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Assessment of the Knowledge, Attitude and Practice (KAP) of PMTCT among Healthcare Providers at the University of Ghana Legon

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

One of the leading causes of morbidity and mortality among communicable diseases is acquired immunodeficiency syndrome (AIDS). A vulnerable group in this setting is HIV exposed infants, (born to women living with HIV). The magnitude of the pandemic of HIV infection in developing countries is such that multiple approaches are required to show its spread and alleviate the burden on the health sector and society in general. Every woman of childbearing age needs to be aware of HIV infection, the risks of Mother-to-Child Transmission and the services available to reduce such risks. Considering these, this study assessed the knowledge, attitude and practice of Prevention of

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mother-to-child transmission (PMTCT) among healthcare providers at the University of Ghana Legon. A descriptive cross-sectional design was used in this study. The minimum sample size for this study was calculated using the single proportion population formula by Fisher (1978):
The study area was the University of Ghana Hospital Legon. The collected data was exported into STATA version 16.0 for cleaning and analysis. Descriptive analysis, such as simple frequencies, percentages, means, and standard deviations, were used to summarize the data. Findings were presented in tables and graphs. Generally, the data accumulated from the research on the knowledge, attitude and practice of PMTCT among healthcare workers indicate that there is unsatisfactory knowledge and practice. In this study, no participants had a total good score above 85%. The relationship between gender, ward and knowledge was investigated using a chi-square. The p-value was higher than the alpha-value, indicating acceptance of the null hypothesis (p-value = 0.79 and 0.053, alpha value = 0.05). Sixteen (16) of the respondents, representing 17.6%, said HIV positive pregnant women should be managed like any other pregnant woman in Labour. The majority of the respondents (56) said at the first week of pregnancy, while only (2) said at week 28. However, their attitude was satisfactory. It must be noted that without further training and an increase in staffing levels, the quality and accessibility of PMTCT will be severely affected. It is therefore recommended that there should be continuous and pre-service training on PMTCT. All new medical officers, midwives and nurses should undergo PMTCT training, and those who are already in service should take refresher courses on new and updated guidelines.

Keywords: Acquired immunodeficiency syndrome; antiretroviral therapy; zidovudine; human immunodeficiency virus; mother-to-child transmission; prevention of mother-to-child transmission {PMTC); reproductive and child health; voluntary counseling and testing; world health organization and nevirapine.

1. INTRODUCTION

Communicable or infectious diseases represent a significant global health challenge, resulting in over 7.1 million deaths [1]. Although constituting a minor portion of deaths in high-income nations, communicable diseases, coupled with maternal causes (related to pregnancy and childbirth) and nutritional deficiencies, constitute the primary causes of mortality in low-income countries [2].

Human immunodeficiency virus (HIV) and its resultant condition, acquired immunodeficiency syndrome (AIDS), stand as prominent contributors to morbidity and mortality within the realm of communicable diseases [3]. The incidence of HIV cases has surged dramatically, evolving into a global pandemic that has affected numerous countries worldwide [4]. Despite years of adversity, the introduction of antiretroviral drugs in 1987 marked a pivotal moment, with the breakthrough of combination antiretroviral therapy (ART) in 1996 heralding a significant advancement in HIV treatment [4]. While ART does not provide a cure, it has substantially enhanced the prognosis for individuals living with HIV, resulting in minimal impact on life expectancy for those under treatment [5].

Despite notable progress, numerous challenges persist, particularly in resource-limited settings that bear a disproportionate burden of these challenges. A vulnerable population within this context comprises HIV-exposed infants, born to women living with HIV. The World Health Organization (WHO) has set forth a vision advocating for zero instances of HIV transmission from mother to child, marking a pivotal milestone in ending the HIV pandemic. However, the grim reality persists, with approximately 400 children under 15 years of age contracting HIV daily [6], with over 90% of these infections stemming from maternal transmission [7]. Failing to treat infected infants yields dire consequences, as half of them succumb to the disease before reaching two years of age [8]. Hence, it is imperative not only to prevent transmission but also to promptly detect and treat HIV-infected infants. Enhanced management and follow-up of HIVexposed infants hold the potential to significantly reduce morbidity and mortality rates, bringing us closer to a future devoid of AIDS-related afflictions [9].

The HIV infection pandemic's magnitude in developing nations necessitates the implementation of diverse strategies to mitigate its propagation and reduce the strain on the healthcare system and society at large [10]. Mother-to-child transmission (MTCT) refers to the vertical transfer of HIV from mother to child during pregnancy, delivery, and breastfeeding. This mode of transmission is the main source of

new infections among young children, contributing to approximately 1,600 out of 16,000 daily infections, especially prevalent in developing nations [10]. The increasing rates of HIV among women and children highlight the urgent need to develop fair and lasting healthcare systems to prevent vertical transmission effectively.

The Prevention of mother-to-child transmission (PMTCT) program is crucial in preventing HIV transmission from infected mothers to infants by providing comprehensive interventions such as HIV screening, initiating antiretroviral therapy (ART), early infant testing, breastfeeding support, safe delivery practices, postnatal care, family planning services, counselling, and continuous monitoring and evaluation. These efforts are aimed at safeguarding the health and well-being of both the mother and child, ensuring that appropriate care and treatment are accessible and effective in reducing the risk of vertical transmission of HIV [11-13].

However, to ensure the success of PMTCT programs, healthcare workers must be fully informed about HIV infection, the risks of mother-to-child transmission (MTCT), and the available services to mitigate these risks [14-16]. Although Ghana boasts of nearly universal awareness of HIV/AIDS among the general population (99% for men and 98% for women) according to the Ministry of Health (2014) and Ghana Demographic and Health Survey (GDHS, 2008) data, there remains a concerning lack of awareness regarding MTCT among certain pockets of health workers. Various studies examining awareness of MTCT have reported diverse findings [17,3] Considering these, this study assessed the knowledge, attitudes and practice of PMTCT among healthcare providers and patients at the University of Ghana Legon.

2. LITERATURE REVIEW

Healthcare providers' knowledge of PMTCT: PMTCT programs are vital components of HIV/AIDS control efforts, focusing on reducing the transmission of HIV from mother to child during pregnancy, childbirth, and breastfeeding. The effectiveness of these programs hinges significantly on the knowledge and expertise of healthcare providers responsible for administering care to HIV-positive pregnant women and their infants.

Several studies have assessed healthcare providers' knowledge of PMTCT, highlighting both strengths and areas for improvement. For example, a study by Haghdoost [18] reported that healthcare providers working in antenatal care (ANC) clinics had a good understanding of the basic principles of PMTCT, such as the importance of antiretroviral therapy (ART) and the significance of early infant diagnosis (EID). However, there were gaps in knowledge regarding the optimal timing of ART initiation during pregnancy and the management of infants exposed to HIV.

Similarly, Nkole [19] assessed the knowledge of healthcare providers in a maternity hospital and found that while providers were knowledgeable about the overall concept of PMTCT, they lacked a detailed understanding of specific components, such as the risks and benefits of different infant feeding options for HIV-exposed infants and the importance of viral load monitoring in pregnant women on ART.

On the other hand, Abtew et al. [2] reported a high level of knowledge and competence in implementing services among healthcare providers working in PMTCT clinics. Providers demonstrated a strong understanding of the latest PMTCT guidelines, including the use of antiretroviral drugs for both maternal and infant prophylaxis, as well as the importance of adherence counselling and follow-up care for HIV-positive pregnant women.

Despite these findings, several challenges persist in healthcare providers' knowledge of PMTCT. Misconceptions and outdated practices continue to influence providers' decision-making process, leading to suboptimal care for HIV-positive pregnant women and their infants. Additionally, the rapidly evolving nature of HIV/AIDS care requires healthcare providers to continuously update their knowledge and skills to deliver evidence-based care.

Mother-to-Child Transmission (MTCT) of HIV: Vertical transmission of HIV, or Mother-to-Child Transmission (MTCT) of HIV, occurs when the virus passes from an HIV-positive mother to her child. In developing countries, MTCT rates range from 25% to 35% without preventive measures, while in developed nations, the range is 15% to 25% [20,21-24]. In non-breastfeeding populations, the risk of MTCT is 15% to 30% without interventions. However, breastfeeding by an infected mother increases this risk by 5% to

20%, resulting in a total risk of 30% to 45% [20]. Rempis [25] highlighted several factors influencing MTCT of HIV, such as high HIV prevalence among women of reproductive age, high birth rates, a significant population of women in this age group, and inadequate coverage of interventions to prevent MTCT Sojl, Z [26,27,28].

Prevention of Mother–To–Child Transmission (PMTCT) Programme: The World Health Organization (WHO) has instituted a program to reduce vertical transmission of HIV, which involves the transfer of HIV from a mother to her infant. This program incorporates several interventions with the following goals:

1. HIV counseling and testing
2. Antiretroviral treatment and prophylaxis
3. Promoting safer delivery practices
4. Encouraging safer infant-feeding practices.

HIV Counseling and Testing : The positive results seen in clinical trials of antiretroviral drugs like Zidovudine (AZT) and Nevirapine (NVP) paved the way for a globally applicable and feasible intervention to decrease HIV transmission from infected pregnant women to their babies. As a result, governmental and non-governmental health services in heavily impacted areas of Africa, Asia, Latin America, and Eastern Europe launched pilot programs for the Prevention of Mother-to-Child Transmission (PMTCT) of HIV, swiftly scaling up their implementation [29,30-34].

Since their establishment in 1999, these programs have provided voluntary counselling and testing (VCT) to over 800,000 pregnant women worldwide [35]. A significant objective of VCT is to identify HIV-positive pregnant women so that they can receive appropriate antiretroviral treatment, either for a short duration or throughout their pregnancy, to prevent HIV transmission to their infants. In addition to its preventive role, HIV counselling and testing also offer opportunities for promoting HIV prevention, encouraging disclosure of HIV status, and facilitating communication between couples regarding HIV and Prevention of mother-to-child transmission. Healthcare facilities that provide PMTCT services routinely offer HIV counseling to all pregnant women attending antenatal clinics. This counseling, which includes voluntary testing, aims to empower pregnant women with knowledge and support to make informed decisions that promote a healthy pregnancy and delivery. It also encourages communication between couples regarding HIV and the prevention of mother-to-child transmission.

Studies have shown the effectiveness of a short course of Zidovudine (ZDV) given during the final month of pregnancy and labor in non-breastfeeding HIV-infected women in Thailand. This intervention significantly reduces the risk of mother-to-child transmission [36,37-39]. These findings have led to a global policy endorsed by UNAIDS, WHO, and UNICEF, recommending the use of Zidovudine prophylaxis in a phased approach, taking into account national and local capacities and the prevalence of HIV among pregnant women.

The Strategy for PMTCT In Ghana: In Ghana, there exists a national document specifically addressing the Prevention of Mother-toChild Transmission of HIV (PMTCT).

Achieving a significant reduction in HIV infection among infants and young children involves a multifaceted strategy that encompasses:

1. Primary Prevention of HIV infection.
2. Preventing unintended pregnancies among HIV-infected women.
3. Preventing HIV transmission from HIV-infected women to their infants.
4. Providing comprehensive treatment, care, and support to HIV-infected women, their infants, and their families.

PMTCT guidelines for HIV-positive women and HIV-exposed infants HIV-positive women: In Ghana, a new treatment approach called Option B+ (lifelong ART) was introduced in June 2015. This approach involves initiating antiretroviral therapy (ART) for all pregnant and breastfeeding women who test positive for HIV, and they continue this therapy throughout pregnancy and breastfeeding, as well as for the rest of their lives. Unlike previous regimens, Option B+ does not necessitate CD4 cell count testing before starting ART [40], (Munchenje, 2015).

Implementing Option B+ has the potential to enhance the health outcomes of both mothers and children by reducing rates of mother-to-child transmission (MTCT) and, more significantly, reducing morbidity and mortality. With Option B+, women receive continuous ART, which eliminates gaps in prophylactic therapy during

subsequent pregnancies assuming adherence to treatment [41].

For HIV-exposed infants, it is crucial that all babies born to HIV-positive mothers receive antiretroviral treatment shortly after birth. The specific treatment plan depends on the mother's antiretroviral therapy (ART) regimen and the method of infant feeding. Infants who are breastfed should receive nevirapine once daily from birth for six weeks. In contrast, infants on replacement feeding should be given nevirapine once daily (or zidovudine twice daily) for four to six weeks.

At four to six weeks of age, all infants born to HIV-positive mothers should undergo early infant diagnosis for HIV. Additionally, they should undergo another HIV test at 18 months of age or upon cessation of breastfeeding to confirm the final diagnosis (WHO, 2015).

Facility and Service Delivery Factors and Implementation of PMTCT: Patient defaulting rates are often associated with challenges such as long distances to health centres, poor road networks, and extended waiting times at healthcare facilities. HIV-positive women who make an effort to reach health centres may encounter long queues and endure extended waiting periods. Staff shortages and the lack of separation between antiretroviral therapy (ART) and other services contribute to these delays. As a result, clients may become fatigued and leave without receiving their medications, and in extreme cases, they may never return to the facility (Munchenje, 2015). Inadequate counselling space is another challenge some institutions face, especially after the scale-up of Prevention of Mother-to-Child Transmission (PMTCT) programs. Insufficient infrastructure and setup adjustments have not accompanied the expansion, leading to a lack of privacy and confidentiality for clients (Munchenje, 2015). This issue of limited space violates clients' rights and can be particularly problematic due to the stigma associated with HIV. The conspicuous designation of consulting rooms and specific healthcare personnel for PMTCT programs indirectly labels clients as HIV-positive, which can be counterproductive [42]. Effective follow-up of HIV-positive clients is crucial in PMTCT programs to minimize defaulting rates. However, inefficient monitoring processes and methods can hinder achieving this goal.

High defaulter rates can be attributed to health facilities failing to maintain patient follow-up registers. Poor record-keeping practices may result in the omission of follow-up visits, especially when a client misses their scheduled appointment but later accesses the service. Consequently, such clients may be incorrectly categorized as defaulters when, in fact, they have not forgotten their appointments but experienced time inconsistencies [43] (Munchenje, 2015).

In Cote d'Ivoire, mothers expressed apprehension regarding the condescending behaviour of healthcare workers at various health facilities. Additionally, HIV-positive mothers were dissatisfied with the amount of time they had to wait before receiving attention during clinic appointments. Inadequate counselling sessions posed another challenge, stemming from limited staffing and space. This limitation hindered effective communication between clients and care providers. Due to the overwhelming workload caused by staff shortages, caregivers often opted for group counselling, which deprived clients of individual contact with their caregivers. Consequently, privacy, trust, and confidence were compromised, resulting in ineffective counselling [44].

According to a study conducted by Laar et al. [42], it was found that caregivers providing services under the PMTCT program in Ghana were performing additional duties due to the increased number of pregnant women seeking care and counselling. The study highlighted Ghana's doctor-population and nurse-population ratios, which stood at 1:13,683 and 1:1,415 per 100,000, respectively (Ghana Health Service, 2007). This indicated that nurses were overburdened during follow-up visits, exceeding the World Health Organization's recommended maximum of 30 consultations per day [6].

The PMTCT program encounters specific challenges, notably an inconsistent supply of commodities such as antiretroviral therapy (ART) medications and fixed-dose combinations of ART. Clients may face significant disappointment upon arriving at their regular healthcare facility only to discover a shortage of drugs, potentially leading to diminished confidence in the facility, healthcare providers, and the treatment itself. Historically, clients on previous ART regimens experienced the burden of managing a large number of tablets,

contributing to challenges in treatment adherence [40].

The concept of lifelong medication can pose retention challenges, especially for clients who perceive themselves as healthy but are required to continue medication indefinitely (Munchenje, 2015). Factors related to medication include adverse effects, the complexity of dosing regimens, pill burden, and dietary restrictions. Health system challenges encompass frequent visits to healthcare facilities for HIV-positive individuals to access care and refill medications, as well as the considerable distances often required to reach healthcare services. Moreover, insufficient information or instructions on medication and limited understanding of HIV infection progression and the benefits of ART can contribute to non-adherence to antiretroviral medication [45,9].

As indicated by Laar et al. [42], caregivers faced significant challenges in effectively conveying the Prevention of Mother-to-Child Transmission (PMTCT) guidelines to their clients, resulting in counselling that was often prescriptive in nature. Counsellors expressed concerns about the lack of refresher programs and on-the-job training, which led to outdated and inconsistent messaging. The study revealed that nurses lacked opportunities to update their knowledge and expressed a desire for regular refresher training to stay updated with current information.

In Malawi, a survey was conducted in health facilities to describe and compare different service delivery models. In a study examining different care models for HIV testing and counseling (HTC) services, multivariate analysis revealed several associated factors. These factors included the workload of HTC counselors, the availability of HIV test kits, and the specific care model implemented by the healthcare facility. The care models investigated were:

1. Facilities where newly diagnosed HIV-positive women received and continued
2. antiretroviral therapy (ART) at the antenatal clinic until delivery.
3. Facilities where newly diagnosed HIV-positive women received the initial ART dose at the antenatal clinic but were then referred to an ART clinic for ongoing care.
4. Facilities where newly diagnosed HIV-positive women were referred from the antenatal clinic directly to an ART clinic for initiation and follow-up of ART.
5. Facilities serving as ART referral sites without providing antenatal care [46].

In another study conducted across four African countries (Uganda, Burkina Faso, Kenya, and Malawi), women's perspectives on consent, counseling, and confidentiality in Prevention of Mother-to-Child Transmission (PMTCT) programs were explored. The findings indicated that in all four countries, over three-quarters of participants reported that healthcare providers adequately explained HIV transmission and prevention methods, emphasized the importance of required tests, and encouraged involving partners in the process. However, during qualitative interviews, some participants expressed concerns about coercive HIV testing and challenges related to disclosure [47].

Drawing from pertinent information gathered from studies conducted in various countries, it can be inferred that PMTCT is a dependable and effective intervention for achieving the nearelimination of mother-to-child transmission (MTCT) of HIV. The achievements and obstacles associated with PMTCT implementation, both at the patient and healthcare facility levels, have been documented globally. Hence, it is crucial to identify and address these challenges within the specific context of Ghana.

2.1 Study Objectives

2.1.1 Main objective

To assess the knowledge, attitude and practice (KAP) of PMTCT among healthcare providers at the University of Ghana Legon.

2.1.2 Specific objectives

1. The specific objectives of the study are to:
2. Determine the method of delivery of HIV-positive pregnant women and to compare the method of delivery with the HIV status of the infant
3. Evaluate the feeding options chosen by the HIV-positive mothers and to compare these options with the HIV status of the infant
4. determine the HIV status of children born by HIV-positive mothers 18 months and above after delivery

Justification/Significance of the study: Understanding the challenges posed by MTCT

of HIV/AIDS and recognizing the potential benefits of effective interventions, having comprehensive knowledge of PMTCT, and adopting appropriate attitudes and practices are crucial. These factors can significantly contribute to reducing both infant and maternal mortality rates, offering substantial advantages in public health outcomes. Knowledge, attitude and practices are critical components that move healthcare providers and decision-makers to make informed decisions concerning healthcare delivery. Therefore, an assessment of the knowledge, attitude and practices of healthcare providers will aid in identifying the gaps in the PMTCT program at Legon Hospital. This will also help to put in measures to improve the PMTC program. Many studies have focused on patients only, with very few having been geared towards health workers and mothers. This study holds significant value in improving the delivery and receipt of services under PMTCT.

3. METHODOLOGY

Introduction: This chapter presents the methodology employed for data collection and the instruments utilized in conducting the study. It provides an overview of the study area's background, study design and type, study population, sampling technique and sample size, study variables, data collection tool and technique, data analysis approach, and ethical considerations.

Study design: The study employed a descriptive cross-sectional design. This design is suitable for capturing information about a population at a specific point in time, providing a snapshot of the knowledge, attitude, and practice (KAP) of Prevention of Mother-to-Child Transmission (PMTCT) among healthcare providers.

Study Population: The target population was the healthcare providers of the University hospital.

3.1 Inclusion and Exclusion Criteria

Inclusion criteria: Healthcare providers whose work is in relation to the Prevention of Mother-to-Child Transmission of HIV.

Exclusion criteria: Trained foreign doctors/healthcare providers who had recently joined the department and had practised for less than a year in Ghana but whose work related to the Prevention of Mother-to-Child Transmission of HIV.

Sample Size Determination: The minimum sample size for this study was calculated using the single proportion population formula by Fisher (1978):

$n = Z^2 * P (1 - P) / d^2$ [36] Where: n = sample size
Z = score for 95% Confidence Interval, which is 1.96

P=proportion of sample =8.2 (Proportion of healthcare providers, Laar et al., 2014) d = tolerable error set at 5%.

$$\frac{1.96^2 * 0.082(1-0.082)}{0.05_2}$$

n= ---$\mathbf{0.05_2}$ =88, with estimated non-response rate of 5%= **91**

Sampling and data collection: Healthcare providers whose work is with the Prevention of Mother-to-Child Transmission of HIV and who consented to be part of the study were recruited. The principal researcher recruited three research assistants. These research assistants were trained for a day on the study, especially on the questionnaire administration.

The data collection tool was divided into 4 sections; demographic characteristics, current status of HIV, nature of treatment given and ART treatment for children. The research assistants were also trained to be able to probe to obtain responses. They were further trained on the consenting procedure. Pre-testing of the survey tools was done during the training period in a nearby health facility with similar characteristics. This allowed the research team to have practical experience with the administration of the study tools.

Data Analysis: The collected data was exported into STATA version 16.0 for cleaning and analysis. Descriptive statistics, such as frequencies, percentages, means, and standard deviations, were used to summarize the data. A chi-square test was conducted between some selected variables to determine the associations between the variables (Table 2). A test of probability value less than 5% (0.05) was considered statistically significant at a 95% confidence interval.

The level of KAP towards the Prevention of Mother-to-Child Transmission (PMTCT) of HIV/AIDS program at the University of Ghana Legon was assessed based on responses from the study participants. The KAP of each participant was categorized as 'good,' 'fair,' or 'poor.' The questionnaire used in the study comprised a total of 22 questions, with 6 questions related to knowledge, 6 to practice, and 10 to attitude [45].

In terms of knowledge, healthcare providers were tested on their understanding of PMTCT, prevalence of HIV among women, the significance of PMTCT in HIV/AIDS prevention, awareness of risks related to HIV transmission during delivery, familiarity with counselling strategies specific to PMTCT in Ghana, and knowledge of existing guidelines for PMTCT implementation [48,49,18].

Attitudes were measured by assessing their empathy and understanding of HIV-positive women's needs in PMTCT, confidence and willingness to address client needs effectively, perception of the significance and impact of the PMTCT program, attitudes towards allocating sufficient time and resources to PMTCT services, perceptions on the impact of PMTCT services on ANC care quality, concerns, fears, and stigmas related to working with HIV-positive women, exploration of reasons behind patients' refusal of HIV testing during antenatal care, and understanding of personal beliefs and attitudes towards HIV-positive women's reproductive choices.

Practices were assessed by questioning them on their ability to manage labour while administering ARV drugs, adherence to protocols during supervised labour management, skills in avoiding or delaying Artificial Rupture of Membranes, approach to counselling and minimizing unnecessary Vaginal Examinations during PMTCT, and their confidence and proficiency in handling essential PMTCT procedures.

Each question was scored with 1 for “Yes” and 0 for “No”. The overall score was determined by calculating the average score for each category of KAP. Scores above 75% were categorized as good, those between 50% to 74% were considered fair, and scores below 50% were classified as poor [45].

4. STUDY FINDINGS

Demographic Characteristics of the study participants: The demographic characteristics of the study participants are presented in Table 1. The majority (72.5%) were female, with 20 (22%) holding a degree and 71 (78%) possessing a diploma. Nurses comprised the largest group (37.4%), followed by midwives (40.7%) and doctors (22.0%). Participants were distributed across different wards, with 15 (16.5%) working in Antenatal Care (ANC)/Family Planning, 34 (37.4%) in the Labour Ward/Delivery Suite, and 42 (46.2%) in the Obstetrics and Gynaecology (O&G) Ward. Marital status varied, with 18 (19.8%) healthcare providers being married, while the majority (80.2%) were single.

Total knowledge score: In this study, no participants had a total good score above 85%. They were either poor or fair. There were associations between level of education, marital status and profession, but no association between ward and gender. Doctors with masters who are married were likely to have fair knowledge. (Table 2).

Knowledge related to PMTCT: The study revealed that the participants exhibited poor basic knowledge of Prevention of Mother-to-Child Transmission (PMTCT) of HIV/AIDS. Misconceptions were prevalent, particularly concerning the impact of PMTCT and transmission risks through breastfeeding and delivery. Additionally, a notable proportion of participants lacked awareness of the counselling approach utilized in Ghana for PMTCT. However, there was a high level of awareness regarding existing guidance for PMTCT interventions. Specifically, 65 respondents (71.4%) acknowledged the risk of transmission through breastfeeding, while 26 (28.6%) disagreed. Moreover, 83 respondents (91.2%) recognized the risk of HIV transmission to the child during delivery, while eight (8.8%) disagreed. Regarding the counselling approach, 77% of respondents identified it as 'opt-in,' while 23.1% stated 'opt-out,' and 47.3% were unaware of the approach (Table 1).

Table 1. Demographic characteristics among healthcare providers

Variable	Frequency	Percentage
Gender		27.5
Male	25	
Female	66	72.5
Age (in years)		
≤30	76	86.81
>30	15	13.19
Educational Qualification		
Degree	20	22
Diploma	71	78
Occupation		
Nurse	34	37.4
Midwife	37	40.7
Doctors	20	22.0
Ward		
ANC/Family planning	15	16.5
Labour ward/delivery suite	34	37.4
O&G ward	42	46.2
Marital status		
Married	18	19.8
Single	73	80.2

Table 2. A chi-square correlation between Gender, Marital status, Education, Ward and knowledge

Variable	Good (>85)	Fair (50-85)	Poor (<50)	Total	P-value
Gender					
Male	0(0)	20(80)	5(20)	25(100)	0.709
Female	0(0)	55(83.3)	11(16.6)	66(100)	
Marital status					
Married	0(0)	18(100)	0(0)	18(100)	0.029
Single	0(0)	57(78.1)	16(21)	73(100)	
Educational level					
Degree	0(0)	20(100)	0(0)	20(100)	
Diploma	0(0)	55(77.5)	16(22.5)	71(100)	0.019
Ward					
ANC/family planning	0(0)	11(73.3)	4(26.7)	15(100)	0.053
Labour ward/delivery suite	0(0)	25(73.5)	9(26.5)	34 (100)	
O&G ward	0(0)	39(92.9)	3(7.1)	42(100)	
Profession					
Doctors	0(0)	20(100)	0(0)	20(100)	
Nurse	0(0)	21(61.8)	13(38.2)	34(100)	
Midwives	3(8.1)	34(91.9)	3(8.1)	37 (100)	0.001

Table 3. Knowledge of healthcare providers on PMTCT

Yes Questions	N			NO
		%	N	%
Prevalence in women	0	0	91	100
Meaning of the acronym PMTCT	90	98.9	1	1.1
Risk of infection during delivery	65	71.4	26	28.6
Counselling approach in Ghana	21	23	70	77
Awareness of the existence of guidance for PMTCT	89	97.8	2	2.2

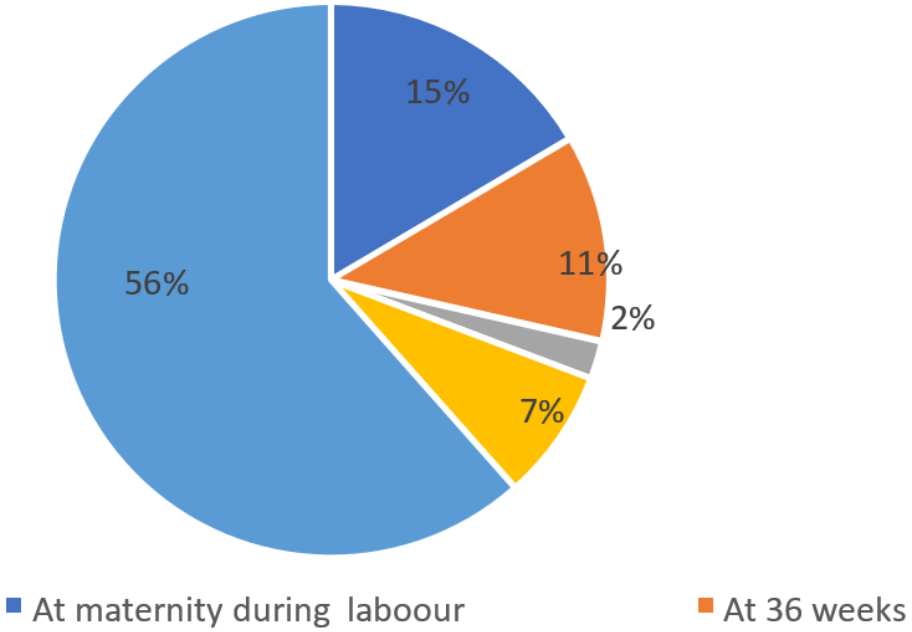

Fig. 1. Initiating ARV

Table 4. Frequency of ARM and episiotomies

What do you often do	Frequency (N=91)	Percentage (%)
Usually	2	2.2
Sometimes	59	64.8
Never/rarely	30	33.0

Knowledge of healthcare providers on PMTCT: The study unveiled a concerning lack of basic knowledge among participants regarding Prevention of Mother-to-Child Transmission (PMTCT) of HIV/AIDS. Misconceptions were widespread, especially regarding the impact of PMTCT and transmission risks via breastfeeding and delivery. Furthermore, a significant number of participants were unaware of the counselling approach employed in Ghana for PMTCT. However, there was a notable level of awareness regarding existing guidance for PMTCT interventions. (Table 3)

Knowledge of when to initiate PMTCT: The study found that the majority of respondents (56) believed that PMTCT should be initiated during the first week of pregnancy, while only 2 respondents suggested initiating it at week 28 (Fig. 1). This part of the study was aimed at assessing the level of knowledge among healthcare providers regarding PMTCT practices and to evaluate awareness of when to commence PMTCT guidelines and counselling approaches.

Labour and delivery: Most of the respondents, 59 representing 64.8%, agreed to do artificial rupture of the membranes (ARM) and episiotomies sometimes, while 2 of the respondents representing 2.2 decided to do ARM and episiotomies usually**.** Thirty (30) respondents, representing 33% of the respondents, said they never/rarely do ARM or episiotomies.

Thirty-eight (38), representing 41.8% of the respondents, said they would do vaginal exams every 4 hours 2 of the respondent whereas 2.2% said they would check for cervical dilation. 23.1% did not answer and 24.2% said they would do vaginal exams only if the woman is bleeding, and 8.8% said they would only do vaginal exams when it is necessary.

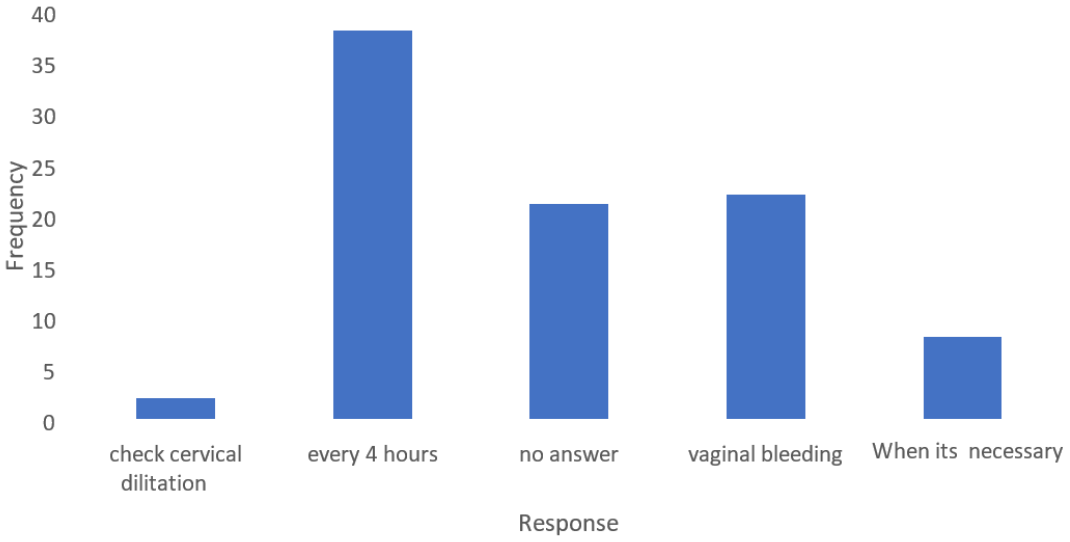

Fig. 2. Vaginal examination in an HIV-positive pregnant woman

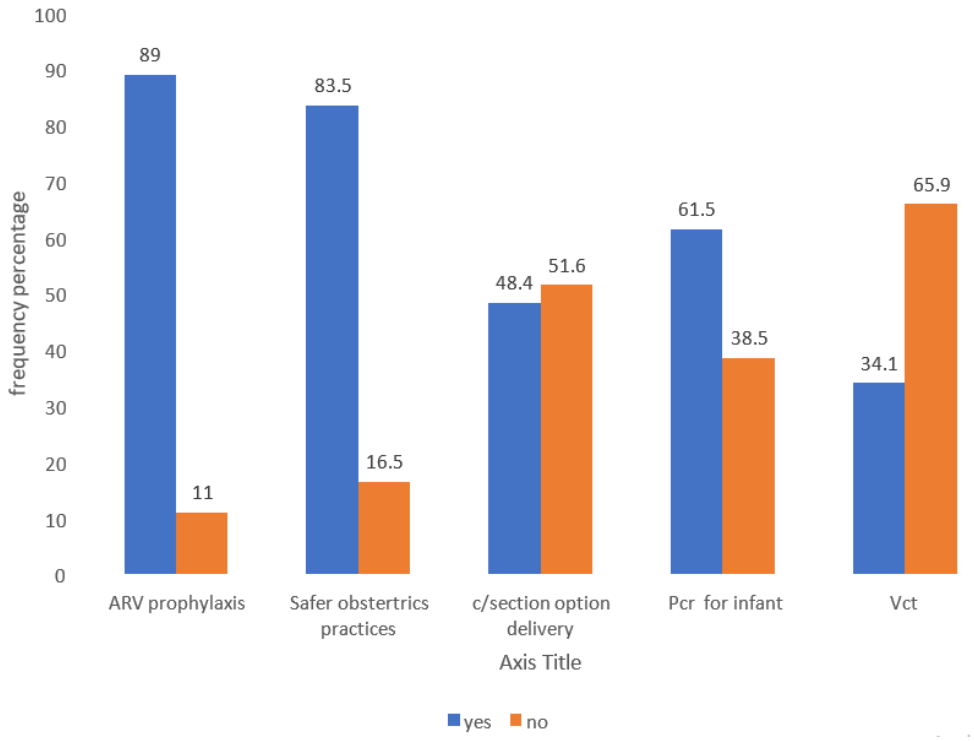

Fig. 3. PMTCT services offered

The Fig. 3 Above shows the workers' responses to the various interventions the University Hospital offers.

Attitude: Overall, attitudes towards PMTCT were positive among respondents. A significant majority (91.2%) viewed PMTCT as a valuable service, with only 8.8% somewhat disagreed with the statement that 'Provideing PMTCT stops us from giving good ANC care' (Table 5). Moreover, over 82% of respondents expressed confidence in their ability to meet their clients' needs, while 9.9% felt unable to do so. They attributed this limitation to their perception of patients' socioeconomic status. Additionally, 35.2% of respondents agreed that the PMTCT

program increased their workload, leading to a perceived lack of time for its implementation.

However, the majority (64.8%) believed there was sufficient time to provide PMTCT services. Despite these challenges, 91% of respondents affirmed the program's effectiveness. Further details regarding attitudes are outlined in the table below (Table 5).

Practice score: Sixteen (16) of the respondents, representing 17.6%, said HIV-positive pregnant women should be managed like any other pregnant woman in labour. Ten (10) of the respondents, representing 11.1%, said HIV positive pregnant women should avoid or delay the artificial rupture of the membrane. Four (4) of the respondents, representing 4.4%, said they (HIV positive pregnant women) should be managed with more supervision, while 25 of the respondents representing 27.5% said they (HIV positive pregnant women) should be managed with ARVs. Ten (10) of the respondents representing 11.1%, agreed to counselling and avoiding unnecessary vaginal examination. Twenty-six (26) of the respondents, representing 28.6%, said they do not know what to do.

Table 5. Details regarding attitudes

Question	Options	n	%
What are the needs of an HIVpositive woman	Counselling and support	77	84.6
	Others	14	15.4
Are you able to meet clients' needs	Yes	82	90.1
	No	9	9.9
PMTCT programme is very important	Agree	88	96.7
	Somewhat agree	3	3.3
Not enough time to give to PMTCT	Agree	32	35.2
	Disagree	59	64.8
Providing PMTCT stops us from giving good ANC care	Agree	4	4.4
	Somewhat agree	3	3.3
	Somewhat disagree	8	8.8
	Disagree	76	83.5
Fear of getting infected by working with HIV-positive women	Agree	1	1.1
	Somewhat agree	7	7.7
	Somewhat disagree	4	4.4
	Disagree	79	86.8
I am scared to deliver HIV-positive women because of fear of infection	Agree	1	1.1
	Somewhat agree	14	15.4
	Somewhat disagree	1	1.1
	Disagree	75	82.4
Why some women refuse HIV testing in ANC	Fear of results	54	59.3
	Fear of stigma	37	40.7
Should an HIV-positive woman have children?	Yes	89	97.8
	No	2	2.2
Reasons for the above reason	Because of Pmtct&counselling	52	57.2
	Others	39	42.8

Table 6. The majority of the respondents (44.4%) said AZT and NVP, and the least response (4.4%) was AZT only and NVP only, respectively

What to do	Frequency (N=91)	Percentage
As anyone in Labour	16	17.6
Manage with ARV	25	27.5
Manage with supervision	4	4.4
Avoid or delay ARM	10	11.1
Counselling and unnecessary VE	10	11.1
Do you know what to do	26	28.6

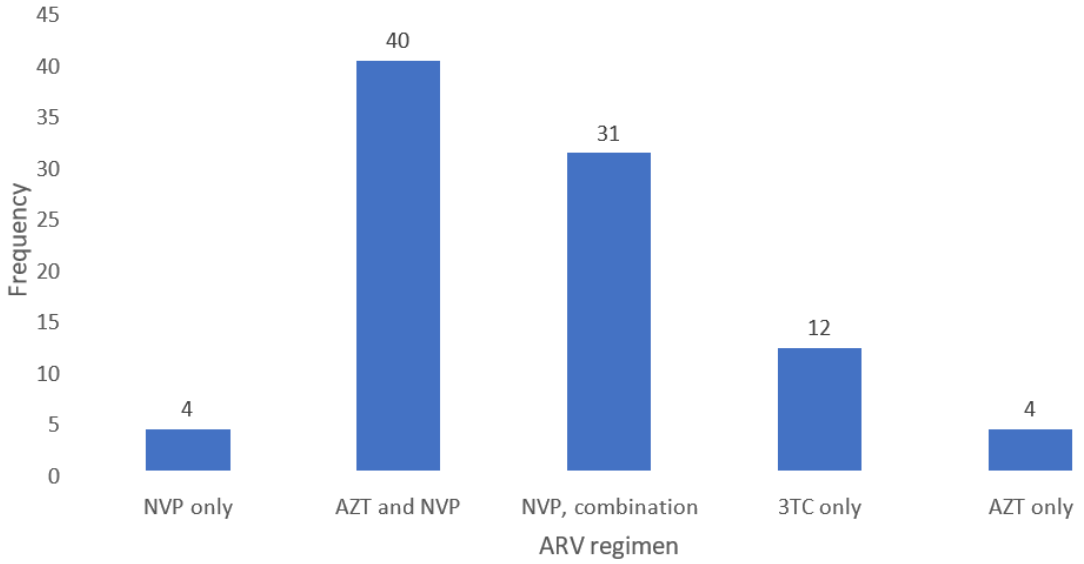

Fig. 4. ARV recommendations for PMTCT

5. DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 Discussion

The study highlighted a concerning lack of basic HIV understanding within the context of Prevention of Mother-to-Child Transmission (PMTCT) among healthcare providers. In contrast, studies in Cente, Katsina State, Nigeria (65%), and South Ethiopia (65.9%) reported significantly higher knowledge levels [10,47]. Similarly, higher knowledge scores were observed in cross-sectional studies in Mekelle, Ethiopia (96.25%), and Hawassa Referral Hospital, South Ethiopia (82.3%) [1]. Differences in knowledge levels were attributed to variations in study settings, accessibility to information, healthcare service utilization, and the availability of healthcare facilities.

These findings highlight the critical need to enhance healthcare providers' knowledge of PMTCT to ensure effective implementation of prevention strategies and improve maternal and child health outcomes.

The study findings further indicate a predominantly positive attitude among health workers towards the Prevention of Mother-to-Child Transmission (PMTCT) of HIV/AIDS, with 71% of respondents exhibiting such attitudes. This aligns closely with similar studies conducted in Mekelle, Ethiopia, Katsina State, Nigeria, and South Ethiopia [10,47,41]. However, it is noteworthy that the observed attitude score was slightly lower compared to studies in Ambo, Ethiopia (93.6%), and Hawassa, Ethiopia (97.4%), but notably higher than studies in Southwestern Nigeria (28.73%) and Juba Teaching Hospital, South Sudan (51%) [1,50, 45] (Tigabu & Dessie, 2018) [51].

Variations in attitudes across different regions could be attributed to geographical differences, distinct study periods, and variations in sample sizes. These findings emphasize the importance of assessing and understanding the attitudes of health workers towards PMTCT to tailor interventions effectively and ensure optimal implementation of PMTCT programs.

In examining the practices related to Prevention of Mother-to-Child Transmission (PMTCT) among healthcare workers, it is crucial to consider their knowledge of HIV transmission. A comparable cross-sectional study conducted in Gondar town, Northwest Ethiopia, revealed concerning findings: only 35.9% of participants correctly identified transmission during pregnancy, 33.6% during labour, and 24.9% during breastfeeding [52].

These low percentages suggest a potential gap in understanding among healthcare workers regarding the transmission routes of HIV during the perinatal period. However, it it noteworthy that the observed differences in knowledge levels may be attributed to temporal changes, particularly the expansion of media. The

increased media presence in the country may have contributed to a greater awareness among pregnant mothers about the mechanisms of motherto-child transmission of HIV/AIDS.

This underscores the dynamic nature of information dissemination and highlights the importance of considering temporal factors in interpreting study results. It also emphasizes the need for continuous education and training programs for healthcare workers to ensure they are equipped with accurate and up-to-date knowledge on PMTCT practices. By addressing knowledge gaps and promoting best practices, healthcare workers can play a vital role in reducing the transmission of HIV from mother to child and improving maternal and child health outcomes.

5.2 Conclusion

Generally, the findings from the research on the knowledge, attitude, and practice of PMTCT among healthcare workers suggest a need for improvement in expertise and practice. Based on the methods used in the study, several conclusions can be drawn.

Firstly, participants demonstrated poor overall knowledge of PMTCT, with none scoring above 85%. This suggests the need for targeted education and training programs to enhance understanding and practices related to PMTCT.

Secondly, the study uncovered misconceptions among participants regarding the impact of PMTCT, transmission risks through breastfeeding and delivery, and counselling approaches used in Ghana. Rectifying these misconceptions through accurate information dissemination is essential for effective PMTCT implementation.

Finally, the study highlighted varying clinical practices related to PMTCT, including the frequency of vaginal exams, ARM, and episiotomies, suggesting areas for standardization and guideline adherence. Conclusion

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Finally, the study highlighted varying clinical practices related to PMTCT, including the frequency of vaginal exams, ARM, and episiotomies, suggesting areas for standardization and guideline adherence.

5.3 Recommendations

The following are some recommendations made based on this study:

1. It is imperative to provide ongoing training on PMTCT for all new medical officers, midwives, and nurses. Additionally, healthcare workers already in service should undergo refresher courses to stay updated on new and revised guidelines.
2. Hospital management should implement robust systems for monitoring and evaluating healthcare workers' knowledge, attitudes, and practices regarding PMTCT. Regular assessments will enable the identification of areas needing improvement and ensure the effectiveness of interventions aimed at enhancing the quality and accessibility of PMTCT services.

6. SUMMARY

Generally, the findings from the research on the knowledge, attitude, and practice of PMTCT among healthcare workers suggest a need for improvement in expertise and practice. Based on the methods used in the study, several conclusions can be drawn. Firstly, participants demonstrated poor overall knowledge of PMTCT, with none scoring above 85%. This suggests the need for targeted education and training programs to enhance understanding and practices related to PMTCT. Secondly, the study uncovered misconceptions among participants

regarding the impact of PMTCT, transmission risks through breastfeeding and delivery, and counselling approaches used in Ghana. Rectifying these misconceptions through accurate information dissemination is essential for effective PMTCT implementation. Finally, the study highlighted varying clinical practices related to PMTCT, including the frequency of vaginal exams, ARM, and episiotomies, suggesting areas for standardization and guideline adherence.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

ETHICAL APPROVAL AND CONSENT

Ethical approval for the study was obtained from Noguchi Memorial Institute for Medical Research, with an IRB number of 050/23-24. The researcher introduced himself to the management of the hospital where the data was collected and further sought permission from the management of the hospital. The healthcare providers were made to understand that participation in this study was voluntary, and they could withdraw from the study at any time. There were no risks associated with the involvement in this study. Also, there were no direct benefits. Names and details of participants were not linked to the data analysis and the findings to ensure anonymity. The informed consent and the purpose of the study were explained to participants. After the data collection, the researcher appreciated the respondents for their time and responses with words of gratitude.

Findings from this study will provide baseline information on the Prevention of mother-to-child transmission of HIV/AIDS program at the University of Ghana, Legon

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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