC, ART, and testing sites, and promoting PITC. The Rapid Result Initiatives (RRI) in Kenya, involving the training of community health providers to provide PMTCT services and quality improvement, resulted in an 87% increase in EID testing, improved maternal outcomes, and less loss follow-up. The quality improvement services were carried out through the MTCT-plus approach to family care, comprising outreach activities, educating families and communities, providing support for nutrition, continuous ART adherence, family planning services, and assessing the need for laboratory tests. In another study, CHWs were assigned to pregnant/breastfeeding WLHIV to improve linkages between PMTCT sites and mothers. There were 72% of women who were initiated in option B+ and were continuously followed up during the intervention period compared to 19% at baseline⁵⁶.

Another study also done in Kenya on quality improvement interventions included adjustment in protocols. Protocol changes, such as stapling maternal ANC card/patients' records, infant's road to health cards, and monthly PMTCT and EID data review meetings with district offices, resulted in 79% to 95% EID testing coverage. Similarly, personnel redeployment strategy by health facility staff and using mentor mothers to timely follow-up patients lost to follow-up resulted in a 25% increase in mothers who were initiated on life-long ART. These also resulted increased uptake of ART/ARVs during the postpartum for mothers and infants from 43% to 84% and 75% to 86%, respectively⁵⁶.

Chapter 5: Discussion

The research results showed factors influencing PMTCT uptake through the maternal newborn and child health program at every level of the ecological model. While those factors at each level of the model have been studied, either independently or combined in the included studies, they are all interconnected. A focus on only one part cannot achieve the desired result of the program, and all factors comprehensively need assessment.

PEPFAR reports on the challenges of the HIV response in the West African region found there was a focus on the first and second 90s identifying PLHIV/WLHIV and getting them on ART was improving. Still, there was a considerable gap in the third 90s to complete the treatment cascade. Also, with the PITC approach to PMTCT, more pregnant/breastfeeding WLHIV could have known and had access to PMTCT services. Reports showed a significant gain in the second cascade for pregnant WLHIV in Liberia who were on ART, but many do not correctly follow PMTCT regimens. Challenges in the PMTCT program uptake seem to be focused on regularly taking ART and giving ARVs prophylaxis and cotrimoxazole to the newborn while breastfeeding, because of loss to follow-up care, mainly during the postpartum period.

Individual

WLHIV lack the needed support (financial, psychological, and moral) to retain in care and remain adherent to lifelong ART, which contributes to MCT. 78% of pregnant WLHIV in Liberia knew their HIV status, which means 22% do not know, and this can be attributed to inadequate knowledge about HIV/PMTCT. Several studies from SSA showed inadequate individual knowledge about HIV prevention and transmission, including PMTCT. It was more common among adolescents, women of low socioeconomic status, and those with less education. Women of reproductive age, within these categories, mostly lived in rural communities, where access to awareness messages, for example, through mass media, was difficult. The LDHS reported that those who had access to radio, television, or social media, had more knowledge on HIV/PMTCT.

Especially adolescent girls were not given the correct information at school because of gaps in policies to provide evidence-based information for girls and women to make the right choices about their health. CSE is not integrated within schools for young people, and due to inadequate knowledge and poverty, most girls are persuaded by their parents and peers to enter early sexual relationships. In the communities and health facilities, adolescents were also not adequately informed on safe sex practices. When pregnant, they could often not access the appropriate care because of limited knowledge on the importance of ANC visits.

The literature results from SSA also found that some pregnant women were either attending fewer ANC visits or attending places where they could not access PMTCT services. There was less information available on the uptake of PMTCT services at most private for-profit health facilities in Liberia. Those private facilities mainly were found in the high prevalence counties rendering health care to pregnant women. This showed that some WLHIV were not getting PMTCT services in time at the right places.

Also, knowledge on the effectiveness of ART is not well known in Liberia. It was shown that Liberia is a low prevalence country and has a high percentage of illiterate population with less access to evidence-based information; consequently, leading to widespread misconceptions around HIV. The kind of misconceptions about HIV were not well explained and will require further study. However, a study done by Amo-Adjei and Darteh in Ghana found that HIV/AIDS stigma and discrimination have been justified by people's perceptions of the disease, and were classifying HIV/AIDS with death, shame, guilt, crime, penalty among others⁶¹.

Communities and families' support

Despite the improved coverage for the second cascade (93% of pregnant WLHIV were on ART), communities and families' interactions influenced PMTCT uptake and resulted in the high loss to follow-up and non-adherence. There was a lack of active male participation in MNCH services and an inadequate community-based approach to PMTCT interventions, influencing retention. Non-adherence and loss to follow-up have been shown in several studies from SSA and Liberia and were highly associated with stigma and discrimination in the societies. Stigma and discrimination were major barriers in engaging, initiating, and retaining women in PMTCT care.

Stigma and discrimination contribute to individual's unwillingness to know their HIV status, sero-positive status denial by WLHIV, non-disclosure of HIV status to partners; and even results in some pregnant and breastfeeding WLHIV to change their geographical locations^{11,16,26}. WLHIV could relocate in areas where PMTCT services were unavailable or transfer to a new PMTCT facility without a referral, thereby appearing to their initial facility as lost to follow-up. Also, pregnant and breastfeeding WLHIV who did not disclose their HIV status to their partners or have non-supportive partner could not adequately follow PMTCT interventions.

Additionally, socio-cultural, and socio-economic factors of families and communities also affect the individual level and program results. Poverty was highly associated with poor utilization of health services, including PMTCT, and has shown to be associated with a poor coping mechanism increasingly affecting the mental wellbeing of WLHIV. Women of reproductive age with less education were more likely to be poor, had inadequate knowledge about HIV/PMTCT, and lacked empowerment to make decisions surrounding their own health. They depended on their partners or family members for financial support and permission before seeking care; and were highly influenced by societal pressure and intimate partner violence, which made them and their children more vulnerable. Also, when living with HIV, those mothers could not ensure an adequate nutritional diet leading to a high viral load. Due to financial difficulties, some could not exclusively breastfeed their infant because they had to make ends meet while a relative looked after the child. Others could also not commit to replacement feeding because of either fear of stigma or lack of financial support to maintain the quality and quantity of formula feeding the child needs to maintain good nutrition. The limited support from the partners (male involvement) and community aggravated the situation of retention and adherence.

Health System and Structural factors

Even though there exists a well-established community health structure in Liberia, consisting of CHWs who have direct interaction with women and children, they are not involved with ART distribution or follow-up for mothers in care. While it was also stated that Liberia has an association of PLHIV and other civil society organizations, they were not fully empowered to take the lead in activities at the community level. Most of the services given were not sufficiently measured, reported and satisfactory, to the needs of pregnant and breastfeeding WLHIV. Likewise, religious leaders who have influential roles in the communities/societies were not fully involved in the HIV/AIDS response, nor were they involved in carrying out any PMTCT promotion activities.

Faith healing facilities providing care were not informed nor trained in active surveillance and referral of PLHIV/WLHIV who visited their facilities for prayers and healing services. There was not much information on support/network groups for WLHIV. Even though mentors-mothers' groups were initiated in Liberia, they were not fully supported and implemented nationwide. In other SSA settings, community-led interventions have been shown to positively impact HIV/PMTCT programs, but in Liberia, major HIV/PMTCT services are still facility-based, signifying a need for a qualitative study to identify the barriers to community-based service delivery for HIV/PMTCT in Liberia.

The health system and structural factors also influenced individuals and communities to respond to the PMTCT uptake in Liberia. This is despite PITC has been combined with PMTCT and integrated with MNCH services to extend the coverage of PMTCT and contributing to more WLHIV having access to PMTCT and ART. Yet, there are several challenges in integrating PMTCT with other reproductive health services for women. These services include family planning, sexual and gender-based violence, STI and cervical cancer screening, and treatment programs, which interfere with the continuum of HIV care resulting in high loss to follow-up during and after the breastfeeding period. One of the interventions of PMTCT is the prevention of unwanted pregnancy among WLHIV, and Liberia has a 30% unmet need for family planning among women of reproductive age-one of the highest in the region¹⁸.

There were also gaps in the availability and quality of MNCH care, which reflected in the uptake of PMTCT services. Most women in rural communities and those in poverty could not have all require (eight or more) ANC visits, deliver in a health facility where PMTCT services are offered, and/or remain committed to their follow-up visit when enrolled in PMTCT care. Resulting in non-retention in PMTCT care and non-adherence to ART. Studies and reports from SSA and Liberia also showed less follow-up mechanism by programs to follow WLHIV who were lost to care. This also reflects the lack of community-based approaches to keep track of WLHIV, who had initiated PMTCT services. In Liberia, there are insufficient skilled human resources to meet the population's demand; and the community health workers who are used to deliver services in hard-to-reach communities are not trained in PMTCT intervention as indicated above. Health providers' attitudes also reflect the gaps in the quality of services provided. A study in Nigeria cited by Avert showed that some health workers had a stigmatizing attitude towards PLHIV/WLHIV that prevented

them from seeking care or retaining in care. Also, reports from Liberia showed that health workers face several health systems challenges. There is limited legal protection towards the violations of patients' rights, contributing to the poor quality of care. The inadequate counseling for pregnant and breastfeeding WLHIV, who were diagnosed and enrolled in care, led to high attrition in the postpartum period and added to the confusion in the feeding options, resulting in mixed feeding, increasing HIV transmission. Global PMTCT guidelines are often updated and require additional retraining for old staff and training for new staff to compensate for the high staff attrition and properly implementing new protocols. Also, all services providers rendering MNCH care were not trained in PMTCT intervention. As such, patients could miss out on important information from service providers; or must be transferred from one area of care to another, which causes lots of constraints for pregnant and breastfeeding WLHIV.

Furthermore, the effectiveness of HIV care requires adequate budgetary allocation, and HIV financing in Liberia is highly donor-based, limiting the implementation of various plans. Viral load monitoring, CD4 monitoring, EID testing, and ART coverage among children (0-14) were lagging behind due to insufficient scaling up those services for PMTCT facilities; viral load coverage (third 90s) for pregnant and breastfeeding WLHIV has not been reported, which shows a gap in the monitoring of the treatment cascade. Monitoring and evaluation of PMTCT interventions, including frequent supervisions and revision of all activities, were not adequately funded. The lack of timely reporting from health facilities, poor accountability, and HIV data discrepancy influenced PMTCT services delivery.

Also, HIV deaths among children have been associated with late infant diagnosis and initiation of ART, which was associated with the poor integration of HIV services in newborn and child health services. Even though the rollout of the Integrated Management of Neonatal and Childhood Illness (IMNCI) for children less than five years, included screening for HIV in children with malnutrition and other sign and symptoms of HIV⁴⁷. More infants are missed for EID because the guidelines are not updated to integrate PITC 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 to timely ART initiation for both mother and children^{62,63}.

5.1 Reflection

The framework has meaningfully helped to meet the study objectives, and all levels of the model were considered, including its subunits were considered. The model can be used to carry out future studies on PMTCT uptake in Liberia.

5.2 Strength and Limitation

There are valid points gathered from evidence-based documents, and the research has identified that while several efforts have been made towards PMTCT/EMTCT in Liberia, the gaps in the implementation of the program is due to inadequate integration of PMTCT with MNCH, which are the divided roles and responsibilities of both the Family health division and the NACP. Most of the problems are related to the general provision of services for women of reproductive age and children. Therefore, a holistic approach in solving the problems in MNCH services will eventually improve PMTCT uptake. However, the research discussion is drawn from the analysis of previous studies and stands a chance of bias. Aspects of the study relating to community-based approaches and other social enablers (mass media, advocacy, and coordination among various stakeholders) towards HIV/PMTCT in Liberia maybe under-reported. It will be necessary to carry out a qualitative study in Liberia to verify the factors influencing PMTCT uptake as identified in this study and detect the strengths and weaknesses of the various interventions carried from the 2015-2020-NSP.

Chapter 6: Conclusion and recommendation

6.1 Conclusion

Over the years, Liberia has been reducing new HIV infections among children through the MNCH care program. Both promoting and hindering factors at the individual, community, health system, and structural levels influenced the PMTCT uptake. At the national level, stigma and discrimination surrounding HIV were further exacerbated by discriminative laws and policies against key populations. Stigma and discrimination were found to be major cross-cutting issues at every level and create gaps in PMTCT uptake. While stigma and discrimination by health providers and in the population against PLHIV are prohibited by law, there were no mechanisms put in place to report the incidence and take timely actions to prevent recurrences. It is the responsibility of policymakers to advocate for implementing laws that protect the rights of vulnerable and at-risk populations.

The socio-economic and cultural factors influenced pregnant and breastfeeding mothers' commitment to PMTCT regimens and impeded program efforts. Improving the social conditions of WLHIV and the population at risk of HIV seem to be a major call for action in the control of HIV. Most women with poor economic status were highly at risk of HIV infection, thereby increasing MCT during pregnancy and breastfeeding. Also, a lack of CSE was influenced by societal norms and the unfavorable religious and traditional environment towards its implementation. Many sexually active individuals were made vulnerable to HIV infections because they lack the empowerment to make the right decision. As a result, adolescents girls and women had limited knowledge about HIV/PMTCT before becoming pregnant.

Additionally, HIV and SRHR integration to promote a holistic approach towards PMTCT interventions was inadequate due to limited HIV funding and was hindering the accessibility of HIV services along the continuum of care; and was a major health systems factor identified. There is a need for further study on the feasibility of the community-based approach towards HIV/PMTCT implementation in Liberia and to identify interventions suitable to the Liberia population's needs. Community health activities have been shown to bring services as close as possible to those most in need and promoting programmatic progress towards HIV/PMTCT. The community health services department in Liberia can help achieve the program's goals through the right-based approach as implemented in other SSA countries. From the study results, the following recommendations have been developed; when implemented effectively, Liberia will be on the path to ending the new HIV infection among children, keeping their mothers alive, and meeting the fast-track targets for 2025.

6.2 Recommendations

To improve the individuals' (15-49) knowledge, perceptions, beliefs, and attitudes

- PMTCT programs should adopt community-based approaches to HIV awareness, prevention, and testing to increase knowledge on HIV and awareness of an individual's HIV status. This should include easy access to condoms for sexually active individuals, availability of self-test kits with information and contact persons, availability of IEC and BCC materials, and continuous awareness-raising through mass media and other social platforms (text messages, Facebook, radio talk show, and HIV prevention promoters at various churches and mosques).
- The MNCH program should ensure adolescent and women's rights to access evidence-based/informed information through CSE at schools and in the communities at various youth organizations. Involve religious and traditional heads and advocate that CSE be integrated into the school curriculum.
- Policymakers should address gender norms and socio-economic barriers through formal and informal education and empowerment programs for women of reproductive age to increase their decision-making power for their health. Include scholarship programs prioritizing females, increasing job opportunities for girls and women, cash transfer programs for girls, and WLHIV, especially during pregnancy. Also, include educational programs for men to increase their knowledge about SRHR service delivery and increase HIV testing among men.

To improve male participation and supportive community's involvement

- PMTCT programs should promote community mobilization, activism, advocacy, behavioral change campaigns, and training PLHIV/WLHIV in stigma reduction through the Association of PLHIV and CSOs/CBOs. This can reduce internal and external stigma, as most PLHIV can cope mentally after some time and serve as mentors for others. Therefore, the association of PLHIV should be supported to identify and encourage professionals PLHIV to carry out HIV/PMTCT interventions for those most in need. Also, peer supporters can be used as differentiated models for the delivery of ART and promote retention in care for PLHIV/WLHIV. Promote multi-month dispensing, which is highly beneficial for communities with limited or no access to PMTCT sites to reduce LTFU. This is even more important during this COVID-19 pandemic, with further barriers to the uptake of HIV/PMTCT services.
- Policymakers should promote a gender-transformative approach to HIV and SRHR, including PMTCT. Encourage active community participation during programs' planning, implementation, and evaluation. Both men and women should have shared responsibilities and promote of male involvement during pregnancy, childbirth, and postpartum, using adolescent and religious communities as partners of change in stopping gender inequalities. Also, set up feedback mechanisms at the community level, where people are the primary consumers of services and can tell whether services meet their needs and identify areas for improvement.

- Policymakers should integrate HIV/PMTCT interventions with primary healthcare, where CHWs are empowered (training, equipment, salaries, and supervision). This will also promote surveillance of cases, facilitate further task shifting to ease the burden of health facilities service providers, and reduce follow-up loss. Other mechanisms should be put in place to hold service providers accountable and promote confidentiality and satisfactory services through patient-centered care.

To address health system factors and policies gaps

- PMTCT programs should use different testing mechanisms that include facility-based and community-based testing. More frequent testing for mothers during pregnancy and breastfeeding should be encouraged. This consists of a follow-up plan for pregnant/breastfeeding women and their infant for timely testing and retesting, during pregnancy and post-partum period up to the end of breastfeeding. Identify at-risk infant or children living with HIV through immunizations services, consultations, and outreaches. Also, integrate PITC with family testing that is rights-based for high-risk communities to identify women in HIV serodiscordant relationships to improve early linkages to care and treatment. Setting up an HIV and community health focal person at the national, county, and district levels will coordinate HIV and other primary health services at the community level.
- Policymakers should increase equitable access to SRHR services and an HIV combination prevention approach to prevent new HIV infection during sexual intercourse, among sexually active individuals, and MCT during pregnancy, childbirth, and breastfeeding. This can be done by integrating and properly implementing HIV and SRHR services, including all services related to the child's health (routine immunization and IMNCI). Also, ensures affordable STI and HIV testing and treatment to improve ART coverage, condom use, and Prep among the at-risk group. Designate a committee on HIV and SRHR integration to oversee these activities with quarterly or bi-annual review meetings to update progress and identify gaps. Also, the committee can play a role in meeting the unmet family planning needs and ensuring different family planning choices are available.
- Policymakers should increase domestic financial arrangements and advocate for more donor support to implement PMTCT strategies efficiently. This includes regular training for facilities and communities' health providers to ensure updated information are implemented without confusion. Ensure the availability of testing equipment (EID, CD4, and viral load) at the PMTCT site if not all but major sites at district/counties levels and improve the transport of specimens through effective mobile transport services. Scale up the feedback system on giving results through mobile text messages/email to various PMTCT facilities in consultations with patients. Address the gaps in referrals system between different levels of care and including monitoring and evaluating. Improve accountability in HIV/PMTCT fundings, strong multi-sectoral collaboration, and public-private partnerships to increase the awareness and utilization of HIV/PMTCT services.

- Policymakers should set up channels to report stigma and discrimination at all levels to the appropriate authorities and ensure legal redress to reduce the effects of stigma and discrimination on PMTCT uptake and HIV programs implementations. This can be carried out through committees involving medical and legal practitioners, policies makers, media authorities, religious and traditional communities, trained to promote anti-stigma awareness messages and address inequalities, stigma, and discrimination in SRHR services.
- National programs should invest in continuous research activities to determine factors influencing HIV/PMTCT services, identifying what works or does not work best in Liberia, and ensure policies and guidelines are tailored to meet the need of the entire population.

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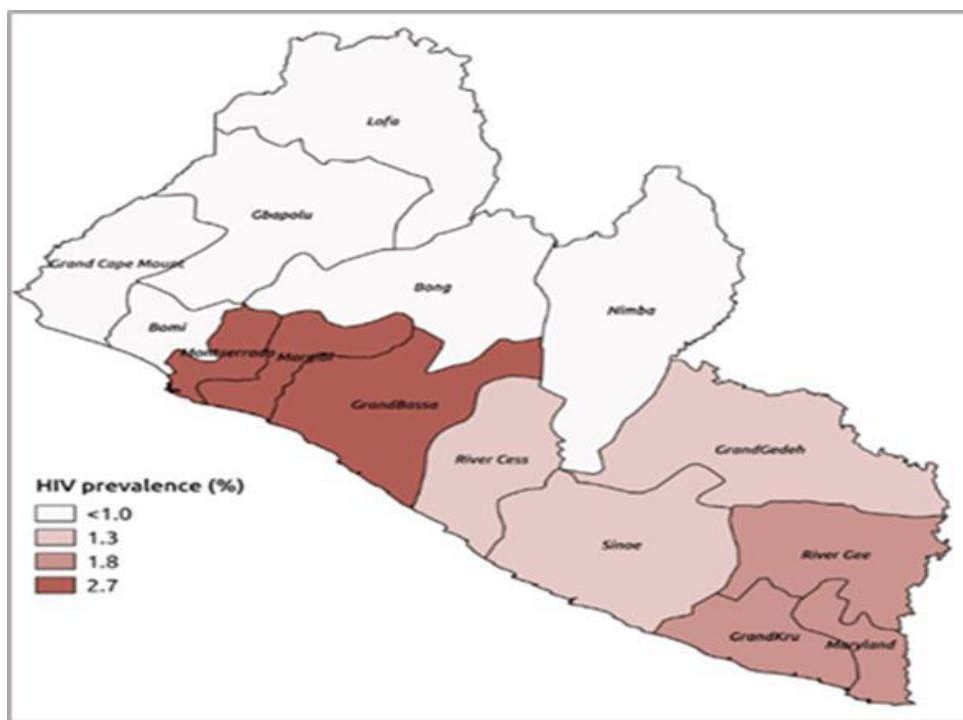
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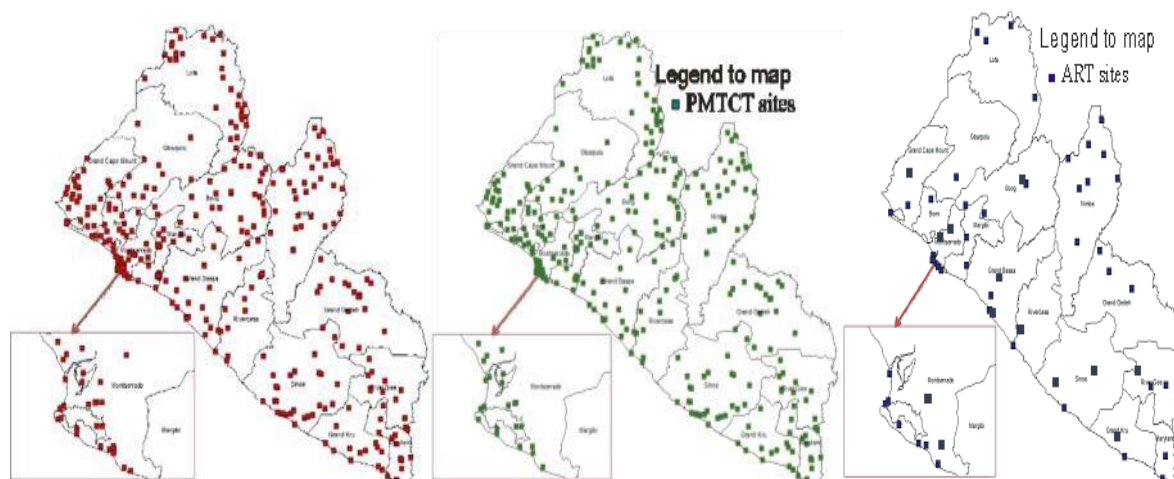
Annexes:

Annex 1. Map of Liberia with HIV prevention per county (2013)¹¹



Source: https://www.emansion.gov.lr/doc/oR_HIV%20NoP%20Devt_Liberia.pdf

Annex 2. Expansion of HIV testing and counselling (red), PMTCT (green), and ART sites (blue) in Liberia (2017)¹¹



Source: https://www.emansion.gov.lr/doc/oR_HIV%20NoP%20Devt_Liberia.pdf

Annex 3. Top-line targets for 2025²⁴

HIV services			Integration	Societal enablers		
95–95–95 testing and treatment targets achieved within all subpopulations and age groups.	95% of women of reproductive age have their HIV and sexual and reproductive health service needs met; 95% of pregnant and breastfeeding women living with HIV have suppressed viral loads; and 95% of HIV-exposed children are tested by 2025.	95% of people at risk of HIV infection use appropriate, prioritized, person-centred and effective combination prevention options.	Adoption of people centred and context specific integrated approaches that support the achievement of the 2025 HIV targets and result in at least 90% of people living with HIV and individuals at heightened risk of HIV infection linked to services for other communicable diseases, noncommunicable diseases, sexual and gender-based violence, mental health and other services they need for their overall health and well-being.	10–10–10 targets for removing societal and legal impediments to an enabling environment that limit access or utilization of HIV services.		
				Less than 10% of countries have punitive legal and policy environments that deny or limit access to services.	Less than 10% of people living with HIV and key populations experience stigma and discrimination.	Less than 10% of women, girls, people living with HIV and key populations experience gender inequality and violence.
				Achieve SDG targets critical to the HIV response (i.e., 1, 2, 3, 4, 5, 8, 10, 11, 16 and 17) by 2030.		

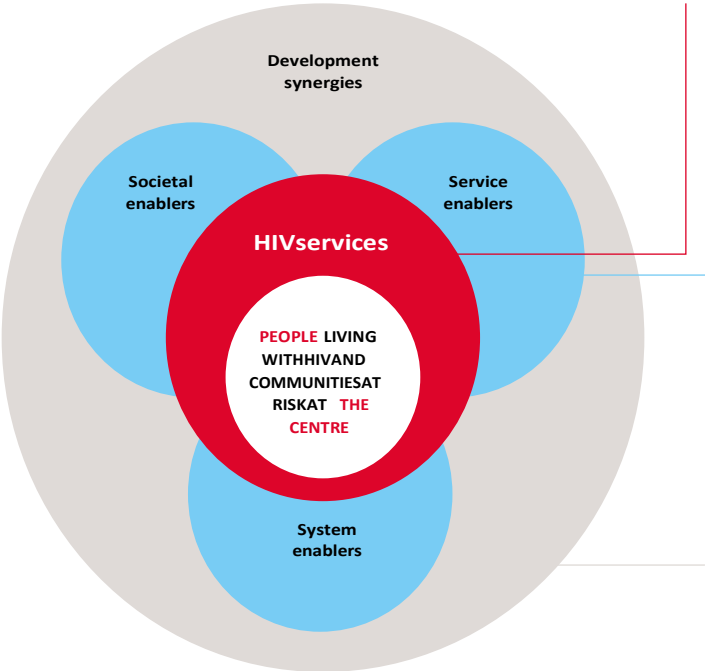
Source: https://www.unaids.org/sites/default/files/media_asset/prevaling-against-pandemics_en.pdf

Annex 4. Detailed targets for sexual and reproductive health services and eliminating vertical HIV transmission²⁴

Population	Target
Women of reproductive age in high HIV prevalence settings, within key populations and living with HIV	95% have their HIV prevention and sexual and reproductive health service needs met
Pregnant and breastfeeding women	95% of pregnant women are tested for HIV, syphilis and hepatitis B surface antigen at least once and as early as possible. In high HIV burden settings, pregnant and breastfeeding women with unknown HIV status or who previously tested HIV-negative should be re-tested during late pregnancy (third trimester) and in the post-partum period.
Pregnant and breastfeeding women living with HIV	90% of women living with HIV on antiretroviral therapy before their current pregnancy
	All pregnant women living with HIV are diagnosed and on antiretroviral therapy, and 95% achieve viral suppression before delivery
	All breastfeeding women living with HIV are diagnosed and on antiretroviral therapy, and 95% achieve viral suppression (to be measured at 6–12 months)
Children (aged 0–14 years)	95% of HIV-exposed infants receive a virologic test and parents provided the results by age 2 months
	95% of HIV-exposed infants receive a virologic test and parents provided the results after the cessation of breastfeeding
	95–95–95 testing and treatment targets achieved among children living with HIV

Source: https://www.unaids.org/sites/default/files/media_asset/prevaling-against-pandemics_en.pdf

Annex 5. Investment framework for the development of the 2025 AIDS²⁴



HIV services are proven to prevent HIV infections or AIDS-related mortality.

Enablers law, system, or action that positively modifies the effectiveness of an HIV service.

Societal enablers include supportive laws and policies and societies that respect gender equality and do not discriminate against PLHIV and key populations.

Service enablers include the linkage or integration of services, differentiated service delivery and community-led services.

System enablers include infrastructure, strategic planning, budgeting, and management systems, monitoring and evaluation systems and communications systems.

Development synergies Broader efforts in different sectors that advance the results of the HIV response. Examples include efforts to end poverty and fulfil the right to health and other human rights

Source: https://www.unaids.org/sites/default/files/media_asset/prevaling-against-pandemics_en.pdf