

**SCHOOL OF PUBLIC HEALTH  
COLLEGE OF HEALTH SCIENCES  
UNIVERSITY OF GHANA**

**ADHERENCE TO ANTIRETROVIRAL THERAPY (ART) AMONG HIV  
POSITIVE WOMEN AT ANTIRETROVIRAL CENTERS IN TEMA**



**THIS DISSERTATION IS SUBMITTED TO THE UNIVERSITY OF GHANA,  
LEGON IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE  
AWARD OF THE MASTER OF PUBLIC HEALTH DEGREE**

**JULY 2012**

## DECLARATION

I, Ruby Jackie Ewusiwa Awittor hereby declare that apart from references to other peoples' work which have been duly acknowledged, this dissertation is as a result of my own research, I further declare that this dissertation either in whole or in part has not been submitted for the award of any degree in this institution and any other university elsewhere.

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## DEDICATION

I dedicate this dissertation to my parents for their help and support after the birth of my sons. Without their support I may not have been able to enjoy the blessing. Thank you and God bless you.



## ACKNOWLEDGEMENT

I am very grateful to my academic supervisor, Dr Patricia Akweongo as well as my field supervisor Dr Amos Laar, for their direction and inputs towards this dissertation to make it a success.

My thanks also go to my lovely husband, Mr. Courage Awittor, and my three boys, Daniel, David and Dyllan Awittor for their immense support throughout the MPH programme.

I also express my profound gratitude to Mrs. Harriet Bonful and Mrs. Gifty Ofori Ansah, Public Health Pharmacists, for their invaluable guidance and encouragement throughout the MPH programme.

I sincerely appreciate the staff of the ART centers in Tema, especially Mrs. Grace Adom, Mrs. Helena Y. Adamu, Mr. Joshua Davis and Mr. Douglas Adukpo for their assistance in collecting data throughout the research period.

I also express my gratitude to Mr. Owusu Agyeman, DDPS, Greater Accra region, Dr Julius Dadebo, DDHS, Ashaiman Municipal Health Directorate and Mr. Eric Behene, a statistician at the School of Public Health for their support and contribution to my work.

## DEFINITION OF TERMS

**Adherence:** Adherence to ART is ingestion of all anti-retroviral (ARV) medicines prescribed correctly at the right time and in the right way observing any dietary restrictions.

**Anti-Retroviral Therapy:** ARV medicines taken for treatment or prophylaxis during pregnancy and up to 7 days after stopping breastfeeding during the postnatal period by the mother and from birth up to 6 weeks for the infant to prevent HIV transmission from mother to child.

**ART naive:** HIV positive persons who have not been initiated on ARV medicines.

**Mother To Child Transmission:** The transmission of HIV from an infected mother to a baby which may occur during pregnancy, labour, delivery or breastfeeding.

**Pill burden:** Patient ingesting more than four antiretroviral medicines with or without other oral medications on a regular schedule.

**Prevention of Mother To Child Transmission:** A protocol designed to prevent HIV infection among prospective parents making HIV testing and other prevention interventions available in services related to sexual health such as antenatal and postnatal care.

**Optimal level of Adherence:** Ingestion of  $\geq 95\%$  of total doses of prescribed ARVs.

**Sub-optimal level of Adherence:** Ingestion of  $<95\%$  of total doses of prescribed ARVs.

**Vertical Transmission of HIV:** the transmission of HIV from mother to child during pregnancy, labour, delivery or breastfeeding.

## ABSTRACT

**Introduction:** Sub-optimal adherence is known to be one of the most common causes of poor treatment outcomes and /or lack of sustained treatment benefits. In the use of ARVs for the management of HIV infection in PMTCT, adherence is key for therapeutic success to be achieved and to ensure undetectable viral load at time of delivery. This reduces the risk of HIV transmission to the infant. In 2011, HIV/AIDS estimation for Ghana indicated that 2,933 babies were infected with HIV through vertical transmission. It is unclear how many of these mothers were on ART and the adherence levels among mothers of these children.

**Objective:** The main objective of the study was therefore to determine the levels of adherence and assess the factors affecting adherence to Anti-retroviral therapy in PMTCT.

**Methods:** This was a cross-sectional study which was carried out at the two ART centers offering comprehensive PMTCT programs in Tema; Tema General Hospital and Tema Polyclinic. Purposive sampling was used to collect quantitative data using a structured questionnaire for 141 HIV positive pregnant and breastfeeding women on PMTCT and an interview guide was used to conduct 10 in-depth interviews with these women who had been on ARVs for at least one month and attended clinic between May and June 2012. A chi-test was performed to compare adherence levels and logistic regression was used in assessing the determinants of adherence. The level of optimal adherence measured as  $\geq 95\%$  for 7-day recall self reported adherence was 85.1% followed by one month visual analogue scale recall of 75.2%. The one month pill count recorded the least adherence level of 63.1%.

**Results:** Sharing pills (OR=0.054,  $p<0.016$ ) was found to be the factor that affected optimal adherence. In the qualitative study, the desire to live longer and be strong to take care of family was the most expressed factors that motivated adherence.

Adherence levels were lower in pregnant and breastfeeding women who had no formal education, lived very far from the facility, shared pills with a family member and had a relative to remind them to take their pills.

**Conclusion:** Sharing pills negatively affects adherence to ART. There is the need to review the content of pre-adherence counseling and to promote post-adherence counseling for women on ART for PMTCT to help ensure optimal levels of adherence to therapy.

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## LIST OF ACRONYMS

AIDS	Acquired Immune Deficiency Syndrome
ANC	Antenatal Clinic
ART	Antiretroviral Therapy
ARV	Antiretroviral medicines
CD4	Cluster of Differentiation Four
HIV	Human Immunodeficiency Virus
HTC	HIV Testing and Counseling
MTCT	Mother To Child Transmission
NACP	National AIDS /STI Control Programme
OECD	Organization for Economic Co-operation and Development
PLWHA	Persons Living with HIV
PMTCT	Prevention of Mother To Child Transmission
SSA	Sub-Saharan Africa
UNAIDS	Joint United Nations Program on HIV/AIDS effort
UNICEF	United Nations Children's Fund
WHO	World Health Organization



## **CHAPTER ONE**

### **1.0 INTRODUCTION**

HIV/AIDS remain a complex global challenge despite the efforts made at all levels to reduce the spread and improve the quality of life of persons living with HIV. While the prevalence is stabilizing, the number of persons living with HIV is increasing due to new infections. Sub-Saharan Africa (SSA) still bears an inordinate share of the global HIV burden. In 2009, the number reached 22.5 million, 68% of the global total. An estimated 1.8 million adults and children became infected with HIV in SSA. An estimated 260,000 children who died of HIV-related illnesses and 88% of the global total of deaths occurred in SSA. Statistics show that 2.5 million children are living with HIV in SSA [UNAIDS, 2010].

### **1.1 BACKGROUND**

Ghana has not been spared from the epidemic and among the numerous health problems the country faces is the emergence and spread of HIV and AIDS. Over the past twenty-four (24) years, the National AIDS Control Programme (NACP) has led the fight against HIV and AIDS with the aim of reducing the incidence of HIV among the general population and improving the quality of life of Persons Living With HIV (PLWH). The NACP rolled out a number of strategies including HIV Testing and Counseling (HTC), Know Your Status Campaign, Prevention of Mother to Child Transmission (PMTCT), the ABC campaign: 'Abstain, Be faithful or Condom use', safe blood transfusion, improved management of sexually transmitted infections and adherence to universal precautions in the work environment for health workers. The provision of Anti-Retroviral Therapy

(ART) using Highly Active Anti-Retroviral Therapy (HAART) and management of Opportunistic Infections (OIs) has effectively lowered the viral load in infected persons and helped to reduce transmission of the virus. These strategies have successfully curbed the rapid spread of the disease.

Even though the strategies rolled out by the NACP has achieved enormous success, adherence to the different treatment regimens remains the main challenge for anti-retroviral therapy. Adherence is essential for therapeutic success to be achieved in the management of HIV infection especially in the case of PMTCT as the patient in focus is the unborn child. Here, the aim is to prevent the transmission of the virus to the infant, this on a large scale, effectively reduces the incidence of HIV.

With the introduction of ARVs and adherence to the different regimens of Highly Active Anti-Retroviral Therapy (HAART) in HIV management, the rate of transmission of HIV from mother to child as well progression to AIDS by persons living with HIV (PLWH) has reduced significantly globally. This is because, HAART reduces immune suppression, slows down disease progression, reduces viral load and improves patient's quality of life [Mannheimer et al., 2005; Patterson, Swindells & Mohr, 2000]. An increase in the number of CD4 cells is evidence that the goal for HAART is being achieved.

Adherence to Anti-Retroviral Therapy is an important subject because it is a lifelong activity which needs commitment to ensure its effectiveness in suppressing viral load, preventing the development of multi-drug resistance strains and reducing the rate of transmission of HIV. According to Patterson *et al.*, [2000], a very high level of adherence

(95%), is required to achieve optimal viral suppression. Non adherence to HAART leads to exposure of the virus to inadequate concentrations of antiretroviral medicines resulting in continued viral replication, development of resistance and increased vertical transmission. Therefore measures to ensure adherence is a key component of ART programs in reducing the risk of transmission.

In Ghana, the rates of adherence to ARVs in the general population were found to be 80.6% and 87.3% [Ohene & Forson, 2009; WFP & GAC, 2011]. Both studies showed suboptimal levels of adherence to ART. HAART consist of three or more anti-retroviral medicines which are taken together eight or twelve hourly at the same time every day. Two of the medicines available in Ghana are taken every 24 hours. The new protocol in PMTCT requires every HIV positive pregnant and postnatal woman who is breastfeeding to take at least three medicines at the same time every 12 hours every day till one week after stopping breastfeeding. There is evidence that such strategies can both keep woman alive and virtually eliminate vertical transmission. However, this enormous pill burden coupled with dietary restrictions for some of the medicines presents a major challenge to adherence.

## **1.2 PROBLEM STATEMENT**

HIV infection in children is believed to stem from transmission in utero, during delivery or post partum as a result of breastfeeding. This mode of transmission accounts for approximately 15% of all new infections in the country. Without any intervention, up to 40% of HIV positive mothers will transmit HIV to their babies [MOH, 2010].

In 2011, HIV/AIDS estimation for Ghana indicated that 2,933 babies were infected with HIV through vertical transmission, 31,576 children aged 0-15 years were living with HIV and in 2009, 2566 of them died of AIDS [NACP, 2011]. Data from NACP annual report [2010] indicates a steady rise (approximately 2 fold increase) in the number of children initiated on HAART from 2008 to 2010. PMTCT is vital to saving lives of young children and reducing infant and child mortality [MOH, 2010]. Women on ART are estimated 95% of the time to have HIV negative babies. It is unclear how many of the mothers of these babies who die adhered to treatment.

In the Tema Metropolitan area, the provision of ART for PMTCT was initiated in 2006 and an estimated 862 HIV positive pregnant women have been on ART since the inception of the programme [TMHD, 2011]. However, few studies have been conducted on adherence to ART in PMTCT. In 2011, a total of 93 children born to HIV positive women in the Tema General hospital were tested for HIV and 8 were positive (8.6%) [TMHD, 2011].

The new protocol for PMTCT seeks to ensure a transmission rate of HIV of less than 5% to exposed infants and the provision of ARVs to over 95% of eligible pregnant women.

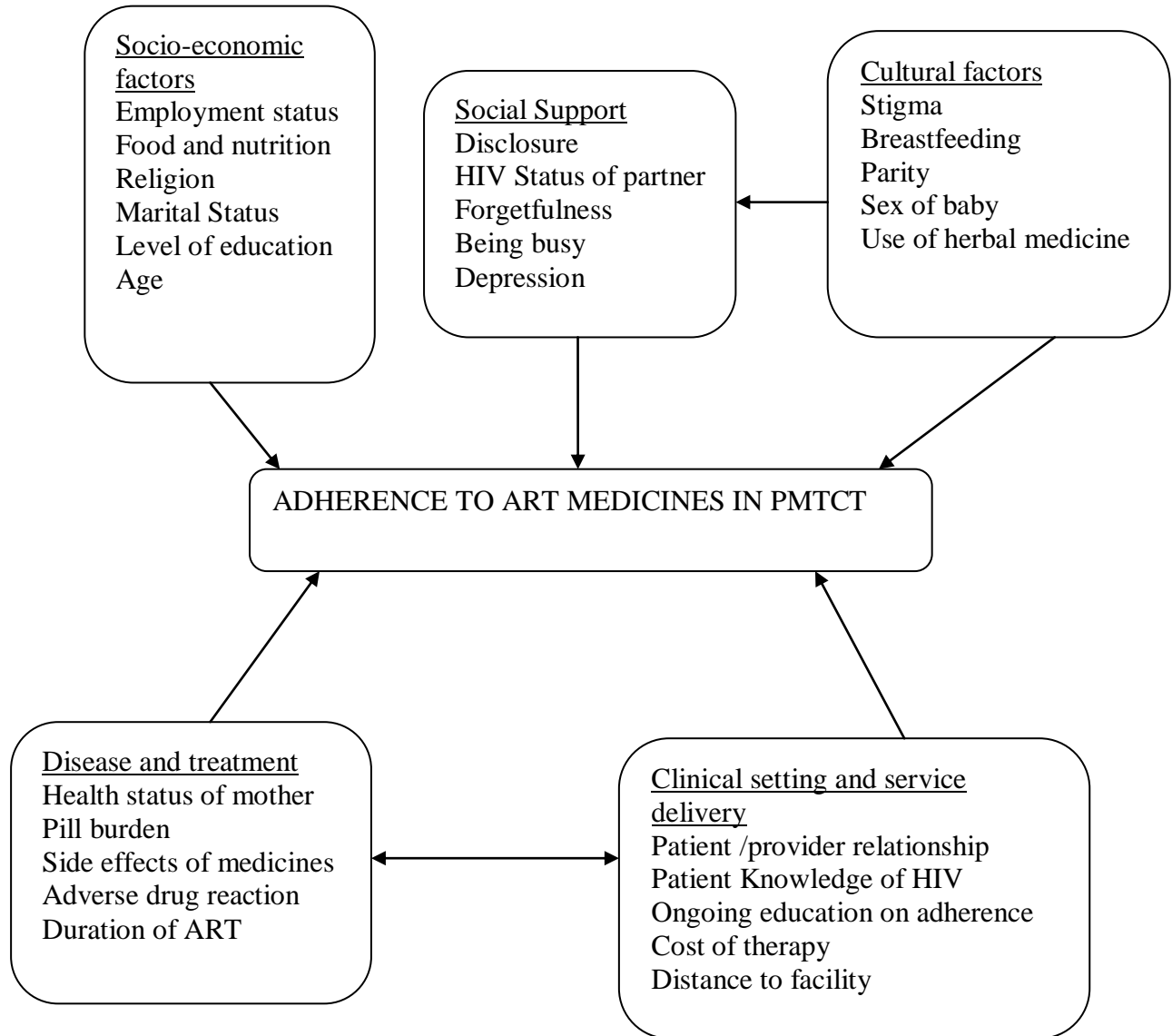
To achieve a transmission rate HIV of less than 5% to exposed infants, it is important that HIV positive pregnant and breastfeeding women who are put on ART, adhere to their medications.

Although some studies on levels of adherence to ART have been carried out in Ghana, these were mostly carried out in the non-pregnant population. The aim of this study is to determine the levels and assess the factors affecting adherence among HIV positive

pregnant and postnatal women on ART in Tema. It will assess the social structures, beliefs and value systems in the society that affect adherence and present barriers to effective efforts to prevent vertical transmission of HIV to infants through the use of ART.

### 1.3 CONCEPTUAL FRAMEWORK

**Figure 1: Factors affecting adherence to Anti-Retroviral Therapy in PMTCT**



Adapted from Chesney et al., [2000]; Nakiyemba A., Aurugai D. A., Kwasa, R. and Thomas Oyabba [2005]

It is estimated that without any intervention, up to 40% of HIV positive mothers will transmit HIV to their babies [MOH, 2010]. However, evidence shows this is preventable with adherence to ART in PMTCT. Factors that affect adherence are categorized into five main groups; socio-economic factors, cultural factors, the disease and the medication regimen, the clinical setting and delivery of care and social support [Hardon et al 2006].

Strong evidence suggests that younger women are more likely to adhere to treatment in PMTCT than older women as do women who are newly diagnosed with HIV [Igwegbe, Ugboaja & Nwajiaku, 2010]. In the general population however, Glass *et al.*, [2006] found that younger females, living alone, and having a higher pill burden were more likely to result in non-adherence to treatment. The presence or absence of pregnancy may account for the difference. New clients are more likely to be enthusiastic about their health and that of the infant. It is more likely for married women to adhere to their medication because of the social context they find themselves in. They have families who depend on them and so they want to remain healthy for their sake. The level of education attained affects behaviour in many ways. First, an educated individual tends to be more informed on health issues, thus is more likely to increase her knowledge on the probability and severity of transmitting HIV to her child. Secondly, a highly educated individual is likely to choose low risk behaviours in health than an uneducated person, helping them to choose the safer option of adherence to medication. Thirdly, being literate, instructions on medications and additional information provided may be imbibed better and can be read later for clarity if misunderstood [Wibulpolprasert W., 2008]. Another identified factor that can affect adherence to ART is one's employment status which ensures availability of income. Having earnings encourages the decision making

process of the HIV positive pregnant woman to use services available to her. Traveling to receive regular care requires effort and cost money. This can negatively affect the adherence of an individual when they are unemployed and therefore do not have an income and are dependent on others. Conversely, a high income earner may have to lose working hours to travel to the clinic. This may result in her being non-adherent. Therefore, employment status may affect adherence either negatively or positively. The availability or lack of food is known to be a silent factor that negatively affect adherence to ART [Abiy, 2007]. Lack of food to take with medications is expected to be a reason for sub-optimal adherence. Religion is another important aspect of an individual's life. This can positively or negatively affect adherence. For some individuals who believe in the power of healing through medicines; medicines are a gift from God, and they are more likely to adhere than those who do not believe in that [Kremer, Ironson & Porr, 2009].

Stigmatisation against PLWHA exist [UNAIDS, 2010]. Fear of stigma can sometimes prevent the HIV positive pregnant woman from disclosing her status to her family and friends and from commencing or continuing treatment [Hardon *et al.*, 200]. This affects the social support available to her. Social support from spouse, family or a network positively affects adherence to medication [Cornet, 2008]. Disclosing one's HIV status to one's sexual partner allows the partner to engage in preventive behaviour as well as access necessary support for coping with sero-status or illness [Deribe, Woldemicheal, Wondafrash, Haile & Alemayeh, 2008]. The partner then has an opportunity to test and know their status. This may motivate the partner to be supportive or may result in abandonment. In Ghana, anecdotal evidence suggests that in sero-discordant couples, HIV positive women are more likely to be abandoned by their partners than vice-versa. If

disclosure results in gaining a supportive partner, then it is expected that adherence to medication may be optimal. On the other hand, being abandoned may result in a series of other issues such as depression and negative self image which may negatively affect adherence. If the partner knows and accepts his own sero-status, adherence may be improved. Igwegbe, Ugboaja and Nwajiaku [2010] found that a major factor that resulted in non-adherence is forgetfulness and being too busy. Forgetting to take her medicines or being too busy too often may result in non-adherent behavior.

Sex preference may influence the adherence behaviour of an HIV positive pregnant woman in a culture where one sex is preferred over the other given that she knows the sex of her baby. Recent evidence shows that exclusive breastfeeding carries a lower risk of HIV transmission than breastfeeding combined with other fluids and food [WHO/UNICEF, 2007]. It is expected that breastfeeding mothers will have high levels of adherence in an effort to reduce the risk of transmission to the infant. The length of time a woman has known her status is a strong determinant of the probability that she adheres to treatment. Studies show that women who have been on treatment for at least two years are likely not to adhere to treatment even in pregnancy [Iwegbe *et al.*, 2010]. A person who gets to know her status during pregnancy is affected in a number of ways. First, she may not receive ART early enough if the test was carried out late in pregnancy. Secondly, she may be in denial about her status and so may refuse ARVs. The knowledge of her status can have a negative effect on her causing her to become depressed. These factors may negatively affect adherence to ARVs. She may also accept the reality of her status and have an increased desire to protect her infant resulting in increased levels of adherence.

Keeping clinic appointments reflects a woman's level of risk aversion. A risk averse individual tends to prefer a low risk choice over a high risk one. Hence her decision to keep clinic appointments can be a predictor of medication adherence. At the clinic, the HIV positive pregnant or breastfeeding woman can acquire more information about the benefits and otherwise of taking or not taking her medicines. Also, in Ghana, ARVs are dispensed to patients only in the clinic setting. Thus, patients who keep clinic appointments are expected to have higher levels of adherence. Stage of the disease, severity of symptoms, opportunistic infections and levels of CD4 count may influence adherence. If a negative health status (weight loss, skin rash etc) is associated with taking ARV medicines, adherence may be compromised. On the other hand, if the patient feels healthier after the initiation of ART, she is more likely to adhere.

The three drug combination to be taken twice daily in addition to other prescribed medicines, the quantity and size of the tablets may make adherence difficult [Hardon *et al.*, 2006]. Some side effects of the medicines such as nausea, skin rash, frightening dreams, dizziness and adverse drug reactions such as Stevens Johnson's syndrome may be difficult to bear if not well explained and understood and may result in a reluctance to take medication. At the clinic setting, negative attitude of the providers, low communication skills and relatively short length of time spent with patients can negatively affect adherence, alternatively, consistently developing a confidential and trusting relationship with the patient may improve adherence remarkably [Merten *et al.*, 2010]. Cost of transport is directly related to distance to the facility. The closer the facility is to the patient, the less the cost required to reach it. Patients who must travel long distances to the clinic are often not able to raise the money required especially at

dispensaries that require that patient pick up the medicines themselves so they can assess adherence. Another important cost consideration is cost of therapy. In Ghana, even though ARVs are highly subsidized, due to the disease, the patient may not be gainfully employed. In such instances, cost of therapy may compete with basic needs such as food resulting in low levels of adherence.

Many Ghanaians believe in the use of herbal medicines and the pregnant woman is no exception. A disease which is not curable like HIV presents a dilemma to many who may not be able to accept that fact. Persons offering herbal medicines generally offer a dire needed alternative; a complete cure. This may lure anxious patients into abandoning their treatment or combining it with herbal medicines resulting in low levels of adherence. Also, western medicine does not address underlying spiritual and social dimensions of illness, a factor that cannot be easily ignored in our setting. This may explain why patients on ART may complement it with herbal medicines.

### **1.3 SIGNIFICANCE OF THE STUDY**

Data from NACP annual report [2010] indicates a steady rise (approximately 2 fold increase) in the number of children initiated on HAART from 2008 to 2010. This signifies a rise in number of infants becoming infected with HIV through vertical transmission. It is possible from evidence of successful PMTCT programs in the western world that a significant percentage of these infections could have been prevented through adherence to antiretroviral therapy.

The first step towards addressing the problem of medication adherence is to accurately identify persons whose risk to non-adherence is sufficient to undermine clinical outcome. It is expected that through the proposed study, the level of and the factors affecting adherence to ART in PMTCT can be determined and described, which could be useful to NACP in the design of effective strategies that can improve adherence and protect infants exposed to the virus from being infected through vertical transmission. This when also addressed can result in increased adherence. The study will be part of a continuing effort and commitment to ensure that high quality HIV care is provided for all.

## **1.5 OBJECTIVES**

### **1.5.1 GENERAL OBJECTIVE**

- To determine the levels of adherence and factors affecting adherence to ART for Prevention of Mother To Child Transmission (PMTCT) of HIV infection among HIV positive women at the ART Centers in Tema.

### **1.5.2 SPECIFIC OBJECTIVES**

- To determine the levels of adherence to ART among HIV positive pregnant and breastfeeding women on PMTCT of HIV infection at the ART centers in Tema.
- To assess factors affecting adherence to ART among HIV positive pregnant and breastfeeding women at the ART centers in Tema.

### **1.5.3 RESEARCH QUESTION**

- Do women who adhere to ART differ from women who do not adhere?

## CHAPTER TWO

### 2.0 LITERATURE REVIEW

#### 2.1 HIV AND AIDS

“No child should be born with HIV; no child should be born an orphan because of HIV; no child should die due to lack of access to treatment,” urged Ebube Sylvia Taylor, an eleven year old born free of HIV, to world leaders in New York. This resonates with UNAIDS vision of Zero New HIV Infections [UNAIDS, 2010]. This is realistic and can be achieved with significantly increased action to implement strategies which have been proved to eliminate HIV transmission to young people.

Slightly more than half of all Persons Living with HIV (PLWHA) are women and girls. Young women aged 15-24 years are as much as eight times more likely than men to be HIV positive. This implies that all children born to women in this category are at risk of becoming infected with HIV. UNAIDS in 2009, called for virtual elimination of Mother To Child Transmission by 2015 [UNAIDS, 2010]. MTCT has become a significant child health problem in Africa contributing to severe child morbidity and mortality, thus undermining the impact of programs that have notably reduced child mortality in the past decades.

To address this, PMTCT was designed by Health Experts to reduce and if possible virtually eliminate HIV infections in children. Statistics show that in 2009, 2.3 million children are living with HIV in SSA, a 21% increase from 2001(1.8 million). This is in contrast with what occurs in several high income countries (North America, Western and

Central Europe) where HIV transmission in infants has been eliminated through PMTCT interventions. In these countries, the number of children living with HIV has decreased from 7400 to 6000, during the same period [MOH 2010; UNAIDS 2010].

New infections of HIV in children are decreasing globally as a result of increased access to PMTCT services. The total number of children who were newly infected with HIV was estimated at 370, 000 (230,000 – 510,000) in 2009, a drop of 24% from 2004 [UNAIDS, 2010].

In South Africa, infant mortality declined by 30% between 2001 and 2007 following implementation of ARV prophylaxis to prevent vertical transmission and 30,000 babies were born HIV free. In Ghana, the estimated number of pregnant women living with HIV in 2009 was 13, 000 (6,900-12,000) same as in 2008 and it is estimated that the number of children (0-14 years) living with HIV is 27,000 (14,000-41,000) in 2009, this is far greater than the estimated 18,000 (9,900-29,000) children infected in 2001 [UNICEF, 2010: WHO, 2010 & UNAIDS, 2010]. Despite these successes, OECD indicates that wealthy nations are currently falling billions short of their commitment. It was projected that Universal access (UA) will not be achieved in 2010 because financial commitments have not been scaled up to deliver the needed HIV prevention, treatment and care interventions. In fact, the gap between resources committed and resources required is substantial and growing [WHO, 2010]. It is therefore imperative for resource constrained settings such as ours who depend solely on donors to fund the programs on HIV, to examine critically loopholes that prevent the success of the program through research and address them effectively.

This has led to a revision in the existing PMTCT guidelines. The current guidelines emphasizes routine offer of HIV testing and counseling to all pregnant women with the provision of triple antiretroviral treatment or prophylaxis to all eligible mothers from 14weeks of gestation till one week after cessation of breastfeeding. Also all exposed infants will be provided with ARV prophylaxis for the first 6 weeks of life. These national guidelines are in line with a vision to achieve a generation free of HIV as part of Ghana's commitment towards virtual elimination of MTCT of HIV by 2012 [NACP,2011].

## **2.2 HIV PREVENTION**

Research and program experience indicate that “combination prevention” is the most effective approach to reducing HIV transmission [IAS, 2008b]. The term combination prevention denotes the use of concurrent multi-pronged HIV prevention strategies that may include structural interventions e.g. establishing an enabling legal and policy environment, biomedical interventions (opiod substitution therapy) for intravenous drug users, combination ART prophylaxis to prevent vertical transmission, medical male circumcision and individual, small group and community behavioural interventions (peer education, distribution and promotion of male and female condoms). A number of effective evidence based HIV prevention interventions: HIV Testing and Counseling (HTC), Know Your Status Campaign, Prevention of Mother to Child Transmission (PMTCT), the ABC campaign: ‘Abstain, Be faithful or Condom use’, safe blood transfusion, improved management of sexually transmitted infections, adherence to universal precautions in the work environment for health workers, the provision of Anti-

Retroviral Therapy (ART) using Highly Active Anti-Retroviral Therapy (HAART) and management of Opportunistic Infections (OIs), tailored for specific populations over the past 20 years have been vital in slowing the pace of the epidemic [IAS, 2008b]. Despite clear evidence of the impact of these interventions, coverage levels are poor and few interventions are on track to become universally available.

### **2.2.1 PREVENTION OF MOTHER TO CHILD TRANSMISSION OF HIV**

Pregnant women living with HIV are at high risk of transmitting HIV to their infants during pregnancy, during birth or through breastfeeding. Well over 90% of new infections among infants and young children occur through Mother To- Child Transmission. Without any interventions, between 20% and 45% of infants may become infected, with an estimated risk of 5-10% during pregnancy, 10-20% during labour and delivery, and 5-20% through breastfeeding. The overall risk can be reduced to less than 2% by a package of evidence-based interventions [WHO/UNICEF, 2007]. This package is now the standard of care in most high-income countries, where its implementation has led to the virtual elimination of new HIV cases among children in many settings. The package comprise of provision of triple ARV therapy commenced at 14 weeks gestation till one week after breastfeeding is stopped for the mother (or for some mothers, the babies are not breastfed at all) and for the infant, zidovudine syrup daily from birth for six weeks, after which the infant is tested for HIV using the polymerase chain reaction (PCR) test. Even in resource-constrained settings, the use of simple and less expensive combination antiretroviral prophylactic regimens, such as short-course Zidovudine (AZT) combined with single-dose Nevirapine (NVP) at onset of labour, can reduce significantly in utero

and intrapartum transmission. However, this efficacy is diminished over time in breastfeeding populations due to postnatal HIV transmission through breast-milk.

In sharp contrast with high-income countries, progress in scaling up effective and comprehensive services for the prevention of mother-to-child transmission of HIV (PMTCT) has been slow in most resource-constrained settings. Overall, only about 11% of pregnant women living with HIV giving birth in 2005 received antiretroviral prophylaxis [IAS, 2010]. Furthermore, despite the progress made in recent years in scaling up antiretroviral therapy in resource-constrained settings, pregnant women living with HIV have had low access to treatment relative to other populations. As a consequence, more than 1400 children under the age of 15 continue to be infected with HIV every day in resource-constrained settings, and children account for more than 10% of all new infections: a major global inequity. Without care and treatment, more than half these children will die before their second birthday but the transmission can be sharply reduced if ARVs are administered to a woman and the treatment adhered to; during pregnancy, delivery and to her infant shortly after birth [IAS, 2010].

### **2.3 ADHERENCE**

There are a number of key issues in the study of adherence to ART; these include accurate measurement of adherence, assessment of the impact of adherence on viral load and clinical outcome, determination of the factors that affect adherence and then the development of interventions. Addressing these issues may provide valuable information about how adherence may be improved.

One of the strategies laid out by the NACP to prevent the development of drug resistance is to ensure optimal levels of adherence to the HAART. The aim is to help the preserve future treatment options [NACP, 2008]. A person who takes ARVs erratically will not receive maximum benefit from it. To achieve optimal adherence to ART, a person needs to take at least 57 out of 60 pills (for one drug) a month in a treatment regimen that requires twelve hourly dosing. This implies that missing even one tablet a week results in 93% adherence; reflecting sub-optimal levels [Patterson et al., 2000]. Such a patient will receive marginal benefit but experience similar side effects as the person who adheres.

Sub-optimal adherence can lead to poor clinical, immunological and virological outcomes [Patterson et al., 2000; Chesney et al, 2000]. This results in incomplete viral suppression, continued destruction of the immune system resulting in decreased CD4 cell count, progression of disease and emergence of resistant viral strains, limited future therapeutic options and higher cost for individual treatment which translates to higher cost of the program. The transmission of drug resistant HIV is an important public health issue in all regions of the world [Kozal, 2009; Ahoua et al., 2009].

### **2.3.1 MEASUREMENT OF ADHERENCE**

There are many ways of assessing clients' adherence to ARVs but generally, it is difficult to accurately measure adherence with absolute precision in the outpatient setting. Chesney [2000] mentions four basic techniques for quantifying adherence, all of which have limitations. These are assays of drug levels, the use of electronic monitoring systems, pill count and patient self report.

### **2.3.1.1 ASSAYS OF DRUG LEVELS**

This is a method that has been used in clinical trials to measure the last dose taken. It is often not practical because it is expensive and generally not available. These assays also measure only recent doses and hence provide limited data. Adherence may be overestimated if patients take their medications before visiting the clinic [Bonds & Hussar, 1991]

### **2.3.1.2 USE OF ELECTRONIC MONITORING SYSTEMS (EDM)**

The second method is the use of electronic monitoring systems such as Medication Event Monitoring Systems (MEMS). These contain a computer chip that is inserted into medication bottle caps. It records the date and time of opening and closing the medicine bottle. With this method, the assumption is that a single dose is taken each time the bottle is opened. This may lead to inaccuracies if multiple doses are removed at once. Its main advantages are that it provides data on the timing of doses taken and permits monitoring over long periods. Electronic drug monitoring more accurately predicts undetectable viral load (UDVL) than self-report or pill count [Gill et al., 2005]. Arsten et al., [2001] noted that patients whose EDM data indicated high adherence achieve UDVL than patients self-reporting the same level of adherence. Other studies had similar results on the relationship between UDVL and EDM-rated adherence. Paterson et al., [2000] observed UDVL in 80% of those with above 95% adherence, while in a trial conducted by Kirkland et al., [2002] mean adherence was 94% with 85% of the patients achieving UDVL.

### **2.3.1.3 PILL COUNT**

The third method of measurement of adherence according to Chesney [2000] is pill count. This requires patients to return their medications to their clinics for assessment of adherence prior to refill. The return of excess pills provides tangible evidence of non-adherence. The limitation here is that, patients may dump their pills (pill dumping) before coming to the clinic. As a result, pill counts typically overestimate adherence. It is however cheap and easy to carry out.

### **2.3.1.4 PATIENT SELF REPORT**

The most common one is patient self reports [Haberer et al., 2012; Gill et al., 2005]. This has the advantage of low cost and flexibility of design. The data can be easily collected using a questionnaire and can help identify why patients are non-adherent. The assumption here is that patients can accurately recall their behavior and provide honest answers. This method is limited as it reflects short term or average adherence and often results in over-estimation.

Despite the limitations of these methods, adherence measurements provide a useful insight into the association between taking antiretroviral medicines and viral load as well as approaches that may be useful for improving adherence. Of the available methods, self report and pill counts are the most practical for routine use in the out-patient clinic setting. Although these tend to overestimate adherence, it is inexpensive and fairly accurate for providing an indication of the problem.

It is important to recognize that some degree of non-adherence is common and should be expected in all patients receiving ART. The first step towards addressing the problem of

medication adherence is to accurately identify whose risk to non-adherence is sufficient to undermine clinical outcome [Arsten et al., 2001, Agins 2001 & Battaglioli, 2007].

### **2.3.2 FACTORS AFFECTING ADHERENCE TO ART**

According to Chesney [2000], the critical factors that influence adherence fall into four main categories; patient factors, medication regimen, patient healthcare provider relationship and the system of care. Other factors identified were stigma, finances, being too busy, being away from home, forgetfulness, malnutrition and frequency of clinic visits and access to health facility [Weiser et al., 2003].

#### **2.3.2.1 PATIENT FACTORS AFFECTING ADHERENCE**

Patient factors known to affect adherence are age, sex, level of education, religion, marital status, fear of disclosure and wanting to avoid taking medication in public places, feeling depressed, hopeless, or overwhelmed and forgetting to take medication at the specified time [Starace et al., 2002; Castro, 2005; Mills et al., 2006]. Other barriers include wanting to be free of medication or preferring a natural approach (due to treatment fatigue); feeling that treatment is a reminder of HIV status, wanting to be in control, not understanding treatment instructions, still having doubt or not being able to accept HIV status and lack of self worth [ Nakiyemba et al., 2005; Mills et al., 2006]. Low level of education may impact negatively on some patient's ability to adhere, while high level of education has a positive impact [Nakiyemba et al., 2005].

### **2.3.2.2 FINANCIAL FACTORS**

Financial burdens may include absenteeism from work, the cost of care during medical visits, the cost of transportation to a health facility, being homeless, the cost of user fees, or the cost of tests and supplies [Castro, 2005]. These costs, though may seem minimal to health professionals and decision makers, often translates into difficult household decisions about who eats, who works, or who goes to school for patients.

### **2.3.2.3 MEDICATION REGIMEN**

Dosing complexity, number of pills, taste, size of pill, food requirement, adverse drug reaction and belief about medication such as causes of side effects (either real or anticipated) are some common barriers in this category. In other studies when individuals prescribed HAART felt healthy, adherence was often negatively affected [Castro, 2005; Mills et al., 2006]. Other barriers include doubting the efficacy of HAART, having a decreased quality of life; uncertainty of long term effects and unwanted changes in body image [Mills et al., 2006].

### **2.3.2.4 PATIENT –HEALTHCARE PROVIDER RELATIONSHIP AND THE SYSTEM OF CARE**

Interpersonal relationships can affect adherence behaviours. Lack of trust or dislike of a health care-provider is an impediment to ART adherence. To ensure success of adherence, it is important to educate patients very well in at least two counseling sessions before initiation of therapy. Disclosure to and the use of adherence monitors has been found effective in improving adherence in addition to information and a committed

supporting medical team [NACP/MOH/GHS, 2008]. Proper education of patients before initiation and during ART is important for success of adherence. Education should cover basic information about HIV, the benefits, side effects and possible adverse reactions of ARV medicines, the dosage and timing of doses, any dietary restrictions and the importance of not missing any dose. Adherence to treatment should be discussed in depth at each follow-up visit [ Sahay, Reddy & Dhayakar, 2011].

### **2.3.2.5 SOCIAL SUPPORT**

The concept of social support in HIV disease has been described as assistance offered by ones' social network rather than by a professional and is often linked with better health outcomes [Burgoyne & Saunders, 2000]. They also noted that higher social support ratings are related with the presence of a partner and a greater proportion of close friends. Network members therefore may include family, friends, neighbours and co-workers. Lack of social support has also been identified as one of the barriers known to influence the outcome of care and adherence to ART medications [Battaglioli-DeNero, 2007].

In a study by Singh et al., [1999], satisfaction with social support, problem focused coping and active behavioural coping were significantly correlated with adherence. The researchers also suggest that satisfaction with social support was a critical factor linked to adherence. Ncama et al., [2008] however found that overall social support was not linked to adherence and related this finding to the small sample size (n=149) and percentage of individuals (21%) who reported low adherence. Not living alone, having a partner, social or family support, peer interaction and better physical interactions and relationships are characteristics of patients who achieve optimal adherence.

### **2.3.2.6 STIGMA**

The negative repercussions of stigma for patients include broken marriages and relationships, rejection by family, ostracism by the community and loss of employment. As a result of these, Weiser et al., [2003] found that 69% of patients kept their HIV status a secret from their families and 94% from their communities. 32% of patients feared they could lose their job if they divulged their HIV status. Hence stigma usually posed a barrier for patients who thought they could not take their medicines at home or work, [Nozak et al., 2011] due to fear of detection and for patients who felt uncomfortable going to the clinic for test and medication refills as a result of confidentiality concerns.

## **2.4 SUMMARY**

Key to success in ensuring optimal adherence to ART in PMTCT are the availability of a system of care, a good patient healthcare provider relationship, a medication regimen that is acceptable and tolerable to the patient and overcoming patient factors that act as barriers to adherence. The combined effect of these factors encourages and enhances adherent behavior which is key to achieving virtual elimination of mother to child transmission of HIV.

With respect to adherence in ART, the relationship between the health worker and the patient is very important as adherence is the act or quality of sticking to something and it is best achieved through a collaborative process between patient and the healthcare provider. That facilitates acceptance and integration of a medication regimen into the

patients' daily life. This primarily emphasizes the relationship that must exist between the patient and the healthcare provider to ensure treatment success.

In adherence, the patient also has a key role to play. Acceptance of HIV status, a good social support network, overcoming cultural inhibitions that prevent adherence and concern about family promotes adherent behavior in PMTCT.

These studies on adherence to ART have been mostly carried out in the non-pregnant population. This study will assess the levels of adherence and factors affecting adherence to ART in PMTCT.

## **CHAPTER THREE**

### **3.0 METHODS**

#### **3.1 TYPE OF STUDY**

The study is an exploratory cross-sectional study using quantitative and qualitative study techniques.

#### **3.2 STUDY AREA/LOCATION**

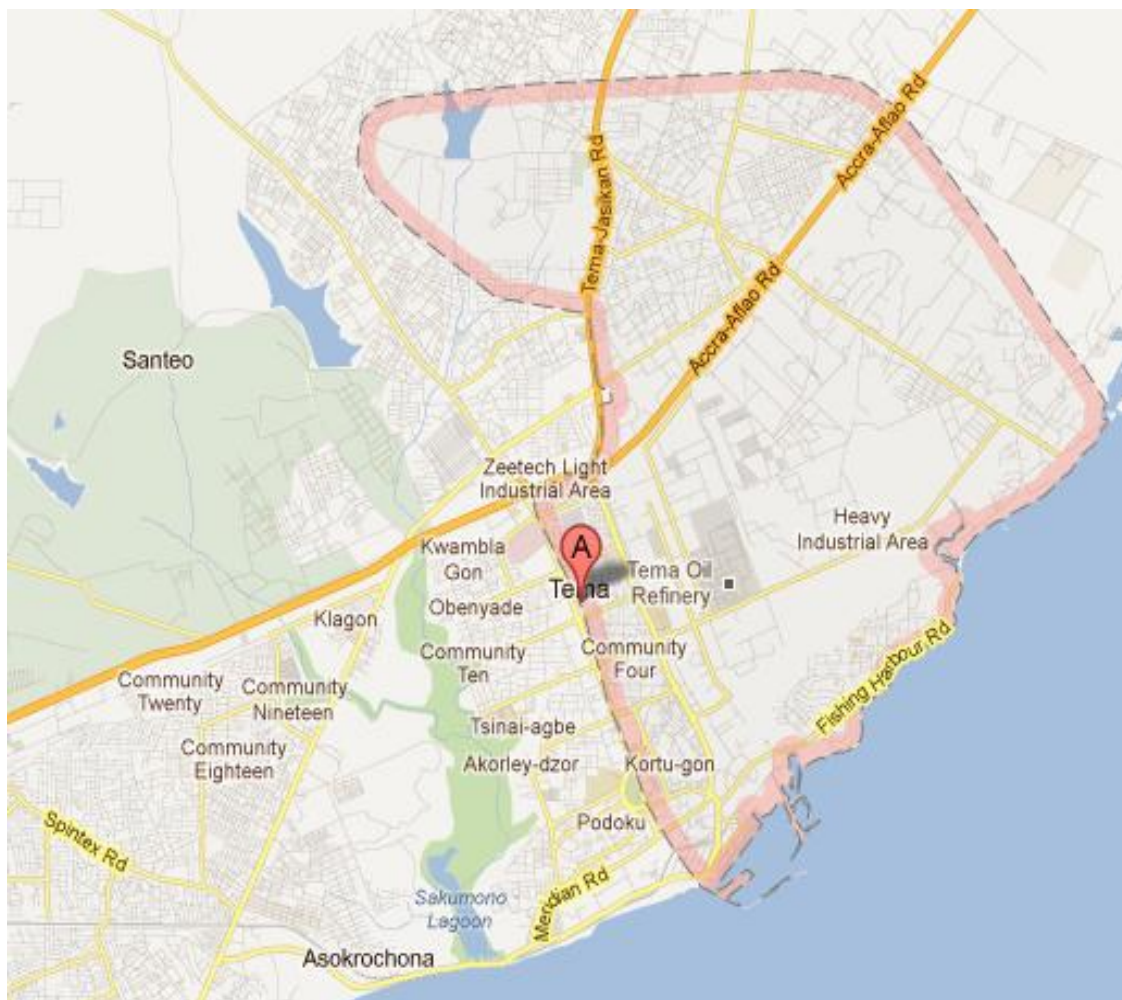
Tema Municipality is one of the 6 districts of the Greater Accra Region, located in the Southeastern part of Ghana. The population of Tema Municipality is estimated at 655,688 (projection from 2000 Census). Its population is about a fifth of the total population in the region and is growing at an estimated 4.4% annually (2000 Census). The municipality is bounded in the North by Eastern Region, on the East by Dangme West District, on the Northwest by Ga East District, on the Southwest by Accra Metropolis and in the South by the Gulf of Guinea. Tema covers an area of 519 square kilometers, stretching between latitude 5<sup>0</sup>37'N on the southern coastline and latitude 5<sup>0</sup>52'N at its northern most limits, and longitude 0<sup>0</sup>05'E on the eastern end and 0<sup>0</sup>10'W on the western side.

The built part is a vibrant commercial and industrial city – about the only well-planned city in the country. It has a large harbor – one of the world's biggest man-made harbors, which is the main seaport entry to Ghana. This makes it very important for the economy and security of Ghana.

The presence of industries offers job opportunities to its residents and neighbors. Despite these numerous job holdings, unemployment is still a major problem in the municipality.

Many migrants, mostly the youth, remain unemployed or only intermittently employed for long periods. They are thus financially disadvantaged. This has resulted in the existence of social vices such as prostitution, armed robbery, pick pocketing, streetism teenage pregnancy and drug trafficking. Prostitution is particularly a problem due to the economic activity, which brings in a lot of tourists, truck drivers and traders. The *STIs* and HIV/AIDS rates in Tema are therefore higher (2.2%) than the national average (2.1%) [NACP, 2011].

**Figure 2: Map of Tema Municipal**



### 3.3 VARIABLES

The dependent variable is Adherence to ART in PMTCT.

Assessment of adherence was done using patient self report, pill count and a 10cm visual analogue scale. The independent variables are as shown in Table 1.

**Table 1: Independent Variables**

Socio-economic Variables	Perceived factors and contributors to adherence	Disease and treatment	Clinical setting and service delivery
-Age	-Stigma	-Health status of mother	-Patient/provider relationship
-Level of Education	-Disclosure	-Pill burden	-Cost of therapy
-Marital status	-HIV status of partner	-Side effects of medicines	-Distance to facility
-Employment status	-Parity	-Adverse drug reaction	-Knowledge of PMTCT and Perception of adherence to ART
-Religion	-Sex of baby		

### 3.4 STUDY POPULATION

The study population was HIV positive pregnant and breastfeeding women who have been initiated on ART for PMTCT for at least four weeks.

#### 3.4.1 INCLUSION CRITERIA

Patients were eligible for the study if they were HIV positive, pregnant or had delivered, were breastfeeding and had been on ARVs for at least 4 weeks.

### **3.4.2 EXCLUSION CRITERIA**

All pregnant and postnatal women who were HIV negative or ART naïve were excluded from the study.

### **3.5 SAMPLING PROCEDURE**

The number of pregnant and breastfeeding HIV positive women who accessed the services at the ART centers in the metropolis on their clinic days during the period and consented to participate in the study were enrolled. There were two ART centers that offered ART in PMTCT in the Tema metropolis: Tema General Hospital (TGH) and Tema Polyclinic (TPC). TGH runs a biweekly clinic on Tuesdays and Thursdays whilst TPC runs their clinic every Tuesday. Every client who met the inclusion criteria was invited to participate in the study due to the small number of the study population. There was an average of eighty clients a day and an average of nine pregnant and breastfeeding women attending seeking care in the clinic.

A non-probability sampling method known as purposive sampling was used due to limitations on time, cost and logistics and the specific characteristics of the study population. The 141 consecutive HIV positive pregnant and postnatal women who met the inclusion criteria were interviewed. Structured questionnaires, In-depth Interviews and review of health records were used to extract and elicit data from respondents.

Subjects were identified at the two ART centers in Tema between May and June 2012 and those who met the inclusion criteria were identified through the clinics' register. At the clinic, the women are seated in two sections, one on the left and the other on the right. The first subject was identified by randomly picking a woman on the left.

In-depth interviews were held with ten HIV positive women identified in the clinics register: five women who were HIV positive before becoming pregnant and the other five women were newly diagnosed. One woman had both an HIV positive and an HIV negative child. Another woman also had had two HIV negative children whilst on ART. Four of the women were pregnant at the time of the interview and six had delivered. These methods resulted in a systematic collection and presentation of data which provided clear and deep insights to the factors affecting adherence to ART during pregnancy and the breastfeeding period.

### 3.6 SAMPLE SIZE CALCULATION

The minimum sample size was determined using the statistical formula of Cochran (1977) [Bartlett, Kotrlik & Higgins, 2001]

$$n = Z^2 pq / d^2$$

Where n= minimum sample size for a statistically significant survey

Z= Normal Deviant at the portion of 95% confidence interval=1.96

p= level of adherence to ART in HIV positive Pregnant women in the Study Area was unknown therefore to estimate for the maximum number of samples, 50% prevalence was used,  $p = 0.5$

$$q = 1 - p = 1 - 0.5 = 0.5$$

d= margin of error acceptable=0.05

Maximum sample size  $n = 384.16$  if the study were population based

But 384 was greater than 5% of the population under study, therefore the Cochran correction formula was used to estimate the corrected required sample size

The formula is  $n_1 = n_0 / (1 + n_0/N)$

Where  $n_1$  is the corrected sample size using finite population factor

$n_0$  = Maximum sample size calculated = 384

$N$  is the study population = 236

Corrected sample size of finite study population

$n_1 = 384 / (1 + 384/236)$

$n_1 = 146$  samples

Adjusting the sample size by 3%, the estimated sample size was 151 persons.

The sampling interval ( $k$ ) was population / sample =  $236/151 = 1.56$ .

Therefore every patient who attended the clinic was invited to participate in study.

### **3.7 DATA COLLECTION TOOLS**

The study involved the collection of quantitative and qualitative data using,

- Structured interviews
- In-depth interviews

#### **INSTRUMENT:**

A structured questionnaire and an interview guide were used for data collection.

#### **3.7.1 QUANTITATIVE DATA COLLECTION TECHNIQUE**

A cross sectional survey was conducted with a structured questionnaire. Face to face structured interviews with consenting patients were carried out to identify missed doses over a one month period. This was to make room for newly diagnosed patients to be a part of the study as their participation could lead to observation of variables of interest.

The interviews were administered by trained interviewers in the local language. Interviewers were trained in the study protocol, the questionnaires and the objectives of the study. The questionnaire examined the socio-demographic characteristics of clients, clients' knowledge of HIV, PMTCT and ARTs, the medical history of clients, the perceptions about the clinical setting and delivery of care provided by Health workers and perceived factors (social and Health provider related) that contributed to or prevented adherence to ART. Items on the questionnaire included distance travelled to the clinic, ability to pay for the service, amount spent per visit on travel and medicines, when HIV was diagnosed, pre and post adherence counseling received, when ARVs were initiated, perception of change in health status, pill burden, methods employed to remember when to take medicines, any side effects and adverse drug events experienced, patient care and privacy at the clinic, disclosure, stigma and reasons why pills are missed.

The quantitative data on adherence was captured using the adherence tools (a one month visual analogue, 2 and 7 day self-report and pill count) prior to patients collecting their medications at the pharmacy (this was part of the questionnaire). A questionnaire was administered to each patient. Respondents answered all items verbally and the interviewers recorded their answers. Patient records were reviewed to confirm patients' medical records that is: date of HIV diagnosis, date of initiation of therapy, record of previous pill counts and consistency at keeping clinic appointments.

### **3.7.1.1 DATA COLLECTION ON ADHERENCE**

Researchers have many ways of assessing clients' adherence to ARVs but generally there are no gold standards. This study selected three measurement tools.

**i) 7-Day Patient Self Report.**

Respondents were asked to recall medication ingestion behavior first in the last two days and then in the last seven days. This method had the advantage of a short time span which means that memory of the medicine intake is likely to be good. However, patients may feel ashamed to report specific instances of non-adherence that occurred in the last seven days prior to visiting the clinic.

**ii) Pharmacy Pill Count**

Pill count measures the actual number of pills left over since the previous refill. To assess the patient, the number of excess pills was subtracted from the number of pills provided at the previous visit and the number expected to be ingested is determined. Percentage adherence is computed for the participant.

During the pill count, patient medication records was assessed with patients consistency at keeping clinic appointments and this was used as a proxy for estimating the number of excess pills the patient is expected to have in her possession. The clinic appointment was for every 28 days but 30 day supply of medicines was provided. This results in an excess of four pills with every monthly visit. Over a period of six months, the patient would have in their possession an excess of 24 pills. A pill count without taking this into consideration will underestimate the patients' adherence. For patients who had been on medication since January 2012, this was used to ensure that adherence was measured accurately.

**iii) One Month Self-Report Using a 10 Cm Visual Analogue Scale.**

With this method, the respondents were asked to indicate their adherence over the past month on a 10cm long visual analogue scale. The beginning of the scale indicated a complete lack of adherence during the period whilst the end was associated with complete adherence. The respondents mark was then measured with a 10cm rule and translated into percentages.

None ————— All

### **3.7.2 QUALITATIVE DATA COLLECTION TECHNIQUE**

Ten in depth interviews were conducted using an interview guide. Average time taken to conduct an interview was fifty six minutes.

The interview date was requested from the respondents during the collection of the quantitative data. Respondents who agreed were interviewed at their convenience. All interviews were conducted at the HIV clinic in the adherence counseling unit as the women preferred to be interviewed there.

Thematic areas explored were knowledge and perceptions of HIV, PMTCT and ARTs, perceived benefits of ART, experiences and opinions of ARTs, disclosure, effect of knowledge of sex of baby and parity on decision or commitment to adhere, the role of social support and networks in adherence, opinion on quality of care received at the facilities, sources of motivation to adhere, problems related to adherence and possible solutions.

Most respondents referred to a positive change in health status and non directive probing questions were used to encourage respondents to expand on these.

In depth interviews were conducted because this method allowed the researcher to explore areas of interest in depth, and to achieve the objective of the study, detailed information on the behaviors and thoughts about adherence in pregnancy and breastfeeding from the respondents was needed. Also, triple antiretroviral therapy in pregnancy was a new concept in Ghana and respondents were not comfortable talking openly in a group due to the sensitive nature of the HIV disease.

The interviews provided insights to adherence behavior in pregnancy and breastfeeding which was not captured in the questionnaire. Interviews were conducted by the researcher who is a trained adherence counselor and had command over the local language, Twi. All interviews were audio taped with the exception of one because the respondent was not comfortable with being taped. Responses to that interview were therefore hand written. Permission was sought from the respondents before recording the interviews.

### **3.8 QUALITY CONTROL**

These involved measures that were put in place to ensure that results obtained were accurate and valid.

#### **3.8.1 PILOT STUDY**

A structured interview was administered for the study. For quality control, the questionnaire was translated into the local language by a translator. This was pretested with a sample of 20 participants in Ashaiman Polyclinic, outside the study area. No modifications were made to the instruments after the pilot studies.

### **3.8.2 DATA COLLECTION STAGE**

Three persons were selected at the ART centers and trained for data collection using the structured questionnaire and to conform to ethical guidelines. One person who performed below expectation during the pilot study was retrained.

All questionnaires were cross checked, inspected for errors with the patient folder during the pill count session and the information on research instrument scrutinized to ensure accuracy, relevance, completeness, consistency and uniformity of the data collected.

Research team members were monitored whilst on the field by the researcher.

In-depth interviews were conducted using an interview guide by the researcher.

## **3.9 DATA PROCESSING AND ANALYSIS**

### **3.9.1 QUANTITATIVE ANALYSIS**

All completed questionnaires were checked within 24 hours of data collection for consistency and analyzed. Data generated from the questionnaire was keyed into SPSS 16 by two data entry clerks separately and descriptive statistics was run to validate the data entered. Data was accepted as correct when the outputs from the different entries were the same. Descriptive statistics was used to describe the data generated with frequencies, bar and pie charts. Pearsons correlation, chi-square was used to test the significance of association. Statistical significance was set at  $p < 0.05$ . Data was transported to Stata SE 10. Logistic regression was used to estimate the independent effects of selected risk factors.

Optimal adherence is defined as taking at least 95% of prescribed doses over the last 30 days. This means that the patient takes at least 57 out of 60 pills for each antiretroviral medicine prescribed over the past month. This corresponds to missing no more than one dose in a 10 day period. To measure this, patient self report and pill count was used.

To measure adherence using patient self report two methods were employed, the 7 day recall and the one month visual analogue scale.

For the self report, the patient was requested to recall their medication ingestion behavior over the last 48 hours, previous week and previous month. For the assessment of the 1 month recall, a 10cm visual analogue line was used. The beginning of the line indicated not taking the medications at all in the past month, while the end meant taking all of them as prescribed. The patient's mark is then measured using a 10 cm ruler and length in centimetres translated into percentages.

Pill count measures the actual number of pills left over since the previous refill. To assess the patient,

The number of pills provided at the previous visit was determined from the patient records and the number of pills returned was counted. The number expected to be ingested was determined by multiplying the number of days between appointments by the frequency of dosing. The number expected to be returned was then calculated by subtracting the number of pills issued at the previous appointment from the number expected to be ingested. The number of pills missed was then determined by subtracting the number of pills returned from the number of pills expected to be returned.

Then the number of pills missed was subtracted from the number of pills expected to be ingested, divided by the number of pills expected to be ingested and multiplied by one hundred. This was used as the percentage adherence for the patient.

*Number of pills expected to be ingested – number of pills missed*

---

*X 100*

*Number of pills expected to be ingested*

The three methods were tested for association with each other. This was done to provide a basis for the use of one of the methods for analysis as the dependent variable with the independent variables

The socio-demographic variables were measured using the questionnaire through structured interviews. Factor analysis was used in SPSS to compute the independent variables and its' components; perceived factors and contributors to adherence was measured using stigma, disclosure of HIV status, HIV status of sex partner, parity and sex of baby; disease and treatment was measured computing the variable with the health status of the mother, pill burden, side effects and adverse drug events experienced; the variable clinical setting and service delivery was computed using patient-provider relationship, cost of therapy, distance travelled to the facility and knowledge of PMTCT and perception of ARVs. Cronbachs reliability was measured for each variable computed.

### **3.9.2 QUALITATIVE ANALYSIS**

The qualitative analysis was performed using the thematic content analysis frameworks. The audio recording was transcribed and translated into English by the researcher. Manual coding in the margins was done by synthesizing and grouping themes in the data in relatively exhaustive categories. Two persons coded the data independently from each other. The two discussed the emerging themes and subthemes. This was checked with the initial texts and the main themes emerged as before.

With in depth interviews, the results usually cannot be generalized and hence will complement the quantitative results.

### **3.10 ETHICAL APPROVAL**

The study was granted ethical approval by the Institutional Review Board of the Ministry of Health. Before the study started, permission was sought from the Greater Accra Regional Health Authority, Tema Metropolitan Health Authority, and Management of the Health facilities offering PMTCT to eligible women

#### **3.10.1 INFORMED CONSENT**

Informed consent was sought from research participants in writing. The purpose, expected duration of the interview and assurance of confidentiality were explained to the respondents prior to the interview. Research participants/respondents were assured of confidentiality during the study and after. Participation was voluntary. Each participant was given the opportunity to refuse to participate or opt out of the study at any point in its course.

### **3.10.2 CONFLICT OF INTEREST**

Apart from its academic and public health importance, I have no other personal interest in the study. This study was self funded.

### **3.11 LIMITATIONS**

The main limitations identified in the quantitative method were recall and information bias. The key to accurate measurement was to ensure that respondents did not feel threatened when reporting in one way or the other, a non-adherent event. Therefore, to minimize recall bias, patient self report was measured using a two and seven day recall of pills ingested as stated. Patients may overestimate their adherence during pill count for fear of the repercussions of revealing to the interviewers that they had not achieved optimal adherence. Respondents can achieve this by presenting fewer pills than were actually left over and reporting that it was ingested. This might have resulted in under or over estimation of results.

To minimize this, trained research assistants were encouraged to be empathic to the problems experienced by the respondents. This was done by reassuring the respondents that they would not be scolded if they were not able to take all their medicines. Research assistants were also trained on how to conduct the interviews and perform pill count to reduce the possibility of them asking the questions and performing pill counts in the way that would result in information bias. All interviews were confidential and anonymous.

For the qualitative aspect of the study, it was possible that the responses of the participants might be biased towards providing the interviewer with information they

think was expected and made the subjects comfortable. To minimize this, the researcher conducted all the interviews. This encouraged the subjects to express themselves freely. The interviews were also time consuming. To ensure that this did not affect the responses, an interview guide was used to direct the path of the interviews. The guide asked open ended questions and avoided ones that required “Yes” or “No” answers. This also ensured consistency between the interviews and thus increased the reliability of the findings.

## **CHAPTER FOUR**

### **4.0 RESULTS**

#### **4.1 INTRODUCTION**

The results in this chapter are organized in three main sections namely: the socio-economic characteristics of respondents (age, marital status, level of education, employment status and religion), adherence to ART (levels of adherence using self report and pill count) and factors affecting adherence (stigma, disclosure, HIV status of partner, health status of mother, pill burden, side effects of medicines, patient provider relationship, and perception of adherence to ART). A total of 142 HIV positive pregnant and breastfeeding women were invited to participate in the study due to time constraints and one person (0.7%) declined to take part.

#### **4.2 THE SOCIO-ECONOMIC CHARACTERISTICS OF RESPONDENTS**

Of the 141 women interviewed, 29.1% (41) were currently pregnant and 70.9% (100) were breastfeeding and had babies aged 6 months old or below. Five percent (7) were pregnant with their first child, 25.5% (36) had one child and the remaining 69.5% (98) had two or more children.

The mean age of the respondents was 31.9 years. Of the total respondents, 65.2% (92) of them were married, 21.3 % (30) were cohabiting with the current sex partner (Table 2). The proportion of women who were single was 13.5% (19). Most of the women 67.4% (95) had only primary education and 17.7% (25) had no formal education. About 14.9% (21) had attained secondary education or higher. The level of education of their partners had a similar pattern to the women but with a lower proportion; 6.4% (9) of the partners

having no formal education, completing primary education 53.2% (75), and with a much higher number of partners, 40.4% (57), completing secondary or higher education.

Of the 141 respondents, 16.3% (23) were currently unemployed. A proportion 75.1% (106) of the respondents was artisans or traders whilst 4.3% (6) were professionals. The proportion of respondents belonging to the Christian religion was 92.2% (130) while 7.8% (11) were Muslims. A greater proportion of the respondents 94% (133) lived in the urban area.

**Table 2: Socio-Demographic Profile of HIV Positive Pregnant and Breastfeeding Women on ART**

n=141

<b>Socio-demographic Factor</b>	<b>Frequency</b>	<b>(%)</b>	<b>In-depth interviews n=10</b>
<b>Age(years)</b>			<b>Frequency</b>
Mean	31.9		31.1
Maximum	43		43
Minimum	21		21
20-29	44	(30.7)	4
30-39	90	(64.3)	5
≥40	7	(5.0)	1
<b>Marital Status</b>			
Married	92	(65.2)	7
Co-habiting	30	(21.3)	3
Single	19	(13.5)	-
<b>Educational Status</b>			
No Formal Education	25	(17.7)	2
Primary/JHS/MSLC	95	(67.4)	4
Vocational	6	(4.3)	-
Secondary School	13	(9.2)	4
Tertiary	2	(1.4)	-
<b>Partner's Educational status</b>			
No Formal Educational	9	(6.4)	1
Primary/JHS/MSLC	75	(53.2)	3
Vocational	7	(5.0)	-
Senior Secondary School	33	(23.4)	5
Tertiary	17	(12.0)	1
<b>Employment status</b>			
Unemployed	23	(16.3)	1
Artisan/Trader	106	(75.1)	9
Professional	6	(4.3)	-
Unskilled	6	(4.3)	-
<b>Religion</b>			
Christian	130	(92.2)	9
Muslim	11	(7.8)	1
Pregnant	41	(29.1)	4
Breastfeeding	100	(70.9)	6
<b>Area of Residence</b>			
Urban	133	(94.3)	10
Rural	8	(5.7)	-
<b>Parity</b>			
No child	7	(5.0)	1
1 Child	36	(25.5)	3
2 Children	50	(35.5)	3
3 or more Children	48	(34.0)	3

### 4.3 ADHERENCE LEVELS AMONG PREGNANT AND BREASTFEEDING

#### WOMEN ON ARVs

Three different methods were employed to estimate the levels of adherence to ARVs (Table 3). With the 7-day self reported adherence, the mean adherence for all the study participants was 93.9% with a standard deviation of 19.4. Out of the 141 study participants, 85.1% (120) were adherent to their HIV medicines for PMTCT (Table 4). Using the visual analogue scale to measure the level of self reported adherence for the past month, 75.2% (107) of the study participants were adherent with a mean adherence of 94.5% and standard deviation of 14.6. Using the pill count method on the other hand, 63.1% (89) of the respondents were adherent with a mean of 89.4% (standard deviation=18.7)

**Table 3: Assessment of Adherence**  
n= 141

<b>METHOD</b>	<b>Mean (%)</b>	<b>Median</b>	<b>Standard deviation</b>	<b>Range</b>
7 Day Self-Report	93.9	100	19.4	100
1 Month Self-Report using visual Analogue scale	94.5	100	14.6	97.5
Pill Count	89.4	97.6	18.7	94.3

**Table 4: Adherence levels in Pregnant and Breastfeeding women on PMTCT using Pill Count, Self-Report and Visual Analogue Scale methods (VAS)**

n=141

<b>METHOD</b>	<b>Frequency (%)</b>	<b>Optimal Adherence (%)</b>	<b>Sub-optimal Adherence (%)</b>
7 Day Self-Report		120(85.1)	21(14.9)
1 Month Self-Report using VAS		107(75.2)	34(24.8)
Pill Count		89(63.1)	52(36.9)
Pregnant	41(29.1)	35(85.4)	6(14.6)
Breastfeeding(postnatal)	100(70.9)	85(85.0)	15(15)

The adherence levels were 85.4% (35) for pregnant women and 85.0% (85) for postnatal women using 7 day self report (Table 4). The adherence levels obtained in this study using 7-day recall self report 85.1% (120), 1 month self report using visual analogue scale 75.2% (107) and pill count 63.1% (89) varied.

**Table 5: Associations between Self Report and Visual Analogue and Pill Count Measurement of Adherence**

n=141

<b>Method</b>	<b>7-day self reported adherence</b>		<b>p-value</b>
	<b>Optimal adherence (%)</b>	<b>Sub-optimal adherence (%)</b>	
1 Month Self-Report using VAS			
Non-adherent	16(13.3)	18(85.7)	0.000
Adherent	104(86.7)	3(14.3)	
Pill Count			
Non-adherent	36(30.0)	16(76.2)	0.000
Adherent	84(70)	5(23.8)	

Pill count and one month visual analogue method for measuring adherence had a significant association with 7 day self reported adherence (Table 5).

#### **4.4 FACTORS AFFECTING ADHERENCE TO ART IN PREGNANT AND BREASTFEEDING WOMEN**

The adherence levels in pregnant women was 85.4% (35) and 85% (85) in breastfeeding women using 7- day self report. There was no significant association in the levels of adherence between being pregnant and breastfeeding (Table 6).

Comparing adherence levels in women with no formal education, 15.8 %( 19) adhered to ARVs whilst 28.5% (6) did not adhere. A similar pattern was observed with women who had three or more children. About 31.7% (38) of women with three or more children adhered to ARVs with 47.6 %( 10) not adhering. Also, in women who lived very far from the facility, 22.5% (27) achieved optimal adherence levels with 33.3% (7), achieving sub-optimal levels of adherence with to ARVs (Table 6).

In women who had a relative to remind them to take their pills, 9.5 %( 2) did not adhere compared to 0.8 %(1) who adhered (Table 8). Women who forgot or fell asleep were more likely not to adhere 42.9% (9). When there was a lack of food to eat before taking ARVs, women were more likely not to adhere 14.3% (3) than to adhere 2.5 %( 3). Nearly 15% (3) of women who shared their medicines with a family member or friend had suboptimal levels of adherence compared to 8% (1) that adhered.

**Table 6: Perceived Socio-Economic factors affecting Adherence to ARVs**  
n=141

Characteristic	Frequency (%)	Adherence level in the past 7 days		X <sup>2</sup> (df)	p-value
		Optimal Adherence (%)	Sub-optimal adherence (%)		
<b>Age (years)</b>					
20-29	43(30.7)	40(33.6)	3(14.3)	5.17(2)	0.075
30-39	90(64.3)	72(60.5)	18(85.7)		
40 years and above	7(5.0)	7(5.9)	0(0.00)		
<b>Level of education</b>					
None	25(17.7)	19(15.8)	6(28.5)	2.64(4)	0.619
Primary/JSS/MSLC	95(67.4)	82(68.3)	13(61.9)		
Secondary	13(9.2)	12(10.0)	1(4.8)		
Vocational	6(4.3)	5(4.2)	1(4.8)		
Tertiary	2(1.4)	2(1.7)	0(0.0)		
<b>Marital Status</b>					
Single	19(13.5)	14(11.7)	5(23.8)	5.54(2)	0.063
Cohabiting	30(21.3)	23(19.2)	7(33.2)		
Married	92(65.2)	83(69.1)	9(43.0)		
<b>Employment status</b>					
Unemployed	23(16.3)	19(15.8)	4(81.0)	0.135(2)	0.713
Employed	118(83.7)	101(84.2)	17(19.0)		
<b>Religion</b>					
Muslim	11(7.8)	9(7.5)	2(9.5)	0.100(1)	0.750
Christian	130(92.2)	111(92.5)	19(90.5)		
<b>Parity</b>					
No child	7(5.0)	7(5.8)	0(0.0)	2.99(3)	0.392
1 child	36(25.5)	32(26.7)	4(19.5)		
2 children	50(35.5)	43(35.8)	7(33.3)		
3 or more	48(34.0)	38(31.7)	10(47.6)		
<b>Ability to pay for services</b>					
No	8(5.7)	6(5.0)	2(9.5)	0.95(1)	0.623
Yes	133(94.3)	114(95.0)	19(90.5)		
<b>Distance to facility</b>					
Near	42(29.8)	37(30.4)	5(23.8)	1.22(2)	0.543
Far	65(46.1)	56(46.7)	9(42.9)		
Very far	34(24.1)	27(22.5)	7(33.3)		
<b>Current status</b>					
Pregnant	41(29.1)	35(29.2)	6(28.6)	0.003(1)	0.956
Breastfeeding	100(70.9)	85(70.8)	15(71.4)		

**Table 7: Perceived Socio-Behavioral Factors affecting Adherence to ARV**  
n=141

Characteristic	Frequency (%)	Adherence levels in the past 7 days		X <sup>2</sup> (df)	p-value
		Optimal Adherence(%)	Sub-optimal adherence (%)		
Disclosure of HIV Status					
No	17(12.1)	15(12.5)	2(9.5)	0.149(1)	0.699
Yes	124(87.9)	105(87.5)	19(90.5)		
Disclosure to sex partner					
Husband	85(60.3)	73(60.8)	12(57.1)	0.327(2)	0.849
Partner	16(11.3)	14(11.7)	2(9.5)		
Status unknown	40(28.4)	33(27.5)	7(33.3)		
Partner's HIV status					
HIV positive	29(20.6)	25(20.8)	4(19.1)	0.191(2)	0.909
HIV negative	61(43.2)	51(42.5)	10(47.6)		
Status unknown	51(36.2)	44(36.7)	7(33.3)		
Stigma					
No	61(91.0)	52(91.2)	9(90.0)	0.016(1)	0.900
Yes	6(9.0)	5(8.8)	1(10.0)		
Health status of mother					
No change	2(1.4)	2(1.7)	0(0.0)	0.36(1)	0.551
Improved	139(98.6)	118(98.3)	21(100.0)		
Pill burden					
No	7(5.0)	5(4.2)	2(9.5)	1.09(1)	0.297
Yes	134(95.0)	115(95.8)	19(90.5)		
Side effects of medicines experienced					
No	96(68.6)	81(67.5)	15(75.0)	0.13(1)	0.504
Yes	45(31.4)	39(32.5)	6(25.0)		
Adverse drug reaction experienced					
No	132(95.0)	113(95.0)	19(95.0)	1.97(1)	0.994
Yes	7(5.00)	6(5.0)	1(5.0)		
Patient/Provider relationship					
Poor	4(2.8)	4(3.3)	0(0.0)	0.72(1)	0.396
Good	137(97.2)	116(96.7)	21(100.0)		

**Table 8: Perceived socio-behavioral factors affecting Adherence to ARVs**  
n=141

Characteristic	Frequency (%)	Adherence in the past 7 days		X <sup>2</sup>	p-value
		Optimal Adherence(%)	Sub-optimal adherence(%)		
Knowledge of PMTCT and ART					
Low	44(31.2)	37(30.8)	7(33.3)	0.05(1)	0.820
High	97(68.8)	83(69.2)	14(66.7)		
Reasons for missing the pill					
Forgot/fell asleep					
Yes	33(23.4)	26(21.7)	9(42.9)	3.89(1)	<b>0.048</b>
No	108(76.6)	94(78.3)	12(57.1)		
Lack of food					
Yes	6(4.3)	3(2.5)	3(14.3)	6.09(1)	<b>0.014</b>
No	135(95.7)	117(97.5)	18(85.7)		
Shared medicines					
Yes	4(2.8)	1(0.8)	3(14.3)	11.73(1)	<b>0.001</b>
No	137(97.2)	119(99.2)	18(85.7)		
Relative reminds when to take ARVs					
Yes	3(2.1)	1(0.8)	2(9.5)	6.48(1)	<b>0.011</b>
No	138(97.9)	119(99.2)	19(90.5)		

Factors such as age, level of education, marital status, employment status, religion, stigma, disclosure, HIV status of partner, parity, sex of baby, health status of mother, pill burden, side effects of medicines, adverse drug reactions, patient provider-relationship, ability to pay for services, distance to facility and knowledge of PMTCT and perception of ART that were perceived to affect adherence did not in this study have any significant association with optimal level of adherence to ARVs among pregnant or breastfeeding women using PMTCT services (Table 6&7) in the bivariate analysis. The only perceived factors that were significant and affected optimal levels of adherence were reasons for missing a pill such as forgetting to take the pill ( $p < 0.04$ ), the lack of food to eat and take the drug with ( $p < 0.014$ ), having shared the medicine with a family member or friend ( $p < 0.001$ ) and having a relative to remind the patient to take their medication ( $p < 0.043$ ).

**Table 9: Determinants of optimal adherence to ARVs among Pregnant and Breastfeeding Women Attending PMTCT Clinics**

	<b>Adjusted Odds ratio(95% CI)</b>	<b>P-value</b>
<b>Way to remember when to take ARVs</b>		
Relatives	0.092(0.007-1.179)	0.067
<b>Reasons for missing a pill</b>		
Shared pills	0.054(0.005-0.581)	0.016
Lack of food	0.275(0.038-1.949)	0.196

In the multivariate logistic regression analysis, sharing pills with a friend or family member had a significant association with optimal levels of adherence ( $p < 0.016$ ).

Those who adhered were protected from sharing their pills (OR: 0.054).

**Table 10: Determinants of sub-optimal adherence to ARVs among Pregnant and Breastfeeding Women attending PMTCT clinics**

	<b>Crude Odds Ratio (95% CI)</b>	<b>P-value</b>	<b>Adjusted Odds ratio (95% CI)</b>	<b>P-value</b>
<b>Way to remember when to take ARVs</b>				
Relatives	12.52 (1.082-144.988)	0.043	10.911 (0.848-140.43)	0.067
<b>Reasons for missing a pill</b>				
Shared pills	19.83 (1.955-201.160)	0.011	18.395 (1.720-196.70)	0.016
Lack of food	6.5 (1.217-34.718)	0.029	3.638(0.513-25.70)	0.196

Perceived factors that had a significant association with adherence were analyzed with sub-optimal adherence by replacing optimal adherence with sub-optimal adherence. Multivariate logistic regression analysis performed showed that sharing pills with family or a friend maintained a significant association with sub-optimal adherence ( $p < 0.016$ ).

The odds of non-adherence among those who shared pills was eighteen times higher than those who did not share pills.

Using the qualitative results to complement the quantitative results, a total of ten in-depth interviews were conducted with HIV positive pregnant and breastfeeding women on ART for PMTCT. Only five of the participants knew their HIV status before becoming pregnant and were already on medication. Five of the in-depth interview participants discovered their HIV status in the current pregnancy and were ART naive prior to pregnancy. Only one participant of the in-depth interview had not given birth to a child yet. Four of the participants were pregnant during the course of the in-depth interviews and six had delivered within the last six months. One participant practiced mixed breastfeeding whilst the other five were exclusively breastfeeding. Three women did not know the HIV status of their current sex partners. Five of the partners of the participants were HIV negative and two had HIV positive partners with one on ARVs. One woman had both an HIV positive and an HIV negative child. Another woman had had two children HIV negative whilst on ART.

The themes that emerged from the in-depth interviews are stated below.

#### **4.5 PERCEIVED BENEFITS OF TREATMENT**

ARVs were perceived by the patients who participated in the in-depth interviews and quantitative study as good and being helpful for them. Being on the drug, most patients have experienced an improvement in their overall health status. Of the 141 women who responded to the survey, 98.6% (139) considered their health status to have improved after being on treatment. Similar observations were made by participants during the in-

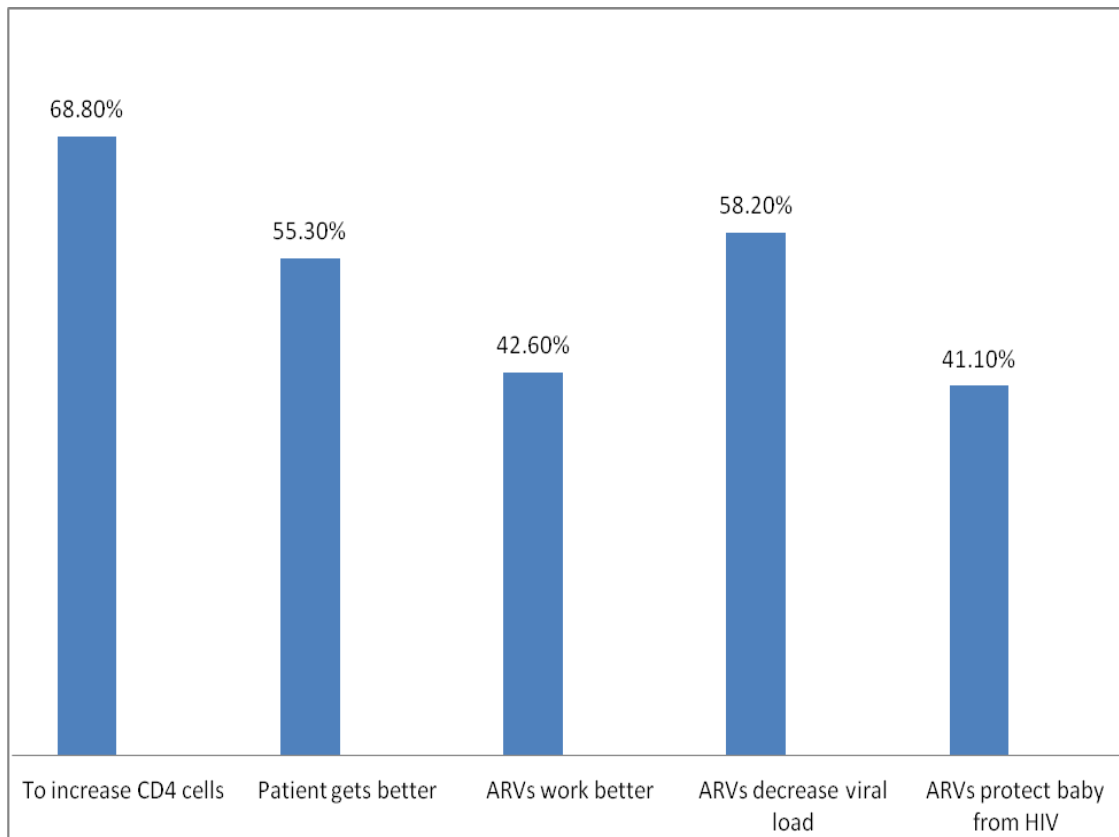
depth interviews. *“I have had a lot of experiences, the medicines have improved my health, I now have strength, I have changed a lot. This is not how I used to be. I used to be big, because of this disease, I became very thin. You can see from the sleeve of my cloth (kaba) I am wearing. I am a lot better now. I can eat well and I have peace of mind. I have become fine.”* (Breastfeeding woman, Tema)

*“When you have this disease, you do not have peace, it is when you start taking the medicines that you begin to have peace.”* (Pregnant woman, Tema)

Thus ART use and availability is a source of social relieve for patients on it.

A similar sentiment was expressed by a breastfeeding woman as

*“Those who did not have the pills died early so those of us who have the pills, God has blessed us.”* (Breastfeeding woman, Tema)

**Figure 3: Importance of ARVs**

The use of ARVs in PMTCT to prevent HIV infection in the infant as a reason was reported by 41.1% (58) of the women who responded to the survey questionnaire (Figure 3). During the interviews however, the desire to protect the baby from HIV infection was strongly stated as the reason for taking ARVs and the relief that they could now exclusively breastfeed the babies while on ARVs was expressed.

One participant for the in-depth interview had an older child who was HIV positive and discovered on the day of the interview that the youngest that was four months old was rather negative and shared her views on taking ARVs as,

*“I did not believe it four years ago when I was told I was HIV positive so at the time, I did not take the medicines that were given to me the way I was told. After I delivered, my*

*baby was sick all the time and grew very lean. The doctors tested him and found that he had the virus. It pained me a lot because if I had done what they told me, maybe this would not have happened. I was very worried, I had been trying to have a child for a long time so when I realized he was HIV positive, in fact I was worried. I thought my child would die, because I had heard that if you get this disease, you would die, So I asked the doctor whether I could have more children and he said my immune system is down so if it gets better, I can have another one. I had to wait till my strength (CD4 cells) came up. Last year I asked again and he said I could try, so I tried and got pregnant and by the grace of God this one is fine.” (Breastfeeding woman, Tema)*

Another woman had this to say,

*“It bothers me; I do not know whether the child will get the disease. I have been taught that if I do not take my medicines, I could give the baby the disease, also, if I breastfeed without taking the medicine, I can give the disease to my baby. I pray to God that as for this disease he takes it away from my child. In fact I did not want to have another baby, but my husband wants another child. Left to me alone, I will not have any more children but my husband wanted it, because of that it made decide to give birth for him. ”*  
*(Pregnant woman, Tema)*

This was how another woman expressed her relief after her child tested negative

*“I was very happy, I used to cry a lot, I was very afraid that my child will get the disease, but after three tests said he was negative, I became happy. I cried every time I came to do the test for him even though I take all my pills. I felt sorry for my child, I am grown so I can handle this disease but this is a young child, it is not fair. He has not done anything to deserve this.”(Breastfeeding woman, Tema)*

The respondents did not express any worry about taking these medicines but rather felt motivated to adhere in order to ensure that they could prevent infection in the infant.

There were multiple responses to why patients did not want to stop taking their medicines. These were; want to live longer 73.8 % ( 104), want to be stronger 56.7 % ( 80) and want to protect baby 27 % ( 38) (Figure 4). During the in-depth interviews a similar trend emerged. The desire to live longer was expressed more strongly than the need to protect the infant.

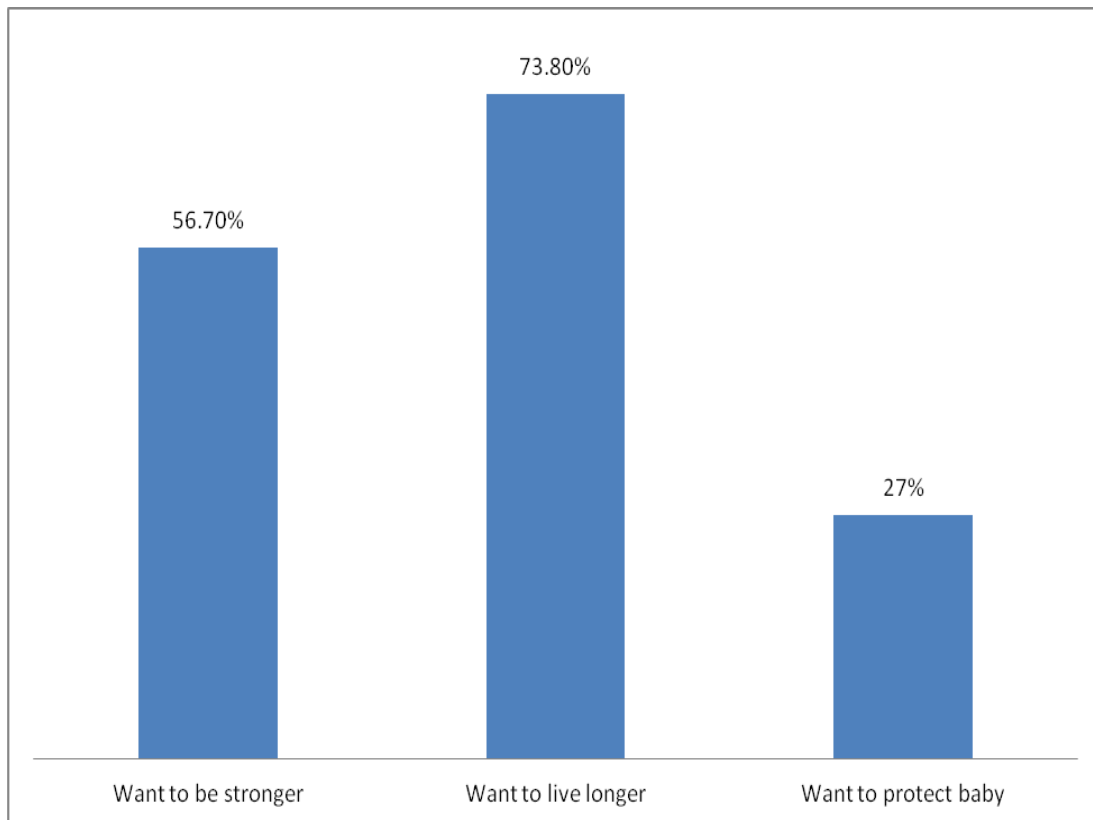
*“For me, for this drug that I am taking, I want to stay longer on earth till the time God himself will call me. This is why I take my medicines. I do not want any sickness to come and kill me, that is why I take my drugs” (Breastfeeding mother, Tema)*

Overall, mothers desired to take their medicines for the sake of all living children, not necessarily the infant in question at present.

*“My children are my main source of motivation; they are young so my mind is that I have to follow what I have been taught so that I can have life and strength to look after the children.”(Pregnant woman, Tema)*

The desire to be stronger was expressed mainly as a result of previous ill-health that interfered with daily activity. As one respondent put it;

*“I used to suffer when I did not know that I had this disease but now that I am taking these drugs, I do not suffer like that again. I want to be strong. I have health. If I play with the drugs, the disease will treat me like it did before. I had sores in my mouth, I couldn't even eat food. This has made me know that I shouldn't play with the drugs. People now tell me that I have gained weight, I have become fine.”(Breastfeeding mother, Tema)*

**Figure 4: Reasons for Decision to take ARVs**

#### **4.6 COUNSELING AND ATTITUDE OF HEALTH PROVIDERS PROMOTE ADHERENCE**

Of the 141 respondents who completed the survey, 96.5% (136) had received pre-adherence counseling before initiation of therapy. Though pre-adherence counseling was not associated with adherent behavior, ( $p$ -value, 0.242), it was a strong theme that emerged during the in-depth interviews, when asked about what they thought about the counseling they received at the clinic, the respondent reported this as;

*“It is better, it is good. Because they make us know what is there. They teach you for you to know. Me for example, because of the teaching, my husband now understands. At first he had some fear in him but now he will tell me the time is 9’oclock oh, he will even call*

*me if there is a programme on TV on HIV. I will not lie to you, the teaching is good. It has helped us paa.”(Breastfeeding mother, Tema)*

Most of the respondents 78% (110) described their relationship with the health workers as excellent and 19.1% (27) described it as good. Health workers at the clinic were perceived as being respectful and supportive to PLWHAs. This was the account of one participant in the in-depth interviews,

*“Health workers treat us with respect and this encourages us. They make us feel like human beings, they do not shout on us and maltreat us. It helps us to live without worrying about the disease. Ei, some people can tell us we are not human beings, we should leave here and go (yen firi ha nko) because we got the disease in a bad way but nurses do not treat us like that.” (Pregnant woman, Tema)*

#### **4.7 PERCEIVED FEAR OF STIGMA AMONG PREGNANT AND BREASTFEEDING WOMEN**

The HIV status of all participants in the in-depth interviews was a closely guarded secret entrusted to mostly their sex partner. This is expressed in the following sentiments

*“It is only my husband who knows about it. I have not told anybody yet. Because of the way I have been taught that this disease is not a problem, others do not think like that. If you tell them, especially in a compound house, it is not everybody that even you laugh with them, they have their own minds about you, so if they know you have something like this, they will start thinking a different thinking in their minds, so I have kept it a secret. It is only between me and my husband and it has helped.” (Pregnant woman, Tema)*

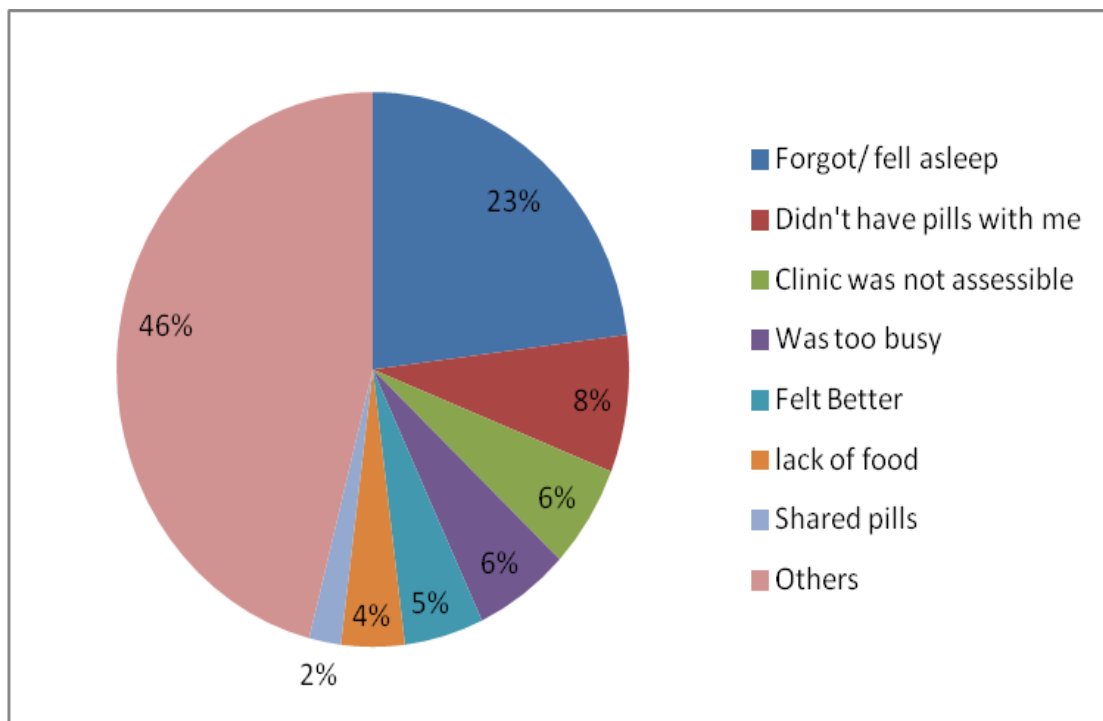
If a family member knew about the HIV status of a participant, then it was because there was a strong assurance of acceptance before the information was shared.

*“I have one sister who helps me to take care of myself and my children. She knows I have the disease. I am all she has so she takes very good care of me. We were four, two boys and two girls, the men have all passed away and I am older than her so I am all she has. She reminds me to take my pills. She will say, Sister, have you taken your pills? She helps” (Breastfeeding woman, Tema)*

The fear of being ridiculed or called names led to HIV positive women keeping their status secret from other members of family and neighbors.

#### **4.8 CHALLENGES OF TREATMENT**

Forgetting to take the pills or falling asleep 23.4% (33), being busy with house work 6% (8) not having pills with them 8% (11) when they were away from home, the need to eat food before taking the pills 4.3% (6) and sharing pills with a family members or friend 2% (4) were some of reasons given for missed pills in the survey.

**Figure 5: Reasons for missed doses**

These reasons were alluded to during the in-depth interview.

*“Sometimes I forget, maybe I am putting the baby to sleep, then I fall asleep as well. In the mornings this does not happen. It is the evening pills that this happens to me. I will say I will sleep a little and the time gets past, by the time I wake up it is past the time for taking the pills so I do not take it.” (Breastfeeding woman, Tema)*

*“they say you need to eat before you take the pills. Because of that I have to try and get corn dough porridge (koko) to touch my lips before I take it. When I have not eaten, then it becomes a problem.” (Pregnant women, Tema)*

These factors were perceived as challenges to optimal adherence to ARVs by the participants of the in-depth interviews.

## CHAPTER FIVE

### 5.0 DISCUSSION

#### 5.1 INTRODUCTION

The objective of the study was to assess the levels of adherence and the factors affecting adherence among HIV positive pregnant and breastfeeding women on ART for PMTCT.

#### 5.2 ADHERENCE LEVELS IN PREGNANT AND BREASTFEEDING WOMEN ON ART FOR PMTCT

This study records an adherence level of 85.1% among HIV positive pregnant and breastfeeding women on PMTCT using the 7-day self-report method as the standard for measuring adherence. The adherence levels among the pregnant and breastfeeding women in this study falls within range of adherence rates obtained in similar studies in Ghana among the non-pregnant population where Ohene & Forson (2009) reported adherence rates in the non-pregnant populations to be (80.6%) and WFP & GAC (2011) reported it as 87.3%. However, the adherence level to ART is lower than the recommended 95% or more which is required for optimal viral suppression (Paterson *et al.*, 2000, Glass *et al.*, 2006, Ahoua *et al.*, 2009).

Adherence level in this study is higher than 78.3% level reported among pregnant women in Nigeria (Igwegbe *et al.*, 2010) and 38% in Uganda (Barigye *et al.*, 2010).

A study in Botswana among patients on ART also reported adherence level of 54% (Weiser *et al.*, 2003). Slightly higher adherence levels of 88.4% was found in Zambia (Nozaki *et al.*, 2011) in ART patients.

Adherence using pill counts is much lower in this study. A study carried out by Haberer et al., (2012) show adherence levels using different methods (MEMS, 3-day recall, visual analogue scale and unannounced pill counts) presents similar results. The variation in this study may be attributed to the fact that pill count is not performed routinely in the facilities studied resulting in accumulation of pills that may be translated to non-adherent behavior.

### **5.3 FACTORS AFFECTING ADHERENCE TO ART AMONG HIV POSITIVE WOMEN ON PMTCT**

In this study, there is no significant association between the background variables age, marital status, education, occupation and levels of adherence. Similar studies in Africa however showed significant associations of background variables to levels of adherence. According to Igwebe et al.,(2010), low educational level of respondents ( $p < 0.002$ ) and their partners ( $p < 0.01$ ) was associated with increased likelihood of non-adherence to therapy in PMTCT. From my study, level of education had no association with adherence ( $p < 0.619$ ).

Of the four factors (forgot/fell asleep, reminders, lack of food and sharing pills), that have an association with optimal adherence in the bivariate analysis; only shared pills did have a significant association in the multivariate model. Individuals who share pills have 0.054 higher odds ( $p < 0.016$ ) of not adhering to ART. On the other hand, odds of sub-optimal adherence among those who share pills is eighteen times the odds of sub-optimal adherence in those who do not share pills. Patients who are reminded by relatives to take their pills are 0.092 times also more likely to adhere ( $p < 0.067$ ) to ART. Though in the

survey this study did not measure perceived fear of stigma, it is strongly expressed in the interviews. Pregnant and breastfeeding women are afraid to disclose their HIV status to family members and friends.

The desire to live longer to be able to care for family was expressed strongly in the qualitative study. This is similar to findings by Byakika et al., (2009) in Uganda. In that study, the most common motivator to adhere to ART was the desire to stay alive in order to care and support one's children and family members. In the same study, Byakika et al (2009) found high adherence levels (mean= 98.3%, SD  $\pm$ 7.7) for 3-day self report, (mean=98%, SD $\pm$  6.4) for 30-day visual analogue scale and (mean=98.5, SD $\pm$ 5.7) for home based unannounced pill count in mothers and children when treatment was provided to all eligible HIV infected members in the family.

In a study by Nozaki et al.(2011) in Zambia, feeling pressured to share ARVs with someone such as a family member or friend (OR=5.7, CI: 2.9-11.4,  $p < 0.001$ ) which was experienced by 9.5% (49) of the participants was the strongest factor associated with being classified in the non-adherent group. This study also finds that perceived fear of stigma resulting from taking ARVs at home or work (OR=2.3, CI: 1.2-4.5,  $p = 0.011$ ) was significantly associated with non-adherence.

Findings by Byakika et al. (2009) suggest that adherence is supported by a family based model that promotes disclosure and provides free therapy for all, a model of care absent in Ghana.

Having a relative, family member or friend to remind the patient to take their medicine is important for patient adherence to ART and most participants have their supportive sex partner to remind them.

Simply forgetting to take the pills or falling asleep ( $p < 0.054$ ) has no association with optimal levels of adherence but is the most frequent reason 23.4% for missing a dose. Other studies showed similar results, where 63.8% of respondents in a study by Igwegbe et al., (2010) in Nigeria cited forgetfulness as the reason for missing a dose and 24% of participants in a survey in Botswana listed 'forgetting, as the primary reason for treatment non-adherence (Weiser et al., 2003).

Extensive review by Mills et al., (2006) shows simply forgetting to take a pill was a barrier to optimal adherence whilst having family or friend help to remind patient facilitated adherence to ART.

There is a higher likelihood of suboptimal adherence to ARVs in pregnant and breastfeeding women who lived very far from the facility, had no formal education, and had three or more children. Pregnant and breastfeeding women who had a relative to remind them to take their pills, who missed a pill because they forgot or fell asleep, did not have food to take their medicines or shared their pills with a family member or friend are also not likely to adhere.

Healthcare providers need to provide support for behavioral aspects of long-term disease management and recognize important patient factors such as being pressured to share pills increases risk of not adhering to therapy.

The objective of ART in PMTCT is to have a generation free of HIV by preventing the transmission of HIV from the mother to the child through pregnancy, labour, delivery and breastfeeding. It was interesting to note that, this is not a primary reason for adherence

among breast-feeding and pregnant women in this study. This finding may be attributed to the fact that in this study, respondents are not categorized into those on treatment and those on prophylaxis. Despite the lack of categorization, this finding is similar to what was found in a study in Nigeria (Igwebe et al., 2010) where patients listed reasons other than protecting the infant as a motivator for adherence.

## **CHAPTER SIX**

### **6.0 CONCLUSIONS AND RECOMMENDATIONS**

#### **6.1 CONCLUSION**

Adherence among HIV positive pregnant and breastfeeding women on ART for PMTCT is lower (85.5%) with the 7 day self report method than the expected level of optimal adherence (95% and above). Low adherence implies that clinical failure may increase leading to more babies acquiring the virus.

Sharing pills and having a relative remind the patient to take their pills was found to affect adherence levels negatively. Sharing pills is enhanced as a result of staff at PMTCT centers not complying with directives to count pills before resupply.

#### **6.2 RECOMMENDATIONS**

##### **6.2.1 NATIONAL AIDS CONTROL PROGRAMME**

The majority of patients studied did not consider preventing HIV transmission to the infant as the primary reason for PMTCT and adherence levels are low. It is recommended that PMTCT centers emphasize the basis of the therapy to the patients.

There is also the need to review the content of the pre-adherence counseling and to promote post-adherence counseling for women on ART for PMTCT by assessing the knowledge of the trained counselors and possibly organizing refresher training for them.

Pregnant and breastfeeding women should be educated on adhering completely to their medications and informed on the consequences of sharing pills.

Levels of adherence were found to be lower than recommended. It will be useful to conduct further studies in this population with a bigger sample size to gain a better insight into the problem.

### **6.2.2 ART CENTERS IN TEMA OFFERING PMTCT**

The use of pill counts as a tool to monitor and promote adherence is generally used in ART centers. This practice was not a routine in the centers studied. It is recommended that the centers adopt this tool effectively.

### **6.2.3 PATIENTS ON ART FOR PMTCT**

Simply forgetting to take a pill or falling asleep was the most frequent reason cited for missing a pill. Patients should be encouraged to set an alarm to alert them for the evening dose.

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## APPENDICES

### APPENDIX I

#### **Consent / General Information for respondents**

TITLE: Adherence to Anti-Retroviral Therapy (ART) among HIV Positive Women at the ART Centers in Tema

I am a student of the school of Public Health of the University of Ghana, Legon. In doing my MPH dissertation, I am collecting information on how pregnant and postnatal women in Tema are able to take their antiretroviral medicines regularly as they have been asked to do, and what makes it easy or difficult for them to take the pills. This information may be useful to the management of Tema General Hospital, the Polyclinic and National AIDS Control Program (NACP) in improving healthcare delivery in these facilities. I am using a questionnaire collect this information. It will take between 10-15 minutes to complete the questionnaire. All information from this survey is confidential and using any records for this survey is voluntary. No names of patients will be collected. You can refuse to let me use any record. I am asking for your help to ensure that the information collected is accurate. If you have any questions, you can contact me, Ruby J.E. Awittor at the department of Social and Behavioral Sciences, School of Public Health, Legon or on my mobile number 024 925 0532.

If you agree to take part in the study, please append your signature or thumbprint to indicate your consent.

Thank you.



APPENDIX II					Variable name
Respondent's Identification Number		<input type="text"/>			
Interviewer code .....			Date:.....		
<b>Section 1: Demographic of Patients</b>					
1.	What is your age?	.....			
2.	What is your marital status?	Single	[1]	<input type="checkbox"/>	
		Married	[2]		
		Separated	[3]		
		Divorced	[4]		
		Widowed	[5]		
		Cohabiting			
3.	What is your religious background?	Christian	[1]	<input type="checkbox"/>	
		Muslim	[2]		
		Traditional	[3]		
		None	[4]		
		Other (specify)	[5]		
4.	What is your highest level of education?	-None	[1]	<input type="checkbox"/>	
		-Primary/Secondary	[2]		
		-Vocational	[3]		
		-Training College	[4]		
		-University	[5]		
		-(specify)			
5.	What is your husband's level of education?	-None	[1]	<input type="checkbox"/>	
		-Primary/Secondary	[2]		
		-Vocational	[3]		
		-Training College	[4]		
		-University	[5]		
		-other (specify)			

6.	What work do you do?	-Unemployed -Artisan/trader -professional -Unskilled -Other (specify).....	[1] [2] [3] [4] [5]	<input type="checkbox"/>	
7.	Where do you live?	Town..... Region.....			
8.	How many Children do you have?	.....			
9.	How old is your last born	.....			
10.	Respondent is pregnant (go to question 11) Respondent has delivered within the last 6 months(go to question 13)	Please tick [ ] [ ]			
11.	Do you know the sex of the baby you are carrying?	Yes No Don't know	[1] [2] [3]	<input type="checkbox"/>	
12.	Would you like tell me?	Male Female No	[1] [2] [3]	<input type="checkbox"/>	

13.	Are you currently breastfeeding?	Yes No	[1] [2]		
<b>Section 2: Knowledge and Perception of PMTCT</b>					
4.	Can a pregnant woman infected with HIV transmit the virus to her unborn child?	Yes No Don't know	[1] [2] [3]	<input type="checkbox"/>	
15	Can a woman infected with HIV transmit the virus to her newborn through breastfeeding?	Yes No Don't know	[1] [2] [3]	<input type="checkbox"/>	
1 6	How do you perceive ART medicines? (Please tick all that apply)	-Prolong life -Improve quality of life -Life-long treatment -Have side effect -Cure the disease -don' know -other (specify).....	[1] [2] [3] [4] [5] [6] [7]	<input type="checkbox"/>	

17	What do you think is the importance of taking your ARV medicines regularly as prescribed?	-CD4 cells increase -Patient gets better -ARVs work better -Viral load decreases -Baby gets protected from HIV	[1] [2] [3] [4] [5]	<input type="checkbox"/>	
<b>Section 3: Disease and Treatment</b>					
18	How long ago were you diagnosed HIV positive? Write date (month and years) mentioned by patient	.....months .....years Don't know	[1] [2] [3]	<input type="checkbox"/>	
19	Are you on ART?	Yes No Don't know	[1] [2] [3]	<input type="checkbox"/>	
20	Were you counseled about how to take your drugs as prescribed?	Yes No Not sure	[1] [2] [3]	<input type="checkbox"/>	
21	What was the duration of the counseling?	<10minutes 10-19minutes 20-29minutes >30minutes	[1] [2] [3] [4]	<input type="checkbox"/>	

22	How many times were you counseled	Once Twice Three times >three times	[1] [2] [3] [4]	<input type="checkbox"/>	
23	How received any counseling again since you started your treatment?	Yes No Not sure	[1] [2] [3]	<input type="checkbox"/>	
24	How would you rate your health before you started treatment?	Excellent good poor Not sure	[1] [2] [3] [4]	<input type="checkbox"/>	
25	How would you rate your health after being on treatment?	Excellent good poor Not sure	[1] [2] [3] [4]	<input type="checkbox"/>	
26	How many pills do you take in 24 hours including the medicines that are not HIV medicines?	2-4 pills 5-7 pills More than 7 pills 0 pills	[1] [2] [3] [4]	<input type="checkbox"/>	
27	How do you remind yourself about taking your medicines?	-Cell phone/clock -Self discipline - individual(monitor) -relations -organizations -other	[1] [2] [3] [4] [5] [6]	<input type="checkbox"/>	
28	Have you experienced any side effects of the medicines you are taking? If no move to question 30	Yes No Not sure	[1] [2] [3]	<input type="checkbox"/>	

29	What did you experience?	-Nausea -Vomiting -Dizziness -Skin rash -Pigmentation of palms and feet -Other	[1] [2] [3] [4] [5] [6]	<input type="checkbox"/>	
30	Have you experienced any severe side effects that made you very, very sick (adverse drug reactions)? If no, move on to question 35	Yes No Not sure	[1] [2] [3]	<input type="checkbox"/>	
31	What did you experience?	-Steven Johnson syndrome -Fainted -Jaundice -Severe stomach ache -Other.....	[1] [2] [3] [4] [5]		
32	Where you admitted to the hospital because of the reaction the medicine gave you?	Yes No Not sure	[1] [2] [3]	<input type="checkbox"/>	
33	How long did you stay in the hospital?	1-3 days 4-6 days 1-2 weeks >2 weeks	[1] [2] [3] [4]	<input type="checkbox"/>	
34	Were the medicine(s) changed for you after that experience? Refer to question 28 and/or 30	Yes No Not sure	[1] [2] [3]	<input type="checkbox"/>	

Section 4 :Clinical Setting and Service delivery					
35	Did you receive general counseling today?	Yes No Not sure	[1] [2] [3]	<input type="checkbox"/>	
36	Did you see your prescriber today?	Yes No Not sure	[1] [2] [3]	<input type="checkbox"/>	
37	Did he/she greet you today?	Yes No Not sure	[1] [2] [3]	<input type="checkbox"/>	
38	Did you get the chance to tell him all that you wanted to say about your health today?	Yes No Not sure	[1] [2] [3]	<input type="checkbox"/>	
39.	Do you feel you can confide in the health workers?	Yes No Not sure	[1] [2] [3]	<input type="checkbox"/>	
40.	Are you able to talk with your prescriber without the fear that someone is listening?	Yes No Not sure	[1] [2] [3]	<input type="checkbox"/>	
41	How long did you spend altogether at the clinic today for this review?	Less than 3hrs 3-5hrs more than 5 hours	[1] [2] [3]	<input type="checkbox"/>	

42.	Do you lose any income as a result of your coming to the clinic	Yes No Not sure	[1] [2] [3]	<input type="checkbox"/>	
43	How much do you lose when you come for a review?	.....			
44	Are you able to pay for all the services at the clinic?	Yes No Not sure	[1] [2] [3]	<input type="checkbox"/>	
45	How much do you spend for treatment at every review?	.....			
46.	How far is this facility from your home?	Less than 5km 5km-10km 11km-20 km More than 20 km	[1] [2] [3] [4]	<input type="checkbox"/>	
47	How would you describe the distance?	Very far Far near	[1] [2] [3]	<input type="checkbox"/>	

<b>Section 5: Perceived factors and contributors to adherence</b>					
48.	Have you disclosed your status to anyone? (If no, move to question 51 )	Yes No Not sure	[1] [2] [3]	<input type="checkbox"/>	
49	Who did you disclose your status to?	.....			
50	If yes, do they help you take your pills regularly and on time?	Yes No N/A	[1] [2] [3]	<input type="checkbox"/>	
51.	Is your partner HIV positive? (If no move to question 52)	Yes No Don't know	[1] [2] [3]	<input type="checkbox"/>	
52	Is your partner on medication?	Yes No Don't know	[1] [2] [3]	<input type="checkbox"/>	
53	Are some people are afraid to touch you or share articles with you once they know you have HIV?	Yes No Not sure	[1] [2] [3]	<input type="checkbox"/>	
54	Do people physically back away from you once they learn you are HIV positive?	Yes No Not sure	[1] [2] [3]	<input type="checkbox"/>	

55	In the past 12 months have you found yourself avoiding others or isolating yourself from friends and family because of your HIV status?	Yes No Not sure	[1] [2] [3]	<input type="checkbox"/>	
56	Do you feel worthless because you have HIV?	Yes No Not sure	[1] [2] [3]	<input type="checkbox"/>	
57.	Have you ever thought of stopping ARTs? (If yes, move to question 59 )	Yes No Not sure	[1] [2] [3]	<input type="checkbox"/>	
58.	If no, why? (Please tick all that apply)	Want to live longer Want to be stronger Want protect baby N/A	[1] [2] [3] [4]	<input type="checkbox"/>	
59.	If yes, why?	-Feel better -Doubt if I have AIDs. -Doubt if ARVs work -tired of taking medicines	[1] [2] [3] [4]	<input type="checkbox"/>	
60.	Over the last three months, did you perhaps miss any pill? (If no move to question 62)	Yes No Not sure	[1] [2] [3]	<input type="checkbox"/>	

61.	If yes, what made you miss a pill? (Please tick all that apply)			
	<input type="checkbox"/> Side effect	<input type="checkbox"/> Pill burden	<input type="checkbox"/> Cost of ARVs	
	<input type="checkbox"/> Lack of food	<input type="checkbox"/> Simply forgot/fell asleep	<input type="checkbox"/> Felt better	
	<input type="checkbox"/> Clinic not accessible	<input type="checkbox"/> Lack of care/support	<input type="checkbox"/> Depressed	
	<input type="checkbox"/> Didn't have pills with you	<input type="checkbox"/> Shared pills	<input type="checkbox"/> Alcohol use	
	<input type="checkbox"/> Feeling that you had to hide your medication from those around you	<input type="checkbox"/> Religion (e.g. fasting)	<input type="checkbox"/> Hospitalized	
	<input type="checkbox"/> Too busy	<input type="checkbox"/> Adverse drug reaction		
<b>Section 7: Assessment of adherence</b>				
62	Now, try to remember the last 2 days before this visit, Did you take all pills during that time?	All doses (excellent) <2 doses(good)	[1] [2] [3]	<input type="checkbox"/>
63	Now, try to remember the last 7 days before this visit, Did you take all pills during that time?	All days(excellent) 5-6 days (good) <5days (poor)	[1] [2] [3]	<input type="checkbox"/>
64	If you missed any, how many pills did you miss? (7-day Self report)	<input type="text"/> N/A		

65	Can we count your drugs (ARVs) to find out how many pills you have left please?				
Please indicate the following for each antiretroviral medicine: How many pills the patient should have taken since his/her last visit, and; How many pills he/she missed (i.e. how many pills were returned)					
1 <sup>ST</sup> LINE	3TC+AZT	EFV	NVP	D4T	3TC
2 <sup>ND</sup> LINE	TDF	3TC	FTC		EFV
	<b>Example</b>	<b>Drug I</b>	<b>Drug II</b>	<b>Drug III</b>	
<b>*Drug name</b>	Lamivudine				
<b>Previous Date issued</b>	7 Mar				
<b>Quantity taken home (total)</b>	60				
<b>Quantity returned</b>	6				
<b>Date returned</b>	4 Apr				
<b>Days since last issue</b>	28				
<b>regimen</b>	1bid				
<b>*Total supposed to take</b>	56				
<b>Should have returned</b>	60-56=4				
<b>*Pills missed</b>	6-4=2				
<b>Percent adherence</b>	$((56-2)/56) * 100$				
<b>*must fill row</b>					
66.	Please make a mark on the line to show how many of your ARV pills you think you managed to take in the last month:			<input style="width: 50px; height: 30px;" type="text"/>	
	None	_____			
	All				

65. How much do you earn monthly? .....

**THANK YOU**

**APPENDIX III**  
**CONSENT FORM FOR INDEPTH INTERVIEW**

I want to thank you for agreeing to meet with me today. My name is Ruby Awittor, I am student at the Department of Social and Behavioral Sciences, School of Public Health, University of Ghana. In doing my MPH dissertation, I would like to talk to you about how you are able to take your medicines as directed by your health workers. Specifically, I would like to know about the factors that help you to take them correctly and the challenges you face daily as you do so. The interview should take less than an hour. I will be taping the session because I do not want to miss any of your comments, I will also be taking notes during the session although I cannot possibly write fast enough to get it all down. All responses will be kept confidential. Please remember you do not have to talk about anything you do not want to and you may end the interview at any time. If you agree to take part in the study, please append your signature or thumbprint to indicate your consent. Thank you.

**Volunteer Agreement**

I have read the information given above or the information above has been read and explained to me and I have understood it. I have been given a chance to ask questions concerning this study; the questions have been answered to my satisfaction. I now voluntarily agree to participate in this study knowing that I have the right to withdraw at any time without affecting my access future health care services.

.....

Respondent Signature or Thumbprint

.....

Name / Signature of Researcher

.....

Date

.....

Date

**APPENDIX IV****IN-DEPTH INTERVIEW GUIDE****TITLE: ADHERENCE TO ANTI-RETROVIRAL THERAPY (ART) AMONG HIV****POSITIVE WOMEN AT THE ANTI-RETROVIRAL CENTERS IN TEMA.**

Respondent's identification number:..... Date.....

How old are you? .....

What is your marital status? Single..... Married..... Co-habiting..... widowed.....

How many children do you have? .....

Do you know the sex of the baby you are carrying? Yes..... No..... Not sure.....

If yes, would you like to tell me? Boy..... Girl..... No.....

Are you breastfeeding? .....

Are you HIV positive? Yes..... No.....

Are you on treatment? Yes..... No.....

- What treatments do you know are available for treating HIV?
- What medicines are you currently taking for managing your health?
- What is your experience with antiretroviral therapy?

(Probe adherence, side effects, adverse reactions, pill burden, nutrition, lifestyle adjustments)

- What is your opinion on the use of these medicines during pregnancy? (probe ART use)
- What do you think about the counseling you receive here to help you take your medicines? (alone and in groups, on adherence)
- How do you see your relationship with the health workers? ( probe privacy, confidentiality, respect)

- What are the sources of motivation for adherence?
- Please talk to me about the support given to help you to take your medicines at home.(probe disclosure, social network, discrimination and stigma)
- Is there anything more you would like to add?

I will be analyzing the information you and others give me and will submit a report to the hospital management team in one month. I will b happy to send you a copy at that time if you are interested.

Thank you for your time.