Examining the risk of mother-to-child transmission of HIV in Ghana

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Abstract— This paper discusses the current state of HIV/AIDS in Ghana, focusing on mother-to-child transmission (MTCT). From to the data presented, Ghana had approximately 350,000 adults and children living with HIV in 2021. Women and young girls are disproportionately affected, with over twice as many women as men living with HIV in Ghana. The prevalence rates for men and women aged 15 to 49 are 1.0% and 2.4%, respectively.

Despite HIV treatment interventions, mother-to-child transmission remains a significant mode of HIV transmission in children under 15 years old. The World Health Organization (WHO) estimates that 90% of HIV infections in children under 15 globally result from mother-to-child transmission. In sub-Saharan Africa, 90% of babies with HIV acquire it from infected mothers.

This article emphasizes the challenges in preventing MTCT, including limited access to antenatal care, late initiation of HIV testing and treatment, inadequate adherence to antiretroviral therapy (ART), and suboptimal infant feeding practices. The study calls for a detailed examination of the risk of MTCT in Ghana to guide evidence-based interventions, policies, and programs.

The methodology involves analyzing the National AIDS/STI Control Programme dataset from 2015 to 2019. The findings indicate a decline in the MTCT rate over the years, but there is a focus on the need for continued efforts, especially within the first six weeks of life. The conclusion highlights regional disparities and challenges, emphasizing the urgency of addressing MTCT in Ghana.

Keywords: HIV, STI, AIDS, Mother-to-Child, Transmission, Ghana, ART, Antenatal care, Prevalence

I. INTRODUCTION

Human immunodeficiency virus (HIV) remains one the deadliest pandemics since the first case of the virus was recorded in 1981 and currently has no cure. The virus comes in two forms, HIV-1 and HIV-2 and of the two, HIV-1 is the most common. About 95% of people living with HIV around the world have HIV-1 (White, 2021). The virus weakens the immune system by destroying cells that fight disease and infection, specifically CD4 cells (also called T cells)1 (Yoo et. al, 2022). If not addressed, HIV diminishes the quantity of CD4 cells within the body, complicating the immune system's ability to combat infections and various diseases.
According to the World Health Organization (WHO), the final and most severe phase of HIV infection is acquired immunodeficiency syndrome (AIDS), and the timeframe for its development varies from two to 15 years, depending on the individual. In 2014, UNAIDS launched the 95-95-95 targets. The aim was by the year 2030, the goal is to identify 95% of individuals with HIV, offer antiretroviral therapy (ART) to 95% of those diagnosed, and attain viral suppression in 95% of those undergoing treatment. The World Health Organization (WHO) in 2022 emphasizes that achieving the recently suggested UNAIDS target requires a significant increase in our efforts to prevent the potential outcome of 7.7 million HIV-related deaths in the next decade.

Sub-Saharan Africa (SSA) has the highest prevalence of HIV in the world (UNAIDS, 2022). In Eastern and Southern Africa, 20.6 million (18.9 million– 23.0 million) people were living with HIV as of 2021. In western and central Africa 5.0 million (4.5 million– 5.6 million) people were living with HIV as of 2021 (USAID, 2022). AIDS-related deaths in 2021 are about 280 000 (230 000– 360 000) in Eastern and Southern Africa, and 140 000 (110 000– 170 000) in central and western Africa. The UNAIDS dataset indicates the HIV prevalence rate for adults aged 15 to 49 was 27% in Eswatini (Swaziland), 25% in Lesotho, 25% in Botswana, and 19% in South Africa. According to Statista (2022), Eswatini, Lesotho, and Botswana are among the nations

with the most elevated rates of HIV. In 2021, Eswatini exhibited the highest HIV prevalence, reaching an almost rate of 28 percent (Statista, 2022). Within SSA, six in seven new HIV infections among adolescents aged 15–19 years are among girls (UNAIDS, 2022). Girls and young women aged 15–24 years are twice as likely to be living with HIV than young men. In 2020, adolescent girls and young women (aged 15 to 24 years) accounted for 25% of HIV infections, despite representing just 10% of the population (UNAIDS, 2021).

In Ghana, there are about 350 000 (330 000 – 370 000), adults and children living with HIV as of 2021 (UNAIDS, 2021). Men aged 15 and over living with HIV account for 99 000 (93 000 - 110 000) of the cases. While women aged 15 and over living with HIV in Ghana account for 220 000 (210000 - 240000) of the cases. This means there are over twice more women than men living with HIV in Ghana. Children aged 0 to 14 living with HIV account for 27000 (23000 – 29000) of the cases. For men aged 15 to 49 HIV prevalence rate is 1.0% (0.8 - 1.1). For women aged 15 to 49 with HIV, the prevalence rate is 2.4% (2.3 - 2.4). The current HIV statistics in Ghana suggest women and young girls are the most affected groups.

Despite HIV treatment interventions, mother-to-child transmission (MTCT) remains the main mode of HIV transmission in children under 15 years old (Kassa, 2018). It involves the HIV transmission from an HIV-positive mother to her infant through direct lineage at one or more of the following stages: pregnancy, labor, delivery, or breastfeeding (Osório et al., 2021). The World Health Organization (WHO) approximates that annually, around 1.3 million women and girls who are living with HIV experience pregnancies. Globally, MTCT accounts for 90% of HIV infections in children under the age of 15 years (UNAIDS, 2022). World Health Organization estimates that MTCT during pregnancy is 5-10% and 10-20% during labor and delivery. Without intervention, the transmission rate of HIV from an HIV-positive mother to her child during pregnancy, childbirth, or breastfeeding varies from 15% to 45%, as reported by the World Health Organization (WHO) in 2022. In sub-Saharan Africa (SSA), 90% of infants contract HIV from their infected mothers (Belachew et al., 2020; Teshale et al., 2021). The prevalence rate of MTCT varies from country to country. UNAIDS 2021 report indicates, Congo stands as the most affected country in terms of MTCT with a 32.5% prevalence rate, Mali with 30.1%, and the Gambia with 28.9%. The best performances in this regard are recorded by Côte d'Ivoire (7.8%), Gabon (10%), and Benin (11.2%). As of 2020 in Ghana, the rate of mother-to-child transmission (MTCT) of HIV was 20%, ranking it as the fourth-highest among the 23 high-burden countries recognized by UNAIDS and the second-highest in West Africa (Hope for Future Generations, 2021).

While various interventions and prevention programs have been implemented to reduce mother-to-child transmission of HIV, significant challenges persist, resulting in ongoing transmission risk. Limited access to antenatal care, late initiation of HIV testing and treatment, inadequate adherence to antiretroviral therapy (ART), and suboptimal infant feeding practices contribute to the persistence of HIV transmission from mothers to their children in Ghana (Nguyen et al., 2020). Moreover, there is limited comprehensive data and research on the current status and factors contributing to mother-to-child transmission of HIV in Ghana (Kassa et al., 2018). Without a thorough understanding of the local context, the specific challenges faced, and the barriers to effective prevention and treatment, it becomes difficult to develop targeted interventions and policies to mitigate this transmission risk (Coelho et al., 2019).

Therefore, there is an urgent need to conduct a detailed examination of the risk of mother-to-child transmission of HIV in Ghana. This study provides crucial insights and recommendations to guide the development and implementation of evidence-based interventions, policies, and programs aimed at reducing and eventually eliminating mother-to-child transmission of HIV in Ghana.

II. LITERATURE REVIEW

II.I. THEORETICAL FRAMEWORK

II.I.I. HEALTH BELIEF MODEL (HBM)

The Health Belief Model (HBM) is a psychological theory that focuses on people's attitudes and beliefs to explain and forecast health behaviours. The HBM was created in the 1950s by social psychologists working for the US Public Health Service to explain why the public doesn't participate in health screening and prevention programs. Subsequent to that, modifications have been made to the Health Belief Model (HBM) to explore numerous long- and short-term health behaviours, such as sexual risk behaviours and the spread of HIV/AIDS. The following are the main HBM parameters (Rosenstock et al., 1994):

- Perceived susceptibility and perceived severity of a health condition make up the concept of perceived threat, which is divided into two parts.
    - Perceived Susceptibility: A person's individualized assessment of the likelihood of developing a disease,
    - Perceived Severity: Perceptions of the gravity of contracting an illness or ignoring it.
- Perceived Benefits: The efficacy of methods thought to lessen the risk of illness.
- Perceived Barriers: These include the demands that may be placed on one's physical, psychological, and financial resources as a result of taking certain health-related actions.

- Cues to Action: Occurrences that cause people to act, whether they are physical (such as physical symptoms of a health condition) or environmental (such as media attention). A component of HBM that has not been thoroughly investigated is its cues to actions.
- Other Variables: A person's perceptions can be influenced by a variety of demographic, sociopsychological, and structural factors, which can then indirectly affect behaviour related to their health.
- Self-Efficacy: The conviction that one can successfully carry out the behaviour necessary to produce the desired results (Bandura, 1977).

Numerous health behaviours have been investigated using HBM research in a variety of populations. For example, scholars have employed the Health Belief Model (HBM) in investigations aiming to elucidate and forecast individual involvement in various programs such as influenza vaccinations, Tay-Sachs carrier status screening, high blood pressure screening, smoking cessation, seatbelt usage, exercise, nutrition, and breast self-examination. With the emergence of HIV/AIDS, the model has also been utilized to enhance comprehension of sexual risk and transmission behaviors (Rosenstock et al., 1994). In a comprehensive review of all HBM studies spanning from 1974 to 1984, researchers found that, across diverse study designs and populations, perceived barriers were the most influential variable in predicting and explaining health-related behaviors (Janz and Becker, 1984). Other noteworthy HBM dimensions included perceived benefits and perceived susceptibility, with perceived severity identified as the least significant variable. (Bandura, 1989).

The overall drawbacks of the Health Belief Model (HBM) encompass several aspects. Firstly, much of the research based on the HBM has focused only on specific elements rather than evaluating the model's effectiveness as a comprehensive entity. Additionally, being a psychological model, it does not account for external factors like environmental or economic influences that might impact health behaviors. Furthermore, the model lacks the inclusion of social norms and peer influences in individuals' health-related decisions, a factor worth noting, particularly when addressing HIV/AIDS issues among adolescents (Krischt & Joseph, 1989).

It has been proposed that an individual's perception of their capability to effectively implement a "health" strategy, such as adopting precautions during breastfeeding, significantly shapes their decision-making and capacity to adopt and maintain a modified behaviour. Tarkang and Zotor (2015), Lin et al. (2005) and Rosenstock et al. (1994) utilised the health belief model to analyse the risk and prevention of the transmission of HIV among various populations. As such per the results obtained in these studies, this research would adopt this model in analysing the behaviours of individuals who risk the transmission of HIV to Children

II.I.II. AIDS RISK REDUCTION MODEL (ARRM)

The AIDS Risk Reduction Model (ARRM), which was first presented in 1990, is a framework that was designed to explain and predict the change efforts of individuals specifically regarding the transmission of HIV/ AIDS. The Adaptive Risk Reduction Model (ARRM) is a three-stage model that incorporates several variables from other behaviour change theories. These variables come from the Health Belief Model, the "efficacy" theory, emotional influences, and interpersonal processes. The stages, along with the speculated factors that impact the successful accomplishment of each stage, are outlined as follows (Catania et al., 1990).

STAGE 1: The individual is aware of their high-risk behaviour and labels it as such. Potentially Influential Factors: having knowledge of sexual behaviours that are linked to the transmission of HIV; having the belief that one is personally at risk for contracting HIV; holding the belief that having AIDS is a negative trait to have; a discussion of social conventions and networking.

STAGE 2: Committing to having fewer sexual encounters with people who present a high risk and engaging in more low-risk activities Hypothesized Influences: cost and benefits; response efficacy (e.g., will the changes successfully reduce the risk of HIV infection?); an individual's beliefs about costs and benefits, as well as self-efficacy, are thought to be influenced by factors such as self-efficacy, understanding of the health benefits of infant feeding practices, and social factors like group norms and social support.

STAGE 3: Getting things done. This stage is divided into three stages: the first is information gathering, the second is obtaining remedies, and the third is implementing solutions. It all depends on the person; some people go through several phases at once, while others skip stages altogether. Potentially Influential Factors:

The following are hypothesised to be influential factors: social networks and problem-solving choices (self-help, informal help, and formal help); past encounters with challenges and resolutions; one's self-esteem level; the resources needed to seek assistance; the capacity for verbal communication with a sexual partner; and the beliefs and actions of the sexual partner.

The authors of the ARRM (Catania et al., 1990) identified additional internal and external factors that could influence an individual's progression through stages. These factors encompass, but are not restricted to, the stages and influences mentioned

earlier. For instance, intense emotional states (like heightened distress regarding HIV/AIDS or alcohol and drug use, both of which constitute strong emotional states) may facilitate or impede the categorization of an individual's behaviors. People might also reassess and potentially modify their sexual activities in response to external stimuli such as public awareness campaigns, depictions of individuals suffering from AIDS, or informal support groups. To date, ARRM studies have examined diverse populations, including those attending HIV testing clinics, gay and bisexual men, unmarried individuals of white, black, and Hispanic backgrounds, as well as adolescent females visiting family planning centers.

II.I.III. STATE OF MOTHER-TO-CHILD TRANSMISSION OF HIV IN GHANA

One of the greatest advancements in public health in recent years is the scaling up of the Prevention of Mother-to-Child Transmission (PMTCT) of HIV (Gumede-Moyo et al., 2017). Antiretroviral (ARV) regimens to prevent HIV infection in children and support maternal health have also improved. Services are becoming more integrated, and new methods of providing them have been introduced. Antenatal HIV testing and counselling, preventing unintended pregnancies, providing mothers and newborns with the proper ARV regimen, and supporting safer infant feeding options and practices are all included in the PMTCT programs for HIV in Ghana (Addo et al., 2018). Ghana is working to reach the goal of having no new HIV infections. Despite the significant progress toward its goal of reducing new infections among children to less than 5%, Ghana still ought to improve measures to ensure the eradication of the phenomenon. Consequently, the nation has launched PMTCT of HIV services in collaboration with its partners by encouraging expectant mothers to be aware of their HIV serostatus (Abraham, 2018). This information directly lowers the likelihood of HIV transmission from mother to child. Despite the advances made thus far, in 2013 there was a prevalence of HIV of about 7% among children born to HIV-positive mothers, which contrasted sharply with the prevalence rate of 2% in the rest of the developed world (Nyarko & Pencille, 2019). The idea behind PMTCT interventions in Ghana is to incorporate PMTCT into health services at all levels where intervention programs can be implemented to lower the risk of HIV transmission from mother to child, improve early case detection and treatment of those infected, and maintain those who are HIV-negative from contracting the virus (Dun-Dery et al., 2017).

Successful execution of multiple interventions in the maternal and child health primary care system can avert the transmission of HIV from mother to child. The United Nations, as categorized by Ayisi Addo et al. (2018), classifies these interventions into four groups: (1) averting HIV infection in women of childbearing age; (2) preventing unintended pregnancies in women living with HIV; (3) hindering HIV transmission from women with HIV to their infants; and (4) delivering suitable care (Sambah et al., 2020). By offering two equally effective options of highly effective prophylaxis to HIV-positive expectant mothers who do not require antiretroviral therapy (ART) for their well-being, WHO places particular emphasis on the third prong, which recommends treatment of eligible HIV-positive pregnant women with lifelong antiretroviral therapy (ART) (Mariwah et al., 2018). These preventive measures have been shown to successfully lower the MTCT rate in developed countries to around 2%.

WHO advises integrating PMTCT interventions by incorporating maternal, neonatal, and child health (MNCH) programs into routine primary care instead of introducing them as isolated initiatives (Gumede-Moyo et al., 2017). Accordingly, Ghana encourages MNCH-PMTCT integration through referrals or at a single point of access. In all 10 administrative regions of the nation, this integration is carried out at district health centres, national (tertiary), and regional levels in both public and private health facilities (Addo et al., 2018). The expansion of Prevention of Mother-to-Child Transmission (PMTCT) centers has been observed, particularly with the extended decentralization to encompass Community Based Health Planning Services (CHPS) sites. Regular antenatal, labour and delivery, and postpartum services all include preventive interventions such as HIV testing and counselling, treatment, particularly the supplying antiretroviral therapy and ensuring a seamless continuum of care (Nyarko & Pencille, 2019).

II.I.IV. GHANA NATIONAL HIV/AIDS CONTROL PROGRAMME

The National Technical Committee on AIDS was established by the Ghanaian government in 1985. After the first two cases of AIDS were confirmed in 1986, the government established the National AIDS Control Programme (NACP) in 1987 after realizing the potential effects that HIV/AIDS could have on the socioeconomic development of the nation (Fenny & Crentsil, 2017). Since that time, NACP has served as the technical lead organization in Ghana's health sector's response to HIV and AIDS. It falls under the Ghana Health Service's Disease Control and Prevention Department of the Public Health Division (GHS) (Hayfron-Benjamin et al., 2018).

The policy goal of the programme is to reduce HIV prevalence among the general population and reverse the upward trend (Gyamfi et al., 2017). The following are the underlying objectives of the programme in achieving its goal:

- To create strategies to stop the spread of HIV.
- To provide assistance and care for HIV-positive people (PLHIV).
- To disseminate timely information on HIV and AIDS to support action
- To offer all Ministries, Departments, and Agencies (MDAs) crucial technical support for carrying out their programs.

The HIV and AIDS Component of Ghana's two five-year health sector strategic frameworks, 2002–2006 and 2007–2012, was developed by the National AIDS/STI Control Program (Ali et al., 2019). Activities currently being carried out by the program are in accordance with the National HIV Strategic Plan for the years 2020–2025, the current Ghana Health Service.

II.II. EMPIRICAL REVIEW

Despite progress in international efforts to stop HIV from being transmitted from mother to child (PMTCT), according to Dzamboe et al. (2022a), more work needs to be done to achieve the desired results in the majority of African countries, including Ghana. The development of HIV PMTCT can be hampered by insufficient structural components. This study evaluated the structural components that health facilities in Ghana's Volta region have made available for the delivery of PMTCT of HIV services. 32 healthcare facilities were studied using a descriptive cross-sectional design. The findings demonstrated the necessity of routine training for medical professionals offering PMTCT services. Additionally, for a comprehensive PMTCT service delivery, programme managers should make investments in PMTCT commodities, particularly antiretroviral therapy prescriptions administered at healthcare facilities at lower levels.

Takure and Okafor (2022) claim that despite preventative measures to stop mother-to-child HIV transmission, there is evidence of low compliance, and as a result, the spread of HIV from mother to child is yet to cease. Therefore, the purpose of this study was to examine the social, cultural, and economic factors that affect how mothers who attend antenatal clinics at University College Hospital, Ibadan, comply with the prevention of mother-to-child transmission of HIV. The survey type's descriptive design was used for the study. 78 pregnant women who tested positive for HIV during the past nine months attended antenatal clinics at University College Hospital in Ibadan. There was total enumeration. A self-structured questionnaire with six sections served as the data collection tool (section A-F). Statistics using both descriptive and inferential methods were applied to the data collected. Results revealed a significant relationship between knowledge of HIV and compliance with PMTCT (r =.518, p =.000), as well as a relationship between economic factors and compliance with PMTCT (r =.315, p =.009), but not a relationship between social or cultural factors (r =.180, p >0.05) or between compliance with PMTCT and HIV (r =.056, p >0.05). The results showed that knowledge (ß = 0.480; t= 5.559; p0.05) and financial considerations (ß = 0.303; t= 2.593; p0.05) significantly influenced how well mothers who attended antenatal clinics adhered to the PMTCT of HIV. The promotion of a primary prevention strategy for preventing HIV from being transmitted from mother to child (PMTCT), particularly among mothers of childbearing age, was advised.

III. METHODOLOGY

This study conducted an analysis of the National AIDS/STI Control Programme (NACP) dataset to investigate the potential for mother-to-child transmission of HIV. The dataset consisted of records that were disaggregated by region and pertained to pregnant women who had registered at various antenatal clinics across Ghana. It is worth noting that every expectant woman who enrolls in prenatal care receive HIV testing with the option to decline, and those who test positive are enrolled in care. The records that were analyzed covered the period from 2015 to 2019. The National AIDS/STI Control Programme is tasked with coordinating and implementing HIV and AIDS-related initiatives under the Ghana Health Strategic Framework. The implementation process is overseen by the Disease Control and Prevention Department within the Public Health Directorate of the Ghana Health Service. On a quarterly basis, the National AIDS Control Programme (NACP) collects and organizes data on HIV and AIDS-related service delivery from community health centers, district hospitals, regional hospitals, and teaching hospitals nationwide. This systematic approach enables the NACP to produce an extensive national dataset that includes information on the provision of Prevention of Mother-to-Child Transmission (PMTCT) services in all sixteen administrative regions of Ghana.

IV. FINDINGS

IV.I. MOTHER-TO-CHILD TRANSMISSION (MTCT) RATE

Figure 1 illustrates the transmission rate of HIV from mother to child within 6 weeks and after 6 weeks. Over the years, there has been a notable decline in the transmission rate in both cases, indicating positive progress in preventing mother-to-child transmission (MTCT) of HIV. However, it is important to note that the transmission rate has consistently been higher within the first six weeks of life since 2015, suggesting a critical period for interventions and heightened focus on early testing and treatment to further reduce transmission rates during this crucial timeframe.

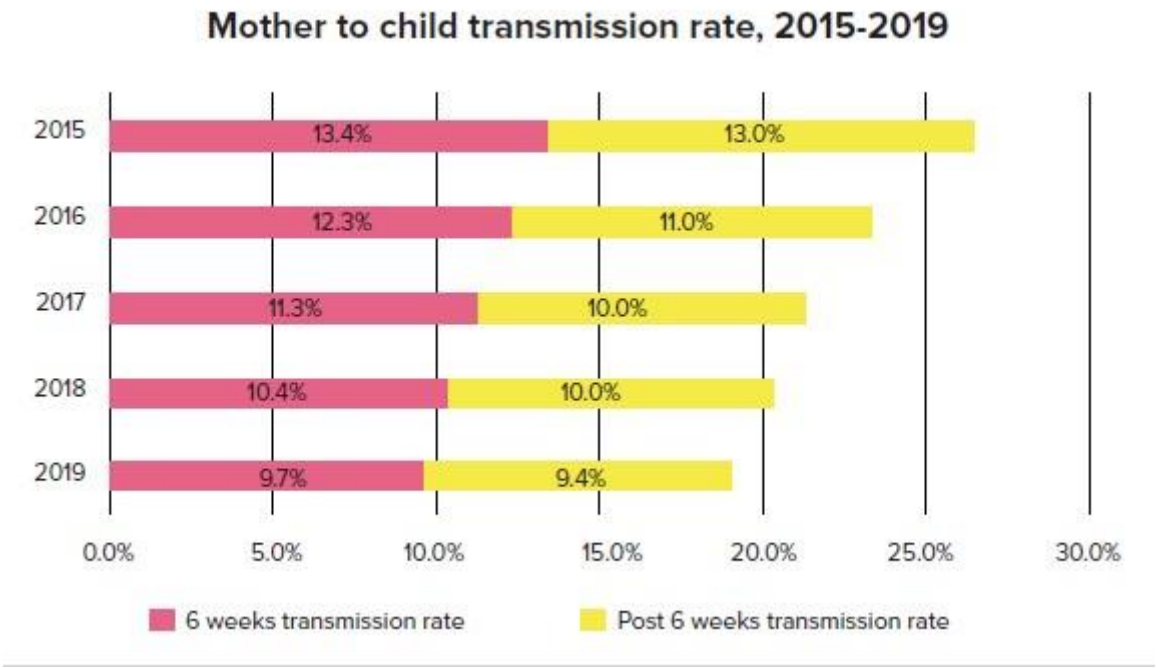

Figure 1: Trend in PMTCT rate; 2015 – 2019 (NACP Annual Report 2020)

Figure 2 provides an overview of the early infant diagnosis of HIV from 2016 to 2019. During this period, there was a decline in the percentage of infants diagnosed with HIV, starting from 12% in 2016, dropping to 8% in 2017, and further decreasing to 7% in 2018. However, there was a slight increase to 8% in 2019. These fluctuations in the percentage of infants diagnosed with HIV highlight the dynamic nature of early infant diagnosis efforts in identifying HIV infection among newborns. While there has been progress in reducing the number of infants diagnosed with HIV, the increase in 2019 suggests the need for continued vigilance and strengthened efforts to maintain the declining trend in subsequent years.

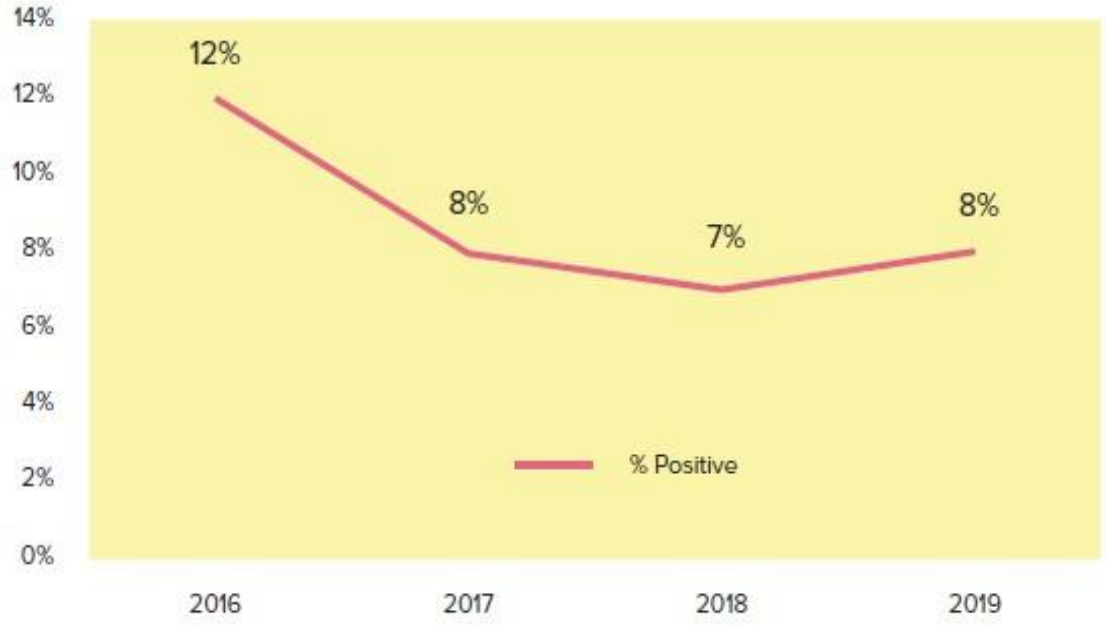

Figure 2: Trend in EID positivity rate at 6 weeks- NACP service data (NACP Annual Report 2020)

IV.II. CONCLUSION AND DISCUSSION

Globally, pregnant women living with HIV face significant challenges in accessing adequate anti-retroviral therapy (ART) compared to other eligible adults, as reported by UNAIDS in 2022. This issue poses a major obstacle in achieving the global goal of eliminating mother-to-child HIV transmissions, as emphasized by both UNAIDS in 2020 and the World Health Organization (WHO) in 2022.

Although there have been notable improvements in the rate of HIV-positive pregnant women receiving ART, there is an alarming disparity in the utilization of Prevention of Mother-to-Child Transmission (PMTCT) interventions across Ghana's sixteen administrative regions. In particular, statistic from 2019 reveals that over 28% of pregnant women in Ghana did not receive HIV testing and counseling services (Figure 1). This finding aligns with a study by Dako-Gyeke et al. in 2016, which showed that a quarter of pregnant women did not undergo HIV testing in 2013. Disturbingly, research indicates that women who refuse HIV testing are more likely to be HIV-infected compared to those who accept it, as highlighted by Abimpaye et al. in 2018. It is noteworthy that three regions in Ghana, namely Bono, Eastern, and Greater Accra, recorded higher rates of HIV-positive pregnant women tested in 2019, surpassing the average yield of 1.5%.

However, concerns persist regarding the effectiveness of the PMTCT program in ensuring universal access through routine HIV testing services (HTS) at antenatal clinics, as stated by WHO in 2022. According to a systematic review conducted by Wettstein et al. in 2012, the utilization of the opt-out testing methodology has shown to be significantly more effective in ensuring a higher proportion of pregnant women undergo HIV testing and counseling (HTC). The study revealed that with the opt-out approach, 94% of pregnant women received HTC, while the opt-in methodology yielded only 58% (Wettstein et al., 2012). Although Ghana has already implemented the opt-out approach for HIV testing among pregnant women, there still exists a deficiency in capturing a significant percentage of this population for HTC.

Ghana advocates for the integration of PMTCT with Maternal, Newborn, and Child Health (MNCH) services, which necessitates efficient administration, gathering of resources, and coordination of all interventions for the prevention of mother-to-child transmission (PMTCT) within the context of maternal and child healthcare provision. Unfortunately, the country faces various inadequacies in maternal healthcare delivery and utilization, which hamper these efforts. While 95% of expectant women in Ghana undergo some type of prenatal care, only approximately three-quarters adhere to the World Health Organization's (WHO) recommended minimum of four ANC visits. Additionally, only 57% of deliveries take place in healthcare facilities (NACP, 2020).

Moreover, statistics reveal that less than half (48%) of Ghanaian women avail themselves of the entire maternal health care package, which encompasses antenatal care, labor, delivery, and postnatal services (NACP, 2020). As PMTCT interventions are multifaceted and require continuous administration within the facility-based healthcare system, deficiencies in the utilization of maternity care significantly impact the effective implementation of PMTCT interventions.

The linkage between Prevention of Mother-to-Child Transmission (PMTCT) and Maternal, Newborn, and Child Health (MNCH) serves as a crucial dual indicator for assessing the achievement of equitable access within existing maternal healthcare delivery structures. This potential effectiveness of utilizing established maternal health delivery systems for PMTCT interventions was demonstrated by Adomako et al. in 2021. However, it also exposes potential weaknesses within the maternal health services delivery system, which may be burdened and contribute to high maternal mortality rates. Therefore, countries need to prioritize strengthening their health structures to ensure equitable access to maternity care for pregnant women.

A notable increase was observed in the annual count of HIV-positive pregnant women initiating antiretroviral (ARV) treatment throughout the entire nation, regardless of regional disparities. In 2019, approximately 89% of HIV-positive pregnant women in Ghana commenced ARV treatment. This finding aligns with the World Health Organization's (WHO) evaluation in 2012, which recognized Ghana, along with Botswana, Namibia, and Zambia, as high-priority nations that had achieved 90% coverage in ARV treatment for pregnant women, contributing to the global objective (UNAIDS, 2022). These findings indicate diverse efforts to improve the situation across the country, demonstrating alignment with worldwide initiatives aimed at addressing the needs of countries with a high prevalence of HIV among pregnant women, as emphasized by WHO in 2022.

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