Exploring factors influencing the utilization of malaria prevention services among pregnant women in Liberia

By
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Liberia

57th Master of Public Health/International Course in Health Development (MPH/ICHD)

14 September 2020 – 3 September 2021

KIT (ROYAL TROPICAL INSTITUTE)

Health Education/

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A thesis submitted in partial fulfilment of the requirement for the degree of Master of Public Health

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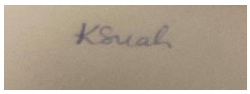
Signature 

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List of Abbreviations

ANC	Antenatal Care
CHAs	Community Health Assistance
CMs	Certified Midwives
CHWs	Community Health Workers
EPHS	Essential Package for Health Services
GCHVs	Community Health Volunteers
HMIS	Health Management Information System
IPTp	Intermittent Preventive Treatment for Pregnant Women
ITNs	Insecticide Treated Net
LDHS	Liberia Demographic and Health Survey
LLINS	Long Lasting Insecticide-treated Nets
LMIS	Liberia Malaria Indicator Survey
LMICs	Low- and Middle-Income Countries
MIP	Malaria in Pregnancy
MOH	Ministry of Health of Liberia
MMR	Maternal Mortality Rate
NMCP	National Malaria Control program
NHA	National Health Account
NDS	National Drug Services
NGOs	Non-Governmental Organization
OOP	Out of Pocket
PHC	Primary Healthcare
PPP	Public Private Partnership
PMI	President Malaria initiative
RMs	Registered Midwives
SSA	Sub -Saharan Africa
SP	Sulphadoxine, Pyrimethamine
SDGs	Sustainable Development Goals
TTMS	Trained Traditional Midwives
TBAs	Traditional Birth Attendance
TIHE	Total Institutional Health Expenditure
UHC	Universal Health Coverage
WHO	World Health Organization

Abstract

Background: Malaria is endemic in Liberia, mostly affecting pregnant women and children. With a prevalence rate of 19%, the disease is responsible for 42% of all clinical consultations and 44% of inpatient deaths. Malaria in pregnancy is the leading indirect cause of maternal death, accounting for 7.5% of the Country's MMR. Even though Liberia's National Malaria Control Program has embraced and prioritized WHO preventative strategies to pregnant MIP, IPTp and ITN use remains low among Liberia's pregnant women.

Objective: The aim of this study is to explore factors influencing the utilization of malaria preventive services among Pregnant women in Liberia for policymakers' attention and consideration that will improve IPTp and ITNs uptake.

Methodology: This research is a review of literature. To investigate factors impacting the utilization of malaria preventive services among Liberia's pregnant women, data were collected and analyzed using the Edgards-Marius et al. conceptual framework.

Findings: Multiple variables were identified by this study to be responsible for the low use of malaria prevention services among Liberia's pregnant women. The most significant are frequent stock outs of IPTp and ITNs, unofficial user fees for prenatal care and limited decision-making power for prenatal care seeking among pregnant women.

Conclusion and recommendation: To overcome these challenges, the NMCP and its partners must improve their monitoring and evaluation systems and prioritizing the empowerment of community health workers to administer these commodities at the community level, with full male participation in prenatal services.

Key words: Malaria, ITN, Liberia, ANC, uptake

Wordcount: 12, 357

Introduction

Malaria is a potentially life-threatening parasitic disease caused by the inoculation of a human host via the bite of the female Anopheles mosquito vector (1). Globally, Plasmodium vivax (P. vivax) has the highest prevalence of malaria followed by Plasmodium falciparum (P. falciparum) which is the most virulent malaria species that is predominantly found in Sub-Saharan Africa (SSA). The other three Plasmodium species known to cause malaria in humans are P. ovale, P. malariae, and P. knowlesi. Many new infections are caused by P. vivax and P. falciparum, which are immune to regular chloroquine treatment in Africa (1).

An estimated annual incidence of 350-500 million cases with approximately 1-3 million deaths per year was reported by the World Health Organization (WHO) in 2009. Malaria, after tuberculosis, is the world's second-leading cause of infectious disease-related death globally (2). P. falciparum and P. vivax are the two malaria parasites with the highest incidence of malaria infections with P. falciparum mostly linked to severe malaria complications and death worldwide (3).

Approximately 90% of all malaria cases in the world arise in Africa. P. falciparum accounts for 99 percent of these cases with an associated mortality of 91 percent within the general population (2). Even though the number of malaria cases in SSA has decreased from an estimated 146 million cases in 2005 (UI: 135–156 million) to 131 million in 2010 (UI: 126–136 million) and 114 million in 2015 (UI: 126–136 million), the number continues to indicate the high burden of the disease (2). Malaria is most prevalent in rural tropical areas typically affecting vulnerable groups including Pregnant Women (PW) (especially primigravida individuals), children under 5 years of age, and those with poor immunity such as persons with HIV and AIDS (1)

As a Nurse and a Public Health Practitioner working with the WHO From 2016 to 2019, I provided technical assistance to the Grand Kru County Health Team (CHT) in remote, rural southeast Liberia, promoting the building of a resilient health system (post-Ebola epidemic), with a focus on maternal and child health. During this time, I became aware of the low uptake of Malaria in Pregnancy (MIP) prevention services; Insecticide Treated Net (ITNs) and Intermittent Preventive Therapy (IPTp), using Sulphadoxine, Pyrimethamine (SP). These gaps were highlighted during the County review meetings with an emphasis on the low uptake of IPTp 3+. I became even more concerned when data from the 15 counties were presented at the National Review Meeting, revealing that IPTp and INTs uptake is still significantly below the country's 85 percent objective, even though this is one of the Health Ministry of Liberia's well-funded programs. This study aims to investigate the factors that influence the uptake of these MIP preventive services to make recommendations to Liberia's National Malaria Control Program (NMCP) on measures to address this problem.

Chapter One: Background of Liberia

Background

Geography

Liberia is a small low-income country on Africa's west coast that is divided into fifteen political subdivisions/counties that are spread across the country's five regions (**see figure 1) (**1) (2).

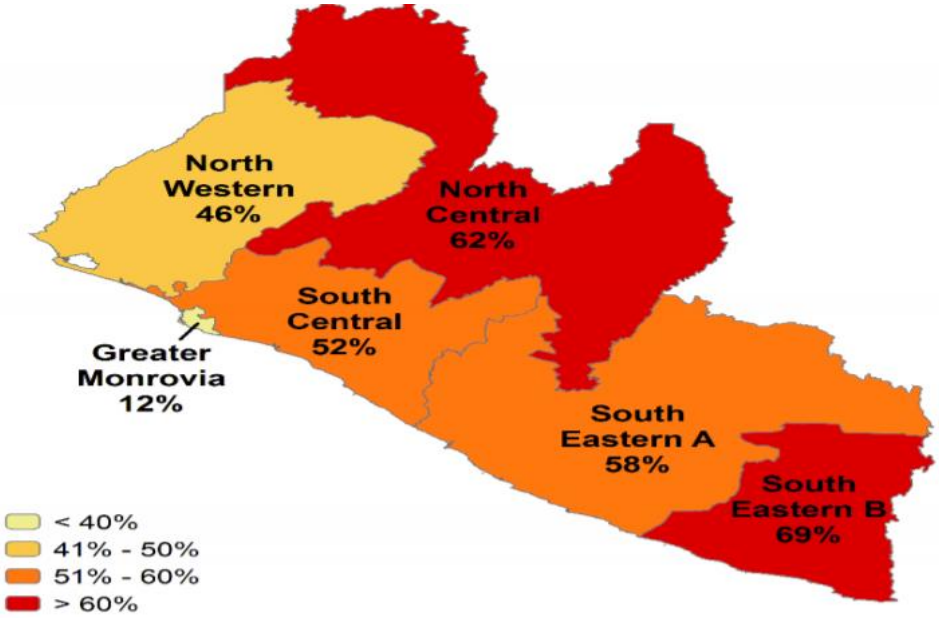


Figure 1: Map of Liberia showing the five regional zones (4)

Present-day Liberia covers 43,000 square miles and is bordered on the southwest by the Atlantic Ocean and the neighboring countries of Sierra Leone (northwest), Guinea (north), and Côte d'Ivoire (north) (east and southeast). Liberia has two seasons: the rainfall, which starts in May and ends in October, and the springtime, which goes from November to April (1). Malaria transmission is common all year, in both seasons with a higher frequency during the rainy season because of more mosquitos breeding in stagnant water produced by heavy rainfall, (2). A larger proportion of the country is below 500 meters above sea level. Wetlands define the coastal areas, which give way to the tropical rain forest, which spreads out northwards and is substituted by evergreen woodland (1). Malaria transmission is possible across Liberia's entire geographic area due to the tropical climate (3). All five (5) species of malaria parasites are present in Liberia but Plasmodium falciparum, like many other Sub-Saharan African countries, is the most prevalent Malaria parasite, accounting for more than 90% of malaria infections (4).

Demography, Health and Socio-Economic Situation of the population

Table 1 : General Socioeconomic, demographic and health characteristics of Liberia (1)(8)(15*)*

Demographic Characteristics	Values	Sources
Population	5 million	The world Factbook 2021
Annual Population Growth rate	2.74%	The world Factbook 2021
Total Fertility rate	4.84 children born/woman	The world Factbook 2021
Population density	127per Km2	WHO GHO Key Country Indicators 2019
Crude mortality rate	6.78deaths/1,000 population	The world Factbook 2021
Under 5 mortality rates	84.6 deaths per thousand live births	World DATAATLAS 2019
Infant mortality rate	45.98deaths/1,000 live births	The world Factbook 2021
Maternal Mortality Rate	661deaths/100,000 live births 2017	The world Factbook 2021
Average life expectancy	65.1 years	The world Factbook 2021
Population: 0 to 14 years	43.35%	The world Factbook 2021
Population: 15 to 24 years	20.35%	The world Factbook 2021
Population: 25-54 years	30.01%	The world Factbook 2021
Population 55-64years:	3.46%	The world Factbook 2021
Population 65 years and above	2.83%	The world Factbook 2021
% Of PW that slept under LLINs the night before the Survey	47%	Liberia LDHS 2019-2020
% Of PW taking 2 or more doses SP for IPTp	40%	Liberia LDHS 2019-2020
Average attending ANC (1st to 4th visits)	23%	Liberia LDHS 2019-2020

Liberia's population was estimated to be over 5 million people in 2020(1). Females account for 49.70 percent of the overall population (5) as well as the fertility rate of 4.84 children per woman (1). Liberia's population is quite youthful with 44.5 percent under the age of 15. The crude birth rate is roughly 33.80%, (6) (5)(7) with a life expectancy of 65.1 years for both men and women (8). With an annual growth rate of 2.74% (1) and a population density of 127 per Km2, the country is listed 134th in the world in terms of population density ranking (8). Despite its wealth in natural resources, Liberia is one of the poorest countries in the world (10). An estimated 50 percent of the population lives on less than 1.25 % of the national income, which is extraordinarily below the global poverty line (1).

The official language of the country is English with the presence of more than 16 indigenous languages. Ninety-five percent of the population speaks these native languages and are labeled as indigenous, while the remaining 5% are Americo Liberians, also known as Congo people including foreigners. Christians account for 85.5% of the population, with Muslim's accounting for 12.2% (1). The literacy rate increased by 5.3 percent between 2007 and 2017, but gender disparities remain significant. Of the 48.3% literate adults, females account for only 34%; similarly, of the 55% youth literacy, 46% are females, with males accounting for the rest (11). Several studies have found a strong relationship between literacy and healthcare-seeking behavior (12). According to a recent study conducted in neighboring Nigeria, illiteracy was

identified as one of the primary reasons why pregnant women did not adhere to ANC visits (13).

Following the 14-year civil war coupled with the 2014 Ebola outbreak in the West African nation, the rural region is no longer appealing to Liberians, particularly youths, due to a variety of factors including government non-investment in growing crops, which is the primary source of revenue in rural communities. Older land ownership has also made agriculture unappealing to youths, and inequalities in access to basic social services and infrastructure between rural and urban areas (14) (15) which has led to increased urbanization of 52.6% of the total population (1). This increased urbanization has led to overcrowding of the country's capital Monrovia with approximately 25% of its total population living in greater Monrovia alone (16). Because of poor infrastructure, a damaged sewage system, and overcrowding of communities and homes which facilitate mosquitoes breeding, 70 percent of Monrovia's inhabitants who live in slum communities are predisposed to highest risk of malaria infection (17).

Culture, Beliefs, and Practices

Liberia is a country that embraces a wide range of cultural beliefs. These cultural beliefs and traditions have an impact on the use of MIP preventive interventions. Pregnancy is taboo to discuss until it becomes visible, and most women lack the decision-making power to seek healthcare unless their husbands or mothers-in-law approve (18). Furthermore, there are many misconceptions about the healthcare delivery system that keep these women out of health facilities and push them to seek traditional therapy while pregnant predominantly in the rural setting (18).

Liberia's Health System

Liberia's health system has over 701 healthcare facilities, including private facilities, spread over the 15 counties. There are two tertiary hospitals, 85 health centers, and 605 clinics that are government owned. Most of these health centers and clinics deliver free Ante-Natal Care (ANC) Services to pregnant women (14). These facilities are in regions/clusters namely, Northwestern, North Central, South Central, Southeastern A, and Southeastern B (15). For patient advance consultation and management, referral hospitals are in all counties within these zones (14).

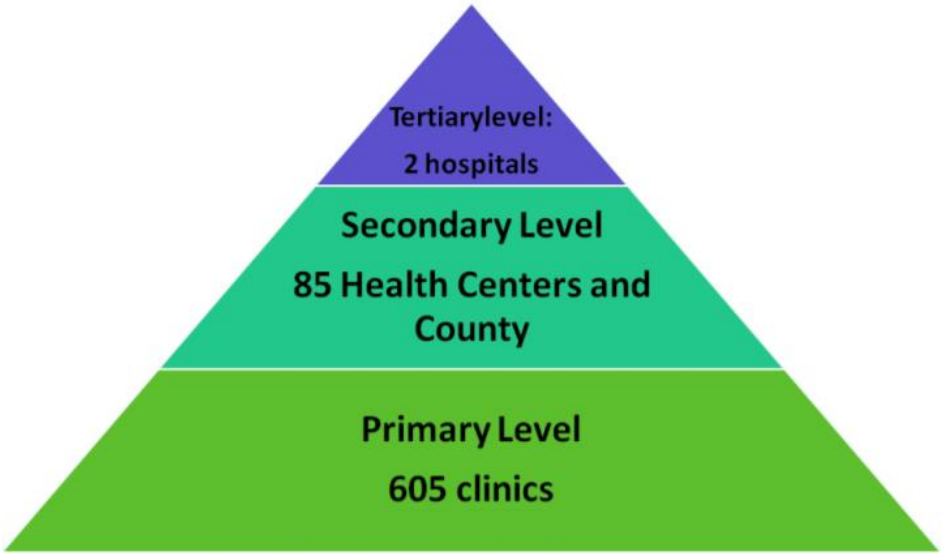


Figure 2: Pyramid showing health facilities in Liberia (14)

Service delivery

Liberia's healthcare sector comprises a three-tiered system namely, Primary (gatekeeping), Secondary, and Tertiary levels (19). The central Health Ministry (MOH), with the assistance of its partners, oversees the creation and regulation of policies and guidelines, as well as providing technical and financial support to the country's already decentralized health system (20). The Primary level includes Primary Health Care (PHC) levels 1 and 2. The PHC level 1 focuses on the community health system. The principal providers of health services at this level are Trained Community Health Assistance (CHA), Trained Traditional Midwives (TTMs), and General Community Health volunteers (GCHVs). Together they serve a population of up to 3,500, with a focus on populations that live in communities that are more than 5 Kilometer away from the nearest healthcare facility. PHC level 2 are basic clinics that serve a target population of 3,500 to 12,000 people per catchment communities. Both PHC levels 1 and 2 offer similar services, such as community outreaches providing health education at the community level and referring pregnant women to the basic clinic for ANC services as well as health centers and hospitals for further management (21) (22). Health centers and district hospitals are healthcare facilities that receive referrals from the primary level for further management. They normally serve a population range of 25000 to 40,000 people. Similarly, the counties referrals hospitals, which serve a population of over 200,000, receive patients and clients from these secondary levels for further management. The country has two tertiary referral hospitals that provide advice management at all levels and are open 24 hours a day, seven days a week. They serve a population of 500000 persons in their catchment area (14).

Liberia uses a Public-Private Partnership (PPP) Model approach in which Non-Governmental Organizations (NGOs) are hired by the MOH to provide an Essential Package of Health Services (EPHS) to the public in Government-owned facilities through a pool fund system. However, as of 2015, Liberia's private-not-for-profit health facilities contributed 47% of the country's total health services, while Private -profits provided less than 30% (23).

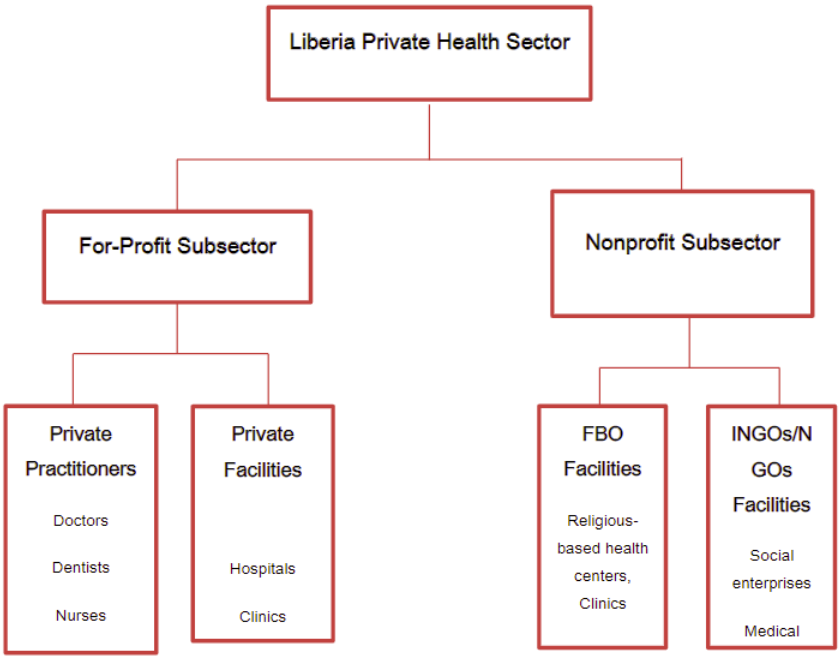


Figure 3: Private sector health actors in Liberia (23)

The MOH through the NMCP is charge with the responsibility to spearhead the implementation of the malaria control program with a focus on under 5 children and pregnant women, precisely MIP. To ensure that these services are provided free of charge, the MOH, included the malaria control services into the EPHS (4).

Partners in malaria funding and program support include (but are not limited to) the following: U.S. President's Malaria Initiative (PMI), Global Fund to Fight AIDS, Tuberculosis, and Malaria, World Bank, and the WHO (22). PMI as the Lead Supporter of the National Malaria Control Strategy in Liberia looks at three primary interventions that are included in the National Malaria Strategic Plan, namely: case management, MIP, and the use of ITNs. The organization also provides technical guidance to the NMCP in drafting and distributing malaria control policy, strategic, operational, and implementation guidelines at the national level, as well as financial and logistical support for service delivery of malaria control commodities in health facilities and communities. The procurement and distribution of quality-assured malaria consumables is part of PMI's technical and financial assistance to the NMCP (2)(3).

Health Information and Research

The Liberian Health Information Management System (HMIS), which is run on the DHIS2 platform, collects data from healthcare facilities on all services delivered, including malaria prevention and management for decision making. Before the system was deployed, all healthcare providers received training on how to use it, a factor which has built their capacity in collecting and generation of information (24). Following the 2014 Ebola outbreak in Liberia, mHero, a mobile phone-based system for real-time reporting of health information with a focus on priority diseases, was piloted and launched (24). There is usually a delay in the provision of feedback to the county district and healthcare facilities level which make prompt response to health emergency sometimes challenging.

Health Financing

Liberia has faced numerous unforeseeable occurrences over the years, including the recent COVID-19 outbreak, which has wreaked havoc on the economy and healthcare system. Despite limited investment in the healthcare system and a heavy reliance on aid, Liberia continues to provide affordable healthcare, including free ANC services in public facilities, to meet the Universal Health Coverage mandate (14).

The country's overall health spending in 2019 was US$ 3.071 billion rising from 127 million in 2009/2010 and US $ 65 million in the National Health account (NHA)baseline survey in 2007/2008. The Total Health Expenditure (THE) per capita also increased from 32.35 in 2010 to 45.42 in 2018. However, government health spending as a percentage of overall government expenditure remaining far below the Abuja objective of 15.0 percent (**see table 2**). (25).

Table 2: Summary of general institutional health expenditure findings 2007 to 2018 (25)(11)

Indicator	2007/2008	2009/2010	2018/2019
Population	3.6 million	3.9 million	5 million 2020
Total real GDP	US $ 670,000,000	US$ 932,833,104	US$ 3.071billion 2019
Total Government Health Expenditure	US$15,470,944	US$18,856,0291	219million 2019
Total Institutional Health Expenditure per capital (TIHE)	18.68	32.35	US$45.42 2018
TIHE as % of normal GDP	9.7	13.6	US$ 6.7% 2018
Government Health Expenditure as % of Government expenditure	7.73	6.79	US$ 6.7%
Out of pocket expenditure as a share of current health expenditure	49.8	51.1	US$ 41.8% 2018
Voluntary Health insurance as a share of current health expenditure			US$ 6.9% 2018
Private expenditure on health as a share of total health expenditure	60.6	54.4	US$ 49.6% 2018

External sources of funding contributed the most to healthcare financing in 2017, followed by out-of-pocket (OOP) payments with government accounting for the least **(see figure 4).**

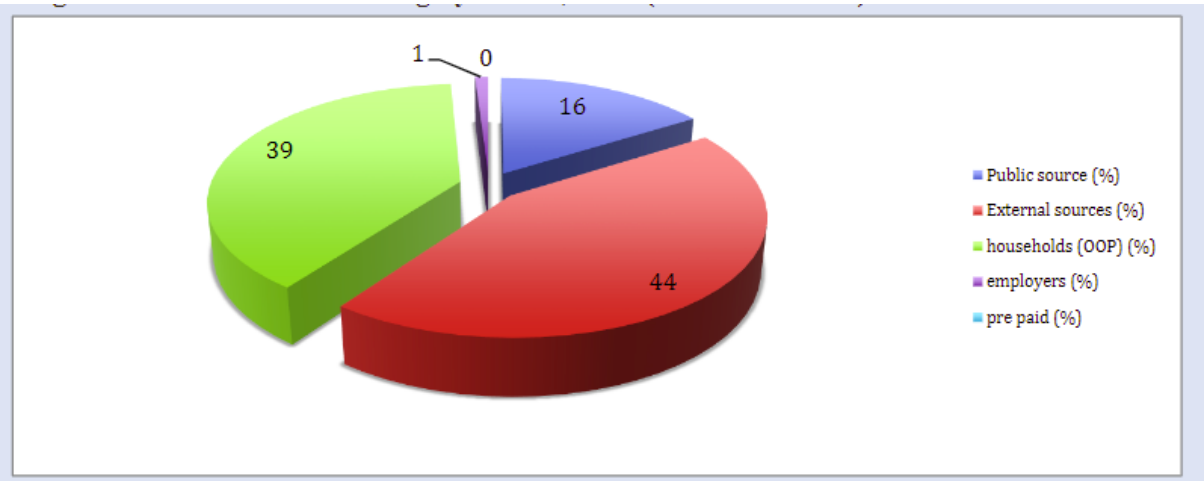


Figure 4: Health financing per sources (7)

Malaria program, like the national overall health spending, is primarily reliant on donor support as well, with PMI serving as the primary donor since the beginning of this program in 2008(27). The US government spent $14,000,000 on malaria in 2020 through PMI, which was spread across several mechanisms and activities to ensure the successful implementation of the NMCP program (28).

Table 3: Malaria annual budget by level 1 category from 2018-2020 including contributors (3)

Year[1]	Funder	Vector Control	Case Management	Drug-Based prevention[2]	Supply Chain[3]	Monitoring, Evaluation & Research	Other Cross-Cutting and Health Systems Strengthening	Total
FY17/CY18	PMI	$2.6M	$5.3M	$0.6M	$1.6M	$1.2M	$2.6M	**$14.0M**
	Global Fund	$0.004M	$1.9M	$0.2M	$0.7M	$0.8M	$3.2M	**$6.8M**
	Host Gov[4]	-	-	-	-	-	-	-
	Total	**$2.6M**	**$7.2M**	**$0.8M**	**$2.3M**	**$2.0M**	**$5.8M**	**$20.8M**
FY18/CY19	PMI	$2.0M	$3.9M	$0.7M	$2.3M	$2.8M	$2.4M	**$14.0M**
	Global Fund	$0.001M	$1.3M	$0.2M	$0.003M	$1.0M	$4.9M	**$7.4M**
	Host Gov[4]	-	$0.1M	-	-	-	-	**0.1M**
	Total	**$2.0M**	**$5.2M**	**$0.9M**	**$2.3M**	**$3.9M**	**$7.2M**	**$21.4M**
FY19/CY20	PMI	$2.6M	$5.4M	$.8M	$2.0M	$.7M	$2.5M	**$14.0M**
	Global Fund	$7.5M	$1.6M	$.2M	$.1M	$.8M	$4.9M	**$15.2M**
	Host Gov[4]	-	-	-	-	-	-	-
	Total	**$10.1M**	**$7.0M**	**$1.0M**	**$2.1M**	**$1.6M**	**$7.4M**	**$29.2M**

Domestic general government expenditure on malaria - current NCU per capita in Liberia increased significantly from 247.88 to 436.99 between 2016 and 2018, rising at an annual rate of 49.06 percent in 2018 according to the Liberia - Health Expenditure Data.

Health Workforce

Liberia's health system continues to face restricted human resource issues due to a lack of proper support and skill, which has hampered personnel recruitment, distribution, and retention, particularly in remote areas (29). The doctor-to-patient ratio in Liberia is currently 1: 15000 when the WHO recommends 1: 1000. Furthermore, before the 2014 Ebola outbreak in the West African country, which infected 375 healthcare workers and killed 189, the health work-to-patient ratio was 3: 10,000, compared to the WHO recommended 22: 10,000 (30). In addition, living conditions in the rural areas and low salaries result in high rates of staff attrition, especially in the counties further from the capital. This has an impact on malaria control and prevention efforts at medical facilities, particularly in the rural areas where Healthcare providers with the basic knowledge and skills in malaria prevention are not retained (31).

Medical Products and technology

The MOH through the National Drug Service (NDS) oversees the procurement and distribution of drugs, medical supplies, and equipment across the Country. To ensure availability, medications and other medical supplies are acquired and delivered quarterly across the 15 counties (20). Notwithstanding, pharmaceuticals and other supplies are characterized by poor supply chain management, notably in terms of distribution and storage. Essential authentic

medical equipment and pharmaceutical goods are in limited supply, and stock outages are common, particularly in areas of the country not currently sponsored by international donor agencies (20). For instance, due to its use as both a preventive and therapy for both intended and non-targeted groups, there is usually a scarcity of SP in most Liberian healthcare facilities (32). However, investment in health infrastructure, such as health facilities, vital medical equipment, and pharmaceutical items, is a sub-sector with the strongest possibilities of U.S. corporations (20). The USAID Global Health Supply Chain Program procurement and Supply management (GHSC-PSM) initiative is collaborating with the NDS to address the issue of supply chain management (33).

Leadership and Governance

Liberia's Ministry of Health is divided into three sections: Administration, Planning, and Health services. The NMCP reports directly to the MOH Department of Health Services as one of its most active and highly donor-funded programs (34). In all counties, the health system is decentralized and overseen by County Health Officers (CHOs) (28). Liberia's central Health Ministry (MOH), with the help of its partners, oversees the health sector. The NMCP is the focus of USAID's initiatives, which include technical support at the national, county, and district levels to build the country's capacity in strong leadership and governance for decentralized healthcare management (33). Malaria services are said to be available in 97% of healthcare facilities across the country (32) with focal points at the county, district, and healthcare facility levels providing regular updates to the central level. To ensure that international-standard malaria services are provided to Liberians, the NMCP, with technical assistance from its lead partner PMI, develops and distributes malaria intervention policies, protocols, and guidelines in all healthcare facilities that provide malaria services across the country with regular refresher training on malaria case management including MIP (2).

Chapter Two: Problem Statement & Justification

Problem Statement

Globally, 25 million pregnant women are at risk of malaria, which causes over 10,000 maternal and 200,000 neonatal deaths per year (35). According to research, women who are pregnant are threefold more likely than non-pregnant women to develop a serious disease because of malaria infection, with a mortality rate of more than 50% (35). Worldwide, the prevalence of malaria is higher in primigravida than in non-pregnant or multigravidas with maternal complications thought to be mediated by pregnancy associated with low immunity and placental sequestration of P. falciparum (36).

Pregnancy compromises a woman's immune response to malaria attacks, exposing them to increased risk of infection such a; severe anemia, spontaneous abortion, premature delivery, or death while subjecting the fetus to the risk of low birth weight or stillbirth (35). It also has negative socio-economic consequences for the individual and the country, such as healthcare costs, including transportation and burial in the event of death, cost of preventive measures, educational days missed, and absenteeism from work, which results in loss of income and decreased productivity. High costs for public health interventions (insecticide spraying or Insecticide Treated Net (ITN) distribution) are other socio-economic impacts of malaria infection (37).

Approximately 25 million African women become pregnant in malaria-endemic areas annually, placing them and their babies at risk of Plasmodium falciparum malaria infection (38). Most women in the African Region reside in areas of relatively stable malaria transmission (39) where the principal effects of malaria infection during pregnancy are associated with malaria-related anemia that may be devastating to the mother and the fetus (38).

Malaria continues to have a devastating effect on people's health and livelihoods, especially in the Sub-Saharan African region, despite remarkable progress made in preventing and eradicating the disease to date (40). For example, malaria infection was directly responsible for 10% of maternal deaths in a study conducted in Mozambique in 2009, whereas HIV/AIDS, which can be worsened by coexisting malaria infection, was responsible for 13% of maternal deaths (41). This indicates that while malaria has been eradicated in parts of Europe and Central and South America, the disease appears to be a concern in Sub-Saharan Africa (41). In 2015, 20% of stillbirths, 11% of newborn deaths and 10, 000 maternal deaths in Sub-Saharan Africa were attributed to malaria (40).

While many countries in Sub-Saharan Africa have made substantial progress toward scaling up their MIP preventive services indicator, the 2010 Roll Back Malaria (RBM) and PMI targets for IPTp ITNs coverage among pregnant women remain unmet (RBM, 80 percent; PMI, 85 percent) (42). Utilizing a variety of surveys collecting data on IPTp and ITN coverage, the reasons why MIP programs in most African countries are struggling to reach their goals is difficult to explain because many programs are aimed at boosting MIP Preventive services indicators in those Countries (40).

Malaria is endemic in both rural and urban Liberia because of the Country's geographical attribute (4). In 2017, Liberia's total population of 4.7 million people was at risk of malaria, with a prevalence rate of 19 percent, one of the highest in the world. Malaria prevalence varied widely by county, with the highest rates in the southeast B reaching 49%. Malaria continues to be a major contribution to the country's disease burden, and it is the disease that receives the most financing of the three leading diseases (HIV, TB, and Malaria). OOP contributed 49 percent of the $62 million spent on malaria in the 2015/2016 fiscal year, followed by donors (31%), and GOL (20%) (43).

Table 4: Burden of Diseases for HIV, TB, and Malaria compared to health expenditure (43)

	HIV	TB	Malaria
Burden of disease	40,000 people living with HIV	308/100,000 incidence rate	193 malaria cases per 1,000 people (911,333 cases)
Prevalence rates	1.4% (adult)	2%	19%
Health expenditure for disease area	$14.9 million	$9.6 million	$61.5 million
Percentage of total health expenditure	5%	3%	19%
Percent of disease expenditure by donors/GOL/out-of-pocket	43%/16%/41%	46%/29%/26%	31%/20%/49%
Current annual resource need	$33 million	$7 million	$36 million

Sources: MFDP, 2017; UNAIDS, 2018; WHO, 2018a, 2018e

This disease condition continues to be a major public health issue where it mostly affects young children and pregnant women like many other SSA countries (44). Malaria is responsible for 42% of all clinical consultations and 44% of all inpatient deaths in Liberia, with pregnant women and children under the age of five accounting for a huge portion of these figures (4).

Women of reproductive age account for about 23 percent of the Country's total population of 3.5 million people (45). MIP is one of Liberia's most common indirect causes of maternal death, accounting for 7.5 percent of the country's current Maternal Mortality Ratio (MMR) (39). Liberia ranks among the countries with the highest MMR in the world, with an MMR of 661/100000 live births in 2017 (15)(46). Against this backdrop, the NMCP has adopted and prioritized the WHO prevention efforts towards pregnant women for MIP prevention in Liberia (38).

Among pregnant women, the core preventive interventions are vector control through the provision and use of ITNs and IPTp with the use of SP during pregnancy to prevent pregnancy-associated malaria (47). The combination of both prevention strategies is cost-effective and is associated with a substantial reduction in malaria transmission (38). According to WHO, the consistent access and use of ITNs and IPTp protect PWs from malaria-related morbidity and mortality while non-use of preventive measures has severe morbidity and mortality implications, especially for pregnant women and under-five children (42)(35).

JUSTIFICATION

As in most disease conditions in tropical Africa, pregnant women and children are the most vulnerable group most especially malaria (37). As such, the WHO prioritizes prevention efforts aimed at alleviating the risk of infection and reducing the likelihood of suffering severe forms of the disease or its complications (42).

The use of preventive measures against malaria among pregnant women is a key factor for the actualization of the malaria control strategy in Liberia (4). The 2019 – 2020 Liberia Demography Health Survey (LDHS) identified that 55% of the Liberian households had access to ITNs during the survey, yet most of these nets were obtained through mass distribution, with only 6% obtained during ANC visits (15). The WHO recommends three doses of IPTp to be adequately protected against malaria during pregnancy. From 2009 to 2020, Liberia made some progress in terms of IPTp uptake however, the results indicate that the country is still far from achieving its MIP indicator target (see figure 5). (15).

Figure 4: Trend in IPTp use by pregnant women from 2009 – 2020

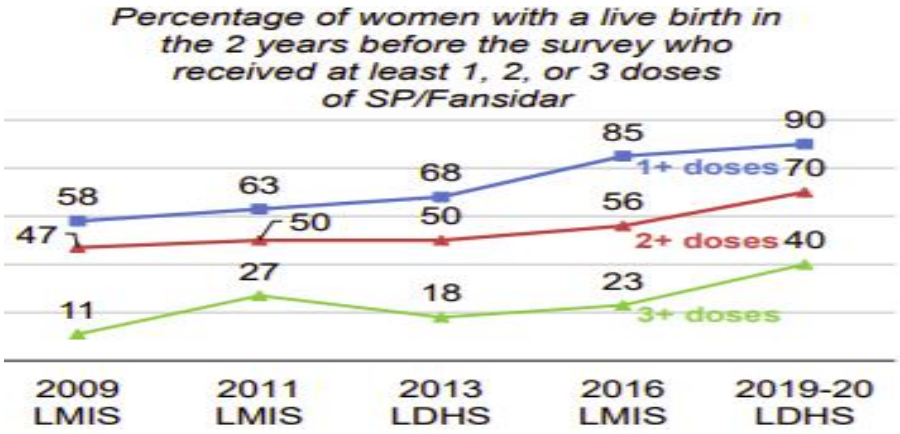


Figure 5:Trend in IPTp use by pregnant women from 2009-2020 (15)

Meanwhile, the utilization of these MIP prevention services remains far below the Country's 85% and Abuja's 80% target, a factor that this study wants to investigate (4).

The situation is even worse for pregnant women living in rural Liberia where access to ANC is limited as compared to urban areas (4). Urban women are reported to be four times more likely than women in rural areas to receive ANC from skilled Healthcare providers like Midwives, Nurses, or Doctors at a rate of 21% versus 5% (2).

The purpose of this study is to identify factors that influence the use of malaria prevention strategies among pregnant women in Liberia to provide recommendations based on the gaps discovered, to assist policymakers in planning and implementing activities aimed at improving the MIP preventive services usage in Liberia. It will also serve as a valuable resource for future researchers on this topic.

General Objective

To explore factors influencing the utilization of malaria preventive methods among Pregnant women in Liberia, to inform policymakers (Ministry of Health and Partners) to make informed decisions that will improve the utilization of these services among Pregnant Women across the Country.

Specific objectives

1. To explore pregnant women related socio demography factors that influence the uptake of malaria preventive services among pregnant women in Liberia
2. To explore pregnant women related sociocultural factors influencing the utilization of these malaria preventive services among pregnant women in Liberia
3. To identify the health system factors influencing the utilization of malaria preventive services among pregnant women in Liberia
4. To explore best practices from other countries that have expanded the use of malaria prevention services and to advise health authorities on how to adopt them in Liberia to increase the uptake of MIP preventative services.
5. To inform policymakers (Ministry of Health and Partners) to make informed decisions that will improve the utilization of these services among Pregnant Women across the Country.

Research Method

This study is a literature review. The search was done using the internet. For analysis, all potentially relevant data related to the selected topic was obtained. The latest versions of national and global malaria control strategies, as well as related publications, were searched. The focus was on papers that have been peer-reviewed as well as gray regional and global articles from in and out of Liberia. In the case where information about Liberia was missing, documents describing the situation in neighboring countries were included. To explore relevant literature to address factors influencing the utilization of malaria preventive services for pregnant women at Health Management Information System, materials or information were gathered from the following: Google scholar and Google as search engines. Databases such as PubMed, Ebase, Medline, Vu Library, Mendeley Library and websites of UNICEF, PMI, WHO, ICF International, World Bank, African Development Bank, Liberia Ministry of Finance and Liberia MOH and MOH/HMIS were as well searched for information.

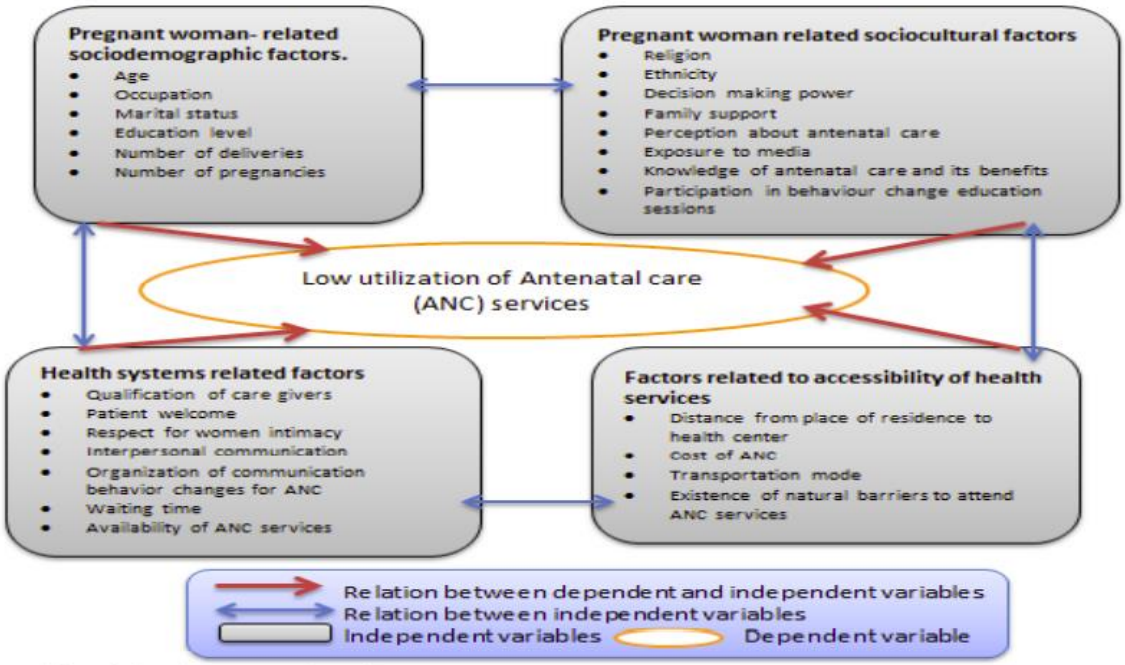
Inclusion and Exclusion Criteria

In this thesis, papers that were authored, published, and assessed online were included in the analysis. Articles that were not available publicly or that had not been officially accepted were excluded from the analysis. However, a possibility exists that some recent, important publications were missed for inclusion in this study. Articles included were also those published after the year 2000. However, older articles containing important information that is unlikely to change over time were included. Because English is the primary language of the researcher and intended audience, only English language documents were examined for analysis and dissemination of this study results.

Conceptual Framework

The conceptual framework focused on the determinant of low Antenatal Care services utilization during the first trimester of pregnancy in southern Benin rural setting, adopted from Edgards – Marius et al. 2015 (48) was used to collect and analyzed data and relevant documents related to this research topic. This service utilization paradigm helped the researcher to explore the utilization of malaria prevention strategies and interventions utilizing both independent and dependent variables. This framework focuses on the inadequate utilization of ANC services during the first trimester of pregnancy, and it was used in this study to assess the utilization of MIP preventive services because ANC utilization is an independent variable for MIP preventive services uptake. These variables were describing the key pillars under headings such as pregnant women–related sociodemographic factors, pregnant women–related socio-cultural factors, health system-related factors as well as factors related to the accessibility of health services, to obtain and present evidence that will answer the questions highlighted in the objectives. Modification in the application of key elements listed as headings and sub-headings to address the objectives of the thesis was mentioned.

The researcher will use the components of this framework to explore the factors influencing the utilization of malaria prevention services among pregnant women in Liberia and how they contribute to the overall disease burden in this target group.



Adopted from (Edgard-Marius et al. 2015)

Figure 6: Conceptual Framework of utilization of Antenatal care service during the first trimester of pregnancy in southern Benin in 2014(48)

Chapter Three: Results/ Findings

3.1 Introduction

Considering MIP preventive services rely on prenatal care use, most of the variables in this result session will focus on prenatal care utilization and adherence throughout pregnancy to determine the uptake of malaria preventive services.

3.2 Pregnant women-related socio-demographic factors.

Age, occupation, marital status, and educational status of pregnant women are among the sociodemographic variables that will be scrutinized in this study.

Age

Young maternal age was found as one of the primary characteristics responsible for low use of free ANC services in a study done to investigate the underutilization of free ANC services in Finland (49). In a population-based study conducted in Nepal in 2014, older age, higher parity, higher levels of education, and household economic status were identified as factors that increased the uptake of ANC services (50), which is the primary MIP service delivery point. In contrast, Hajizadeh et colleagues discovered that multiparous women were less likely to attend prenatal services as compared to primiparous women (51). However, a systematic review conducted in Sub-Saharan Africa, including Liberia, to identify factors affecting the delivery, access, and use of interventions to prevent malaria in pregnancy found that, young maternal age is also a major barrier to pregnant women seeking ANC services (52). The Current LDHS also revealed regional difference among urban and rural pregnant women in Liberia (15). (**See figure 7)**

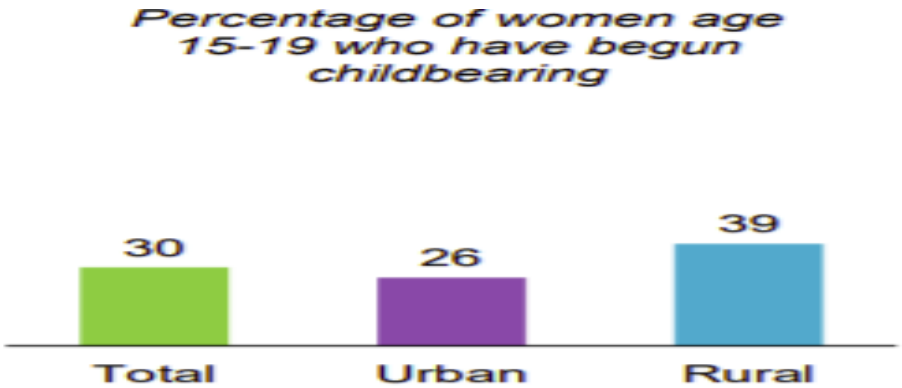


Figure 7: Teenage pregnancy and motherhood by residence in Liberia 2019-2020 (15)

Occupation

According to a systematic review by Hajizadeh et al. focus on Africa, a pregnant woman's or her partner's occupation has a significant impact on her ability to adhere to ANC visits (51). A cross-sectional study conducted in Uganda to investigate the reasons for seeking prenatal care late found a strong link between the pregnant women's or their partner's occupation and ANC attendance. Pregnant women and/or their partners with well-paid employment were shown to be more likely to use ANC services than those with low or no-pay jobs. (53). a population-based study in Nepal also discovered that having a high socioeconomic income is a factor that leads to adherence to MIP preventative services through the utilization of ANC visits (50). Similarly, research conducted in post-Ebola Liberia found that pregnant women with a high-income index attended ANC more frequently and adhere to MIP preventive measures than women with a low wealth index. Most women in urban regions were shown to have a higher Health Index than those in rural and urban slums. (54). Currently, 52% of the country's entire youthful population are unemployed with a heavy burden in the rural areas. Most people living in rural and urban slum work in unpaid informal employment, which is far more common among females than males (55).

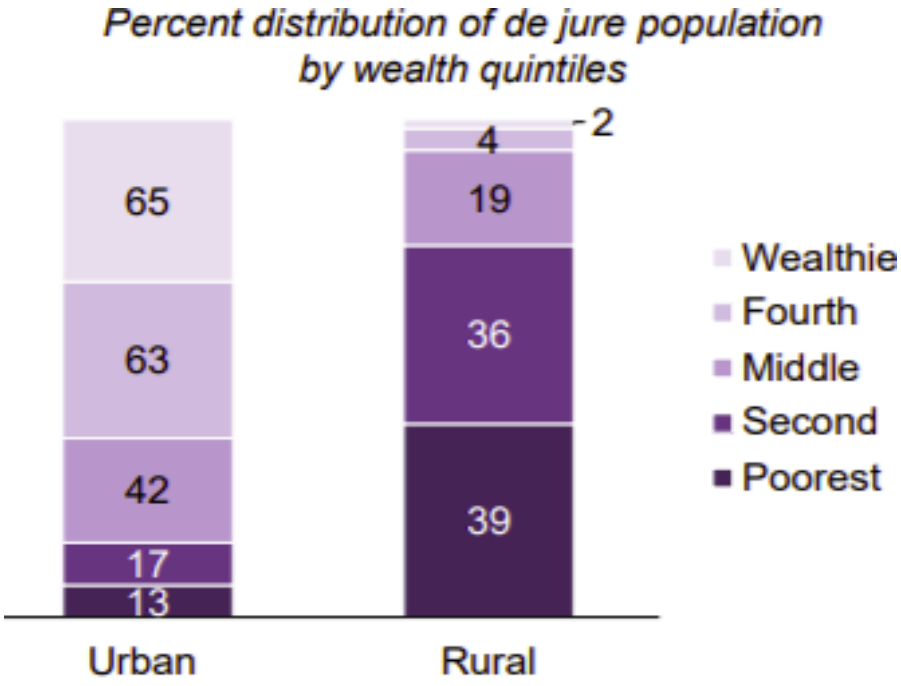


Figure 8: Household wealth per residence in Liberia (55)

Nevertheless, the Liberia Malaria Indicator Survey (LMIS) 2016 report found that, in terms of household health, the southeastern A zone has the highest percentage of people in the lowest wealth quintile (46%) compared to the Greater Monrovia region, which has no people in the lowest quintile (55).

Marital Status

When researchers looked at the characteristics that influence ANC service consumption in Ghana, they observed that a pregnant woman's marital status had an impact on her ability in keeping ANC services utilization (56). Meanwhile, another study investigated the underutilization of free ANC services in Finland and unmarried status was also found as one of the main factors of low ANC attendance among pregnant women (49). The median age of

first marriage for women aged 25 to 49 was found to be 21.2 years in Liberia, however, 25% of women aged 25 to 49 initiated sexual activity before the age of 15, and 36% of Liberian girls marry before the age of 18. Owing to Africa's child marriage culture, which Liberia is not an exception, women in rural regions marry around 4 years sooner than women in urban areas (19.1 years against 23.3 years) (52). Notwithstanding, Komuhangi et al. identified that pregnant women with husband who does informal low-pay jobs are unable to adhere to ANC service for MIP prevention (53). A pregnant woman with a good income status, on the other hand, is better able to access and comply with ANC services than a pregnant woman with little or no earnings (53).

Educational Status

According to multiple systematic reviews undertaken in Africa, the educational status of a pregnant woman and her partner is the key driver of adherence to seeking healthcare services while pregnant (57) (51)(55). Likewise, a study from Liberia and other neighboring countries have proven that pregnant women with higher educational level are more likely to access ANC services as required compared to those with lower education. Seeking ANC service and adherence to MIP preventive Services follows the same pattern because malaria preventive service is mostly received during ANC visits in Liberia (54)(58). The LMIS 2016 reported that over 31% of women aged 15 to 49 had no education in the country with only 6% getting a higher degree. On average, Liberian women have completed a median of only four years of education. (**See figure 9)** (55).

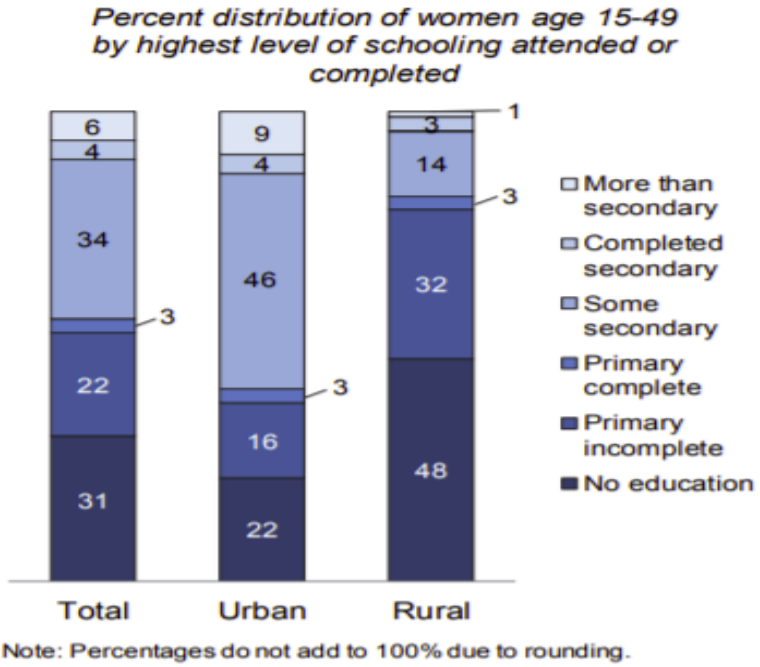


Figure 9: Education of survey respondents by residence (55)

3.3 Pregnant Women related Sociocultural Factor

Religion/ Ethnicity

A systematic review discovered that a pregnant woman's ethnic or religious views affect her prenatal care-seeking behavior in SSA (51). Conversely, Hajizadeh et al observed that religion and ethnicity were influential variables in pregnant women's use of prenatal care in Turkey. Sunni Muslim women used ANC services less than women from other ethnic groups. They even refuse to participate in ANC sessions since there were men from other ethnic groups involved (51).

Culture and traditional beliefs

Women in Nigeria used multiple caregivers during pregnancy, with a preference for traditional providers, according to a study. Traditional medicine was highly regarded, particularly care that is provided by Traditional Birth Attendants (TBAs) who have lived in the community for a long time (59). Meanwhile, another study in Malawi indicated that most pregnant women did not seek ANC care early because they were afraid of being bewitched. Another cultural barrier that limited rural pregnant women's access to ANC care identified in Malawi was a by-law that required unmarried pregnant women to get permission from traditional authorities before seeking prenatal care (60). Following the Ebola outbreak in 2014, a community-based informed research project in Liberia revealed that some Liberians believed in factors other than mosquito bites as causes of malaria, and as a result, some would turn to traditional medicine and spiritual care to treat the disease. ANC services were also less frequently used because male partners preferred traditional medicine to clinic-based malaria treatment for their pregnant partners (61).

Decision-Making Power

Women's rights to full body autonomy have been identified as a concern in Africa, according to one of the literatures reviewed during this study (62). The study further identified that in Kanya, pregnant women who have autonomy over their decisions and seek ANC care frequently were less than those who rely on their partners to make decisions (62). Additionally, a study in Nigeria found that a husband's decision controlled whatever the wife opted to do, including when, where, and how to seek healthcare assistance (63).

Liberia, like many other countries in Sub-Saharan Africa, is a patriarchal state (64). This male-dominated culture permits men to make practically all household decisions, including healthcare access (65). Because most Liberian women have a low socioeconomic level, resources are controlled by their husbands, who select how and what to spend them on (65)(66). A pregnant woman's access to MIP preventive services at the Antenatal clinic is heavily dependent on her partner's willingness and financial status (18).

Family Support

Evidence shows that in Sub-Saharan Africa, both financial and emotional assistance from a partner for pregnant women throughout pregnancy is a struggle (67). While a study in Uganda found that support from partners, including other family members such as the mother, father, and aunt, improves adherence to prenatal care services (68). A study conducted in Malawi discovered that partners' refusal to accompany their pregnant women due to fear of being tested

for HIV was one of the primary factors that reduced ANC visits among pregnant women (60). . According to research conducted by a Liberian single mother's club, most of the women in the club were rural and uneducated women who did not receive any support from their partners when they became pregnant because most of the males refused to take responsibility for the pregnancy while those who accepted careless. Other family members did provide some encouragement to seek prenatal care, although only insufficiently (69)

Perception, Knowledge, and attitude about the uptake of IPTp and ITN and its benefits among pregnant women in Liberia

A multi-country study in Sub-Saharan Africa investigated the reasons for the low use of malaria prevention programs and discovered that the low uptake of these services was attributed to perceived convenience, delivery method, and supplier type (70). A community-based study conducted in Nigeria on malaria awareness, perception, and prevention in pregnancy indicated that respondents' knowledge, perception, and preventative actions for MIP were insufficient. The study advised that community-based public health education on MIP be improved to promote knowledge and prevention, as well as to explain misconceptions (71).

A cross sessional survey conducted in Liberia by USAID and Health Communication Collaborative looked at people's attitudes, beliefs, and practices about the use of malaria prevention services using samples from four different Counties, including pregnant women in 2014. The final report on this survey found that there was a good knowledge and awareness of malaria in general including the usage of bed nets and IPTp. However, many people had negative feelings towards bed nets use. For example, most respondents (82%) thought it was difficult to sleep under a bed net in hot weather, and 60% agreed that the pesticide used in bed nets could be harmful to individuals Health (72). Regarding IPTp use, the survey found that more than half of the respondents (53%) were aware that SP was a malaria prophylactic administered to pregnant women and had vast knowledge on the benefits for them and their unborn child. Furthermore, many respondents believed that a Healthcare provider could not administer harmful drugs to a pregnant woman. In contrast, although malaria prophylaxis for pregnant women (SP) is safe when taken on an empty stomach, most respondents (97%) thought that taking drugs on an empty stomach could make a pregnant woman unwell (72).

Exposure to Media

There were variations in the use of ITNs and antimalarial drugs among the African countries including neighboring Sierra Lone in a study that looked at the prevalence of malaria preventative behavior among adult women and the impact of mass media exposure. In a multivariate regression study, it was discovered that not obtaining malaria-related information via radio, posters/billboards, community events, and health personnel significantly correlated with a lower likelihood of using an ITN the night before the survey. Those who did receive malaria information on the radio had a 23 percent chance of using antimalarial medications during their last pregnancy, compared to those who did not receive malaria information on the radio while those who did not receive malaria information on the radio (73).

Liberia's National Malaria Communication Strategy for 2016-2020, for example, highlighted that National standard require the participation of political and administrative leaders in

meetings and mass-media campaigns to support Long Lasting Insecticide treated Nets (LLITN) distribution and use (2).

In 2014, USAID final survey on examining attitudes, beliefs, and practices linked to malaria prevention and treatment, in four counties in Liberia (Rivercess, Grand Kru, Grand Cape Mount, and Grand Kru), discovered that 82 % of participants confirmed hearing or seeing malaria prevention and treatment information on the radio or poster, and 26% admitted hearing it from a community leader in a public environment. According to the poll, media habits differ greatly by county and gender. In the study, 79% of Rivercess respondents said they listened to the radio at least once a week, with the least number of listeners being 51 in grand cape mount county (72). In all four counties, men had the largest percentage of weekly radio listening compared to women (72).

According to the data, couples who took part in the survey claimed to have had interpersonal communication about malaria preventive messages within the previous 12 months before the study. for example, take covered under the Net, which was launched in 2009 to encourage everyone, regardless of gender or age, to use ITNs, and Healthy Baby, Healthy Mama, which was launched in 2011 to promote the early detection and treatment of malaria in children under the age of five, both of which they said were frequently broadcast. Overall, 52% of couples in the survey admitted to having interpersonal communication with one another, and they were able to clear up certain misconceptions about malaria, promoting adherence to malaria prevention activities. Males made up 57 percent of the population engaged in interpersonal communication, while females made up 50 percent (73).

Participation in Behaviors Changes Education Session

Pregnant women's behavior change programs (BCPs) are regularly undertaken as part of health promotion campaigns. Effective counseling and accurate information on the use of ITNs and IPTp, awareness of the importance of MIP prevention services by both peri-urban and urban women, and provision of political and financial support by policymaking to enhance IPTp and ITN home-based care services delivery were all mentioned as key behavioral change indicators in a five-African country review, including Liberia. Behavioral change communication for MIP-specific intervention also looks at Trained service providers (including trained traditional midwives and community health volunteers) on behavioral change strategies to promote the regular use of LLINs by pregnant women and early care-seeking from appropriate providers for case management (74).

Policymakers at the MOH and Partners legitimize and unify the community health program in Liberia, based on community involvement that led to the eradication of the 2014 Ebola outbreak. This program's goal was to encourage CHAs to provide primary health care in the community, with an emphasis on under 5 children and pregnant women. Instead of clients and patients, community members are seen as actors in the health system in this approach. As a result, pregnant women are fully included and participate in health promotion initiatives at the community level (75). For example, pregnant women, community leaders, TTMs, TBAs, and the Redemption Hospital Maternal Health care staff participated in a Participatory Action Research in New Kru Town Liberia after Ebola in 2016 to address barriers to maternal health. The goal was to identify the needs, desired outcome services for maternal healthcare, and factors affecting them (76). In rural communities, TTMs s and CHAs increasingly partner with health facilities to integrate community Health meetings with health facility meetings, ensuring that all community members, particularly women of reproductive age, are fully included. In

these meetings, key health messages are delivered with full participation from the women and men in the discussion, as well as clarification from healthcare workers on common misconceptions and positive behavioral change practices that will promote maternal health, including the use of malaria in pregnancy preventive services (55).

3.4 Health System Factor

Qualification of Caregiver

At the primary healthcare facility level in Liberia, Certified and Registered midwives (CMs and RMs) generally provide MIP prevention services while at the secondary and referral Hospital, prenatal services are provided by a mixed category of staff (14). Liberia's CHAs program, which is completely integrated into the health system, collaborates with TTMs at the community level, particularly in communities with a range of more than 5 kilometers, to identify and send pregnant women to PHC facilities for ANC services. There is a strong network system between the professional staff and TTMs with the frequent meeting as a collaborative effort to improve the lives of pregnant women (14)(21). Moreover, in 2012, due to poor road conditions and widespread usage of cellular phones, midwives in rural Liberia received a three-day training on how to use mobile phones to report pregnancy-related concerns (77).

However, there is an acute shortage of these CMs and RMs, the first line MIP care providers, with only 325 CMs working in Liberia out of the required number of 1634 (29). Based on this, the GOL and its partners have launched a new Bachelor of Science midwifery program, providing additional professional development to help midwives advance their careers and usually graduate 50-75 Registered Midwives (RM) per cohort, assisting in the staffing of over 700 health facilities across Liberia (31). Retention of these staff in rural areas remains a major challenge (78). Absenteeism and attrition are also common in rural areas, resulting in insufficient or unavailability of maternal healthcare services delivery for days, particularly MIP prevention (31). Additionally, the CHAs and TTMs are not allowed to provide malaria preventative drugs in the community (21).

Patient Welcome, Respect for Woman Intimacy, Interpersonal Communication, Organization of Communication Behavior

The use of healthcare services has been significantly connected to factors such as financial, educational, and geographic location (54). In comparison to pregnant women who seek treatment from public facilities, pregnant women with good educational and socioeconomic standing are more likely to seek care from private facilities and claim to have a positive interpersonal interaction with healthcare staff at these facilities (79). Due to the low socioeconomic status of many Liberians, the bulk of pregnant women seek care in public facilities, in which the EPHS provides all services, including those for pregnant women free of charge (31)(14).

The negative behavior of healthcare personnel was highlighted as one of the explanations for low ANC attendance in a study conducted in Malawi. Most of the women in the research said they started ANC late or skipped it altogether because some healthcare professionals were disrespectful and did not respect privacy (60). According to Hajizadeh et al systematic review, health personnel's attitudes toward pregnant women seeking ANC care are not warm and friendly, and as a result, pregnant women are discouraged from obtaining ANC care (51). A

qualitative study in Tanzania of women and men's experiences of disrespectful maternity care and abuse during childbirth revealed several types of disrespect, including feelings of being ignored or neglected, monetary demands or discriminatory treatment, as well as verbal and physical abuse (80). Accordingly, during the Ebola outbreak in Liberia, Guinea, and Sierra Leone from 2014 to 2016, pregnant women mainly adolescents in the three heavily hit Countries identified unwelcoming and negative attitudes of healthcare workers as key factors that discouraged them from using health care services and instead seek help from traditional birth attendance and private facilities, or simply stayed at home when sick (81).

Waiting time

In a study conducted in rural Benin, pregnant women who are not attended to by a healthcare professional for more than 4 hours while seeking ANC services were less likely to return to ANC care (48). Pilot research on scheduled appointments was done in three maternity clinics in Mozambique because long waiting times at the Healthcare facility were linked to low utilization of ANC services in Sub-Saharan Africa. The study's findings suggested that improving the organization of scheduled appointments for ANC services could boost utilization (82). In a research conducted in Margibi County, Liberia, a healthcare worker acknowledged becoming weary after seeing 25 of the 75-100 patients she serves in a PHC facility daily. She further said that most patients will complain about prolonged wait times and end up returning home (31).

Availability of Malaria in Pregnancy preventive services commodities

PMI, in collaboration with the MOH, acquires malaria preventive commodities such as ITNs and SP, which are then distributed to all government-owned facilities as part of the EPHS package (14)(3). Nevertheless, Due to poor supply chain management, particularly in terms of distribution and storage, the government-owned facilities including those covered by PPP that care for most pregnant women seeking malaria preventive services in Liberia frequently run out of MIP prevention supplies (20). SP is frequently in short supply in most Liberian healthcare facilities that are not covered by Non-Governmental Organizations due to mismanagement. Unofficial user fees for ITN also limit access to ITNs for pregnant women seeking antenatal care as well (61). According to the LMIS 2016 final report, of the 76% institutional deliveries 5 years before the survey, 98% of these mothers sought ANC services at least once or twice. In addition, the survey found that 79 percent of the 98 percent of women who sought ANC attended three or more visits, yet the MIP preventive service uptake was far below 85% (55).

3.5 Factors Related to the accessibility of MIP Preventive services

Distance from Place of Residence to the Health Center

Several studies have found that the distance between healthcare facilities and places of living especially rural versus urban has a negative impact on the use and adherence to prenatal services (83)(56). A cross-section study conducted in the northern part of Ghana to determine why adolescents' pregnant women in the region were underutilizing ANC services uncovered that while the respondents in the study were aware of the importance of adhering to prenatal services, the distance between their communities and health facilities discouraged them from

seeking care (83). Another multi-center study in rural Uganda discovered that most pregnant women in remote communities seek care from TBAs rather than professionals since TBAs were closer to them in terms of distance (56).

In 2011, David Okutu conducted a study that included both rural and urban Ugandan women to investigate ANC access, utilization, and adherence. He revealed that 62 percent of urban respondents sought adequate ANC services, compared to 46.1 percent of rural respondents. The distance from the facility to their home was found to be the greatest predictor of rural women's low utilization of ANC services (84). Correspondingly, 60 percent of Liberia's population resides in rural areas more than 5 kilometers from the nearest healthcare facility between 2012 and 2015 according to a WHO survey. Pregnant women in these locations were more vulnerable, according to the survey, this was one of the main contributing factors to the country's high maternal mortality rate (725 deaths per 100,000 live births) as of 2017(85).

Because of the low utilization of malaria prevention services, particularly among rural pregnant women, a project called Transforming IPT for Optimal Pregnancy (TIPTOP) was launched in 2017 in four SSA countries (Nigeria, DRC, Mozambique, and Madagascar) to deliver IPTp at the community level through CHWs. This method is known as Community IPTp (C-IPTp). This five-year project, which will end in 2022, also features CHWs visiting pregnant women to ensure that they return to ANC clinics on time (86).

Cost of MIP Preventive commodities and services

Malaria in pregnancy preventive commodities and services have no cost in Liberia because it is one of the services included in the EPHS in Government-owned facilities and should be delivered free of charge (14)(32). Without a doubt, there are certain unofficial user fees associated with these services, which pregnant women have disclosed in numerous studies (61). The expense of malaria medication was cited as the most significant barrier to pregnant women receiving it. Malaria-related direct costs account for 28-34 percent of impoverished households' yearly income and 1-2 percent of high-income households' annual income (2). Pregnant women who obtain ANC at private for-profit facilities, typically pay a fee for these services (79). Because rates vary by facility, an exact figure is unknown.

Transportation Mode and natural barriers to attending ANC Care

The majority of studies conducted in rural Africa to determine the reasons for low utilization of ANC services have highlighted transportation costs and modes, as well as natural barriers such as mountainous areas, hills, and overflowing rivers during rainy seasons, as some of the main reasons for not adhering to prenatal services accordingly (48)(83)(56). In Benin, for example, rural pregnant women cited walking for more than an hour from their homes to the facilities as a major factor discouraging them from keeping with ANC return dates, while in Ghana's rural northern region, most adolescent pregnant girls stated that their socioeconomic status prevented them from affording transportation costs for ANC services (48)(87)

Owing to Liberia's poor road network, approximately half of the country's rural inhabitants do not have access to paved roads. This problem is aggravated during the rainy season, when heavy rains frequently make roads inaccessible, including the overflowing of rivers (88). Against this backdrop, there are significant geographic differences in healthcare accessibility in rural and remote populations (89). Due to the lack of pavement and poor road conditions (88) the majority of Liberians in rural areas must walk for more than an hour to reach

healthcare. In remote and isolated areas, studies have established a substantial correlation between distance, transportation costs, and journey time to poorer healthcare utilization (89).

Chapter four: Interventions in LMICs that have promoted the use of malaria prevention services among pregnant women and are regarded as best practices globally that were explored in This Study

4.1 Introduction

Many countries in Sub-Saharan Africa are working to minimize malaria, particularly malaria in pregnant women, by adopting effective solutions. The WHO and other internal organizations have developed many initiatives to ensure that the incidence of malaria is reduced or eradicated across the region. As a result, some countries in the region are developing new actions to promote access to these services among pregnant women. Some of these approaches have been approved and used as best practices throughout the world. All the studies below were considered because they are typical of Liberia in terms of malaria epidemiology, geographic location, health workforce, and health worker qualification.

4.2 Information-Motivation-Behavioral skills (IMB) model on malaria preventive practices and pregnancy outcomes

From January to March 2017, Ahmed Dahiru Balami et al conducted a randomized control trial study in Maiduguri, Borno State, North-east Nigeria, to determine the effects of a malaria health educational intervention using the Information-Motivation-Behavioral skills (IMB) Model. IMB skills are defined as the provision of information and knowledge about a certain behavior, as well as the individual's motivation to participate in an activity that is required to execute the behavior.

The intervention group in this study then received a four-hour health education intervention based on the IMB model that focused on the necessity of IPTp use throughout pregnancy. This trial was a huge success, and the intervention was shown to be effective in increasing the use of MIP preventive services (IPTp & ITN). Both the control and intervention groups admitted that their use of ITN had improved before the start of the trial, but the study's ultimate result revealed that the intervention group improved their uptake of IPTp first and second doses significantly compared to the control group (Intervention: Often–14.0%, Almost always–9.1; Control: Often–12.4%; Almost always 16.1%) to the time of second follow up (Intervention: Often –28.10%, Almost always–24.5; Control: Often–17.2%; Almost always 19.5%). Reported IPTp uptake at second follow-up was also higher for the intervention group (Intervention: Two doses–59.0%, Three doses 22.3%; Control group: Two doses–48.4%, Three doses–7.0%).). As a result, the researchers advised that the study's module be approved and implemented into routine National Antenatal Care services at Health Centers throughout the region (90).

The study described Maiduguri, the capital of Borno state, to have a climate that changes depending on the time of year and an average annual rainfall of 613mm. With a catchment population of 540,016 people, the study was done in one of the state specialty hospitals in the region's central part. This hospital's antennal clinic is open Monday through Friday and sees about 100 pregnant women per day. Health talks were given by the midwives in the ANC clinic before providing ANC services, However, the researchers discovered that the topics presented to these women were not effectively structured to provide adequate information that will increase the utilization of MIP preventive services and as such, an IMB should have been

preferable to ensure that the pregnant women themselves part take in the Health education process in order understand the benefit for utilization(90).

4.3 Administering Malaria Intermittent Preventive Treatment in Pregnancy at a Community Level

Most studies conducted to offer IPTp at the community level in most Sub-Saharan African countries have resulted in criticism, such as community health worker competencies, community perceptions of community health workers, and integration of the community health program into the health system (91).

Meanwhile, Julie R. Gutman & team. undertook a community-based cluster-randomized trial in Burkina Faso from May 2017 to August 2018, focusing on the distribution of intermittent prophylactic medicine for MIP prevention at the community level due to low uptake of MIP preventative services within the region. This trial was successful because IPTp administration in the intervention group was higher than in the control group at the end of the study, with a 17.6 percent increase in IPTp3+ use. This finding leads the researchers to believe that community based IPTp distribution could result in a higher number of IPTp doses being given while ANC coverage remains unchanged. (91).

Burkina Faso, high malaria endemic Sahelian country in the heart of West Africa with a population of 20 million people, accounts for 4% of the world's annual malaria cases. The research was carried out in three of the 13 malaria-endemic districts (Sud-Ouest [South-West], Centre-Sud [Central-South], and Centre-Est [Central-East]). Each of the three regions had one district chosen at random, based on malaria epidemiology, IPTp coverage, and the existence of active CHWs (92).

In four SSA countries (Nigeria, the Democratic Republic of Congo (DRC), Madagascar, and Mozambique), a 5-year project called the C-IPTp strategy began in 2017 and will end in 2022. This approach allows CHWs to deliver IPTp at the community level why encouraging pregnant women to adhere to ANC service. The study pointed that, previous studies have proven that CHW treatments at the community level improve health outcomes, as seen by their services to children under the age of five. In addition, research in The Gambia, Ghana, Senegal, and Nigeria have shown that CHWs may deliver malaria preventive methods at the community level successfully because this approach is ongoing in these Countries and Improving IPTp uptake (86).

4.4 The provision of a mama kit including raising awareness of the health benefits of IPTp and establishing trust between health practitioners and clients to boost IPTp uptake adherence.

In 2013, Anthony Mbonye and colleagues researched in Mukono District, central Uganda, in a malaria-endemic zone, to see if the method might enhance malaria preventive service consumption due to the underutilization of such program in the district. The district has a total population of 850,900 people, with a 2.3 percent annual growth rate, and is primarily made up of subsistence farmers. The bulk of the population (88%) lives in rural and remote areas. The study enrolled 1,069 women and had four primary objectives: raising awareness by describing the benefits of IPTp and emphasizing the significance of sticking to the two IPTp dosages. 2) A mama kit was promised to each pregnant lady attending routine ANC; 3) trust was developed by exhibiting each woman the mama kit and marking it with her name; 4) maintaining the

promise by supplying the mama kit when women come to give birth. Overall, 78.0 percent of these women said the intervention influenced their decision to use IPTp precisely IPTp 2. The researchers concluded that the new technique provided good motivation for women to attend scheduled ANC checks, follow IPTp, and give birth at the study facilities. The urgent necessity for policymakers to adopt the motivation package by Health based on the health-Trust Model to increase and adherence to IPTp was encouraged (93).

4.5 Drivers of intermittent preventive treatment of malaria during pregnancy

The primary drivers of IPTp adoption were identified using longitudinal count data (Repeated measurement of the data over time) gathered from the Sunyani Municipal Hospital in Ghana's Brong Ahafo Region from December 2008 to January 2017. The hospital from which this information was gathered serves a population of about 150,000 people. For the past nine years, Ernest Yeboah Boateng and his colleagues have been collecting these statistics monthly. The data show that antenatal registration of pregnant women, male partner participation in antenatal clinic attendance, and frequency of antenatal clinic visits are the primary determinants of IPTp-SP uptake. The authors suggested that the Ghanaian Ministry of Health's Family Planning and Community Health Nursing units run effective health campaigns aimed at raising awareness, encouraging early antenatal registration by pregnant women, encouraging male partner involvement in antenatal clinics, and increasing the frequency of visits (at least 4) Pregnant women should go to antenatal clinics to enhance the low uptake of IPTp-SP in Ghana (94)

Chapter Five: Discussion

Malaria is endemic in Liberia and is transmitted throughout the country at all times of the year. Malaria infection is a huge public health problem as it has been the primary cause of morbidity and mortality across the country for decades, infecting most young pregnant women and children under the age of five. MIP is part of Liberia's malaria control program, which is one of the country's best-funded, with a myriad of initiatives and measures in place to keep malaria at bay until it is eradicated. This study investigated the factors that influence pregnant women's use of the malaria control methods that NMCP is implementing.

Low uptake of MIP preventive measures has been linked to the sociodemographic, sociocultural, healthcare system, and healthcare accessibility factors. However, utilizing the Edgards-Marius et al. conceptual framework, the researcher was able to identify the health system component as the factor that is heavily responsible for the low use of MIP prevention services. The three key health system gaps identified are: Unofficial user fees charges for ANC services including MIP preventive commodities, frequent professional staff attrition, and absenteeism from rural health facilities coupled with frequent stock-outs of MIP preventive commodities.

Most healthcare providers with experience in providing maternity and childcare services, including MIP services in Liberia, prefer to work in urbanized settings and not rural settings resulting in frequent attrition and absenteeism. Some PHC facilities at times are closed to the public for weeks or days only because the only professional staff assigned there have traveled to urban region to see his or her family. Consequently, the burden and workload on rural healthcare practitioners have increased as reflected by the patient-to Health worker ratio in the background. Factor such as low wages and incentives have pushed these healthcare workers to charge for services that are meant to be provided free of charge. Due to delay in monitoring and evaluation supervision along with difficulties in access some of these facilities by car or motorcycle, there are usually frequent stock out of medical supplies including ITNs and IPTPs.

The CHA program, which was created to improve ANC attendance by offering health education in areas more than 5KM away from the nearest healthcare facility, as well as identifying and referring these women for timely ANC care, has made a significant contribution to the increased ANC visits across the country. As a result of this intervention, while other SSA countries like Benin, Ghana, and Nigeria are outlining high transportation cost, low educational levels, and negative perception, as factors that are influencing the low uptake of IPTp and ITNs, Liberia's pregnant women especially those in rural regions on the average walked for more than an hour to access health facilities while overcoming natural barriers. This indicates that while pregnant women are utilizing the Healthcare facilities, they are not receiving the quality of care to which they are entitled. Because these pregnant women especially those in the rural and urban slum lack the negotiating ability to ensure that they receive the care they desire and deserve, even when they are opportune to encounter a professional, they are frequently denied once they cannot afford the unofficial users fees.

According to the WHO, a pregnant woman in a malaria-endemic country like Liberia needs three or more doses of IPTp to be effectively protected against malaria during pregnancy while sleeping under an ITN. Unfortunately, most pregnant women in Liberia, particularly in rural areas and urban slums, receive only one or no dose of such prophylaxis and have little or no access to ITNs. This is a worrisome and alarming situation for Liberia's maternal and child

health service delivery because it is a contributing factor to the country's existing high MMR and infant mortality rates.

Statistics from within Liberia show that there is a significant gender and regional gap in the educational and occupational standing between rural and urban dwellers. For example, those in the Urban region are more literate than those in the rural regions, while people found in the poorest wealth quintiles are predominantly found in southeastern B which is one of the most remote regions in the country. Even though most pregnant women in Liberia were found to be young with low educational and occupational status including their partners coupled with rural residency, but it did not limit their ANC uptake which is the primary MIP prevention uptake site. This finding little differs with results from previous researchers reviewed in this study who identified young maternal age, low educational and occupational level as barriers for MIP prevention uptake. However, there were 21% of pregnant women who did seek attend ANC second and third visit five years prior to 2016 LMIS survey. While this number is significantly low, these pregnant women nonadherences could be because of these sociodemographic factors

The secrecy surrounding childbirth including and limited decision-making power among pregnant women were the two major sociocultural factors discovered to hinder MIP prevention uptake. The Liberian Sandy Society creates a strong connection between young pregnant women and the TBAs who serve as the organization's leaders. They preferred to seek care from them, particularly in remote areas as a means of not revealing their pregnancy to the public in the early stage. Although these TBAs were trained and converted into TTMs working in close collaboration with healthcare facilities and meet regularly to promote maternal and child health in rural communities, the issues of distance and logistics remained a challenge.

The sandy society also thought these women how to obey their spouse in all aspects including decision making. When it comes to obtaining healthcare, most rural pregnant women were found to lack decision-making authority. Based on traditional cultural believes including financial status, these pregnant rural and urban slum women rely exclusively on their in-laws and husbands for decision-making during pregnancy. A pregnant woman's access to MIP preventive services at the Antenatal clinic is heavily dependent on her partner and his financial status. This result totally corresponds with findings in LMICs identified in previous studies during this research. Pregnant women's lives are often constrained by these socioeconomic and cultural standards that prevent them from making their own decisions about things like obtaining or seeking health care including malaria preventive services. These factors usually delay or deny them of accessing Health care.

Many pregnant women in Liberia were found to have good knowledge and understand about the need for ANC services including where to obtain care for malaria preventative services, as well as the benefits for themselves and their offspring. A behavior-change communication approach that included CHAs raising awareness about the danger indicators of pregnancy, as well as the need for malaria prevention throughout pregnancy has improved maternal and child Health indicators as proven by the increase ANC uptake. Another contributing factor to the increased ANC uptake was Liberia's use of the media as its primary malaria control communication tool. Even though there is a significant gender gap in media consumption, with males being more likely than women to own and listen to the radio in rural and distant areas, however, messages frequently broadcast were said to be gender-sensitive and most of the couples confirmed the frequent practice of interpersonal communication. Even though the pregnant women perceptions towards the use of IPTp and ITNs were found to be poor due to issues such as feeling uncomfortable while sleeping under the nets and taking SP on empty

stomach, but these are typical due to the country's geographical attributes and pregnancy related feelings.

These outcomes identify key interacting hurdles to access, delivery, and use of IPTp and ITNs in Liberia and show that these barriers are relatively consistent across the country. This study identified frequent IPTp and ITNs stock out, unofficial uses fees for services and Healthcare workers attrition and absenteeism as the key reasons for the low uptake of MIP prevention services in Liberia even though, there were some demand side gaps as well. Some of these gaps can be resolved in the short-term using some approaches implemented by neighboring countries that have scaled up the uptake of these services. However, some of the barriers that are entrenched within the overall healthcare system will only be resolved with medium- to long-term strategies that aim to improve the quality of maternal health services.

Administration of IPT and ITNs at the Community level

The low uptake of malaria preventive services among pregnant women in Liberia has been linked to several factors including access and distribution mode. This study ascertained that pregnant woman in majority wants to prevent MIP, but the limited number of healthcare worker and stock out of communities lower their consumption. Furthermore, there are 21% of pregnant women who were noted to skip second and third ANC visits due to distance to the facilities, transportation costs, decision-making authority, and responsiveness of the health system. Once these CHAs are trained to provide MIP preventive services at the community level as it was done for the creation of awareness for ANC attendance, it will boost the IPTp and ITNs uptake. With frequent stock, proper supervision, and monitoring, nearly all pregnant women living more than 5 kilometers from the nearest healthcare facility will be able to take their IPTp complete doses and ITNs in their own homes. This technique was tested in rural Burkina Faso and shown to increase IPTp uptake while negatively impacting facility-based ANC visits.

Liberia's community health program is already integrated into the healthcare system, and these CHAs have been successful in improving ANC coverage in the country. This indicates that there is already a level of trust between CHAs, and community members.

The NMCP supply chain system has been poor for years, and if Liberia is to succeed in this community-based approach, a strong supply chain system is required to ensure that these CHAs do not run out of stock and that the level of trust between them and the pregnant woman in the community is maintained to improve the uptake IPTp and INTs.

Involvement of men into ANC services as a key driver to increase IPTp and ITN uptake

Decision making power was another barrier identified by this presents study that limits MIP prevention uptake. Because Liberia is a patriarchal state and most women were noted to have low socioeconomic status, full participation of men in prenatal services will encourage pregnant women to adhere to IPTp and ITNs uptake. More besides, because males are the ones who are heavily exposed to the media, they are more educated than the women, and they control most of the cash, they will be influential in ensuring that their partners stick to MIP preventive services uptake. In almost all the rural communities, it is taboo for a woman to disobey her partner so if the man is aware of what will happen to his pregnant partner and unborn child if

they don't seek ANC service, he will be able to ensure she seeks and completes her required MIP prevention care. This approach has proven to increase ANC attendance in neighboring Ghana.

5.1 Study Strength and Limitation

Considering malaria infection is linked to a range of determinants, the Edgards-Marius et al. conceptual framework (**see figure 6)** proved helpful in identifying most of the factors linked to the low utilization of MIP prevention interventions among Liberian pregnant women. Interestingly, each variable in the framework was employed as an analytical component, allowing the researcher to uncover demand and supply gaps, with the supply side heavily responsible for MIP prevention services uptake as this study identifies. Secondly, because malaria is endemic in Africa, getting literature from other neighboring countris was not a challenge. Nevertheless, these findings external validity may be poor rendering it less useful for future researcher's reference owing to the study design. Most of the literature cited came from neighboring countries due to limited literature on the topic from Liberia and as such, their characteristics may not be relevant to Liberia's current situation. secondly, due to regional disparities in resources distribution, healthcare facilities, and implementation partners, the gaps indicated may not be applicable to all fifteen counties across the country. Finally, and most critically, acquiring primary data from Liberia as current and practical evidence is impossible making the findings non practical.

Chapter 6: Conclusion and Recommendation

6.1 Conclusion

The factors influencing the utilization of malaria prevention methods among pregnant women remain vast and complex in Liberia. Based on findings from other research and country-wise malaria reports cited in this document and based on all the dependent variables of the Edgards – Marius et al. conceptual framework, multiple factors influence the low utilization of MIP prevention among Liberian pregnant women ranging from sociocultural, sociodemographic, health service accessibility as well as health system factors. Even though there are cross-cutting issues among all the variables assessed, it was found that the factors influencing the utilization of malaria preventive services among pregnant women are heavily dependent on the services being provided in the health system.

Frequent stock-outs of MIP preventative commodities, unofficial user's fees for ANC services, professional staff attrition and frequent absenteeism from rural health facilities along with stock out of IPTp and ITNs were the key gaps identified by this research, influencing the low uptake of MIP preventive services in Liberia. The widening gap between ANC attendance and MIP prevention services uptake justified these findings.

The sociodemographic factors identified issues such as young maternal age, low or no education, low or no employment status, and rural residency as factors that influence low IPTp uptake among pregnant women in LMICs. But this research found limited number of pregnant women who were influence by this demand side factor. Limited decision-making power and secrecy surrounding pregnancy were the two key notable sociocultural factors that influence the low uptake of MIP prevention among pregnant women, according to the literature reviewed.

Most of these gaps would have been addressed if the health system had been strengthened. Ironically and interestingly, the health system is the variable in this study with the greatest obstacle, contributing to the low uptake of ITN and IPTp full doses. Despite all these sociodemographic and sociocultural challenges faced by pregnant women in Liberia, ANC attendance has increased while MIP preventive services are still far below the Abuja target of 85%. It is vital that gaps elucidated within the health system-related factor be addressed in these programs, as improvement in the effectiveness of both the maternal health and malaria programs are likely to positively influence IPTp utilization. To address some of the findings of this study in the short term, the Liberian malaria control program and its partners should find a reason to adopt some of the MIP control approaches that have enhanced the uptake of malaria prevention services among pregnant women in other countries and have been globally approved revealed during this research. To meet the 2030 Sustainable Development Goal (SDGs) 3.1: reduce global maternal mortality to less than 70/100000 live births by 2030(101) in fulfillment of Universal Health Coverage (UHC), Liberia must improve the NMCP operation with a proper channel for the distribution of ITN and IPTp that will not leave anyone behind, regardless of their financial, educational, age and or geographical location.

Recommendation

Ministry of Health

- The Liberian Ministry of Health, in collaboration with partners to train Community Health Assistance to provide MIP preventive commodities (ITN AND IPTp) at the community level with a local stock tracking mechanism such as telephone or paper-based tracking tool to avoid stock out. This will also allowing pregnant women in communities with a radius of more than 5 kilometers to receive full doses of IPTp, as it has been done for the raising of awareness for ANC care at the community level. There should also be full male participation in MIP prevention health education to improve spousal understanding and promote support for pregnant women seeking MIP services

National Malaria control program

Liberia's National Malaria Control Program, with the support of its lead technical partner and donor PMI, should allocate more funds for personnel recruitment and MIP supply chain management for timely monitoring and evaluation mechanisms at the national, county, district, healthcare facility, and community levels, ensuring that these commodities are available for prompt and quick response to pregnant women with timely reporting and restock system at all levels

County Health Team

- The County Health Teams (CHTs) and its supporting partners in all fifteen counties to train all healthcare providers at the facility level in the provision of MIP preventive services regardless of qualification for the delivery of these services in the absence of professional staff with mechanism to track supplies for restock.

- The Healthcare providers at the facility level with support from the district and county health teams to engage local authorities through coordination meetings to introduce by-laws governing the uptake of MIP preventive services, like how it is done for home delivery.

Research

- There should be another research conducted on this topic using primary data to aid the country in identifying and prioritizing the health system pillars that require long-term interventions for improved effectiveness of the health system in general which will also help policymakers, program managers, and health administrators to make appropriate decisions on practical long term interventions such as health workforce capacity and distribution, drug availability and quality, health financing mechanisms,

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Appendices

Table 5: Key Search terms

OR	Malaria In Pregnancy	AND	Global	MIP
OR	Malaria In Pregnancy	AND	Low- and Middle-Income Countries	LMICs
OR	Malaria In Pregnancy	AND	Sub Saharan Africa	SSA
OR	Malaria In Pregnancy	AND	Liberia	
OR	Malaria In Pregnancy	AND	existing policies	
OR	Malaria In Pregnancy	AND	Long Lasting Insecticide-treated Nets	LLITN
OR	Malaria In Pregnancy	AND	Intermittent Preventive Treatment	IPT
OR	Malaria In Pregnancy	AND	Sulphadoxine, Pyrimethamine	SP
OR	Malaria In Pregnancy		Antenatal Care	ANC
OR	Malaria In Pregnancy	AND	Age	
OR	Malaria In Pregnancy	AND	Occupation	
OR	Malaria In Pregnancy	AND	Marital Stauts	
OR	Malaria In Pregnancy	AND	Education	
OR	Malaria In Pregnancy	AND	Religion	
OR	Malaria In Pregnancy	AND	Ethnicity	
OR	Malaria In Pregnancy	AND	Decision Making Power	
OR	Malaria In Pregnancy	AND	Family Support	
OR	Malaria In Pregnancy	AND	Perception	
OR	Malaria In Pregnancy	AND	Knowledge	
OR	Malaria In Pregnancy	AND	Exposure to Media	
OR			Participation in Behaviors Changes	

			Education Session	
OR	Malaria In Pregnancy	AND	Qualification of Caregiver	
OR	Malaria In Pregnancy	AND	Patient Welcome,	
OR	Malaria In Pregnancy	AND	Respect for Woman	
OR	Malaria In Pregnancy	AND	Organization of Communication Behavior	
OR	Malaria In Pregnancy	AND	Intimacy, Interpersonal Communication,	
	Malaria In Pregnancy	AND	Waiting time	
OR	Malaria In Pregnancy	AND	Availability of Malaria In Pregnancy preventive services commodities	
OR	Malaria In Pregnancy	AND	Distance	
OR	Malaria In Pregnancy	AND	Cost of Preventive commodities and services	
OR	Malaria In Pregnancy	AND	Transportation Mode	
OR	Malaria In Pregnancy	AND	natural barriers	