THE EFFECTIVENESS OF PREVENTION OF MOTHER-TO-CHILD TRANSMISSION (PMTCT) OF HUMAN IMMUNODEFICIENCY VIRUS (HIV)

AT ST.MARTIN DE PORRES HOSPITAL, AGOMANYA

BY

Sr. Mary Veronica Amponsah B.Pharm (Hons.)

A thesis submitted to the Department of Clinical and Social Pharmacy, Kwame Nkrumah University of Science and Technology

in partial fulfillment of the requirements for the degree of

Master of Science.

Faculty of Pharmacy and Pharmaceutical Sciences

College Of Health Sciences

May 2010

Certification

I hereby declare that this submission is my own work towards the MSc and that, to the best of my knowledge, it contains no material previously published by another person or material which has been accepted for the award of any other degree of the University, except where due acknowledgement has been made in the text.

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Abstract

Women of child bearing age constitute nearly half of the over 40 million adults currently living with HIV/AIDS world-wide. (1)

The increasing number of HIV infected women and children has implications for a sustainable health care and society. Integrating a comprehensive prevention of mother- to- child transmission (PMTCT) services (including prevention and treatment interventions) may significantly reduce the number of infants who are HIV infected. The aim of the study was to establish the effectiveness of PMTCT programme (Antiretroviral treatment and prophylaxis, safer delivery practices and safer infant-feeding practices) started at the St. Martin De Porres hospital in 2002.

This was a retrospective study. The study aimed at all pregnant women who agreed to Voluntary Counseling and Testing (VCT) whilst attending antenatal care (ANC), tested positive for HIV, attended ante-natal, delivered at the hospital and attended post natal care till the status of the infants were determined from 2002-2007. Folders of all the women who exhibited all of the above characteristics were retrieved from the records section and the following data; demographic characteristics, antiretroviral (ART) treatment

prescribed during ANC and delivery, type of delivery, ART prophylaxis for infant, feeding practices and status of the child after 18months collected.

From 2002-2007, a total of six thousand, three hundred and fifty-five (6355) patients' agreed to VCT whilst attending ANC. Eight hundred and forty nine (849) tested positive for HIV and two hundred and five (205) delivered at the facility. However only forty (40) women exhibited all the characteristics for inclusion into the study. Twenty-seven, (67.5%) of the pregnant women were administered with a single dose of Nevirapine and 5 (12.%) took a combination of Zidovudine (AZT) and Lamivudine (3TC) combination. Thirty-seven, (92.5%) of the pregnant mothers had spontaneous vaginal delivery and three (7.5%) had caesarean section. All the 40 HIV exposed babies received antiretroviral prophylaxis. Twenty-seven (67.5%) of the mothers exclusively breastfed their infants for six months, five (12.5%) practiced replacement feeding whilst, eight (20%) practiced mixed feeding. Eighteen months after delivery, thirty (76%) of the children tested negative, and ten (25%) tested positive. All these ten (100%) HIV positive children were born through spontaneous vaginal delivery. Also eight (80%) of the HIV positive children were mixed fed.

The prevention of Mother-to- Child Transmission (PMTCT) of HIV programme at St. Martin De Porres hospital is effective, about three quarters of the children born to 40 HIV positive women tested negative to HIV. However a high proportion of children who were mixed fed were HIV Positive. Mixed feeding should be avoided completely in the first six months because the immune system of the child is not well developed and may result in recruitment of white blood cells into the gastrointestinal tract, providing additional target for HIV infection. However a limitation of the research was the lack of follow-up of the HIV positive children after the eighteen months test.

ABREVIATIONS.

AIDS	Acquired Immune Deficiency Syndrome
ART	Antiretroviral therapy
ARV	Antiretroviral
CD4	Lymphocytes T-cells Count
CT	Counseling and Testing
DNA	Deoxyribonucleic acid
D4T	Stavudine capsule
HAART	Highly Active Antiretroviral Therapy
HIV	Human Immunodeficiency Virus
MTCT	Mother-To-Child Transmission
NVP	Nevirapine Tablet
OI's	Opportunistic Infections
PCR	Polymerase Chain reaction
PLCS	Pre- Labour Caesarean Section
PMTCT	Prevention of Mother-to-Child Transmission
RCH	Reproductive and Child health
SDNVP	Single dose Nevirapine
VCT	Voluntary Counseling and Testing
WHO	World Health Organization
ZDV/AZT	Zidovudine Tablet
3TC	Lamivudine Tablet

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CHAPTER ONE

1.0 INTRODUCTION

The HIV and AIDS epidemic is not just a public health concern, but a major socio-economic problem in Ghana as it is in other parts of the world, particularly in Africa, South of the Sahara. Of the 40.3 million people living with HIV world-wide as at the end of 2005, 2.3 million were under 15years of age [1]

It has been estimated that averagely, about 2000 new infections occur each day in children world-wide. Most of these infections (90%) occurred in Sub-Saharan Africa[2] including Ghana. HIV adult prevalence in Ghana as at 2005 was estimated as 2.7%,with about 400,000 Ghanaians anticipated to be living with the virus.[2]

1.1Background to AIDS

The first recognized cases of Acquired Immune Deficiency Syndrome (AIDS) occurred in 1981 in the United States of America [3]. In Ghana the first diagnosis of AIDS was reported in March 1986, and as at the end of June 2006, a cumulative number of 111,985 cases were reported in Public Health Institutions. [4] AIDS is a collection of disease conditions which develop because of deficiencies in the body's immune system. AIDS is caused by a retrovirus, the Human Immunodeficiency Virus (HIV). The virus is transmitted mainly from human to human through sexual intercourse, use of contaminated needles and other sharps, blood and blood transfusions, as well as trans-placental or trans-vaginal routes, breast milk or other direct contact with infected human bodily fluids.[4]

AIDS is a late-stage of HIV infection with severe immuno-suppression, in which the numbers and function of T-lymphocytes are reduced. When HIV infection progresses to Illness, the symptoms are usually due to failure of the immune system to resist other infectious diseases called opportunistic infections (O.I's) [3]

Incubation period for HIV infection is approximately one to three months, this being from the time of infection to the time that antibodies can be detected in the laboratory [4]. After transmission of HIV, a person does not immediately develop AIDS. Often there is a lengthy period from infection with HIV, to development of AIDS that may last about five to ten years or even longer. The average time from infection with HIV to development of AIDS without Antiretroviral (ARVs) is estimated to be about eight years. For most of this period, the person may not have any symptoms and, therefore may not be aware that he or she is infected. This contributes to the spread of HIV, since the person can transmit the infection to others without realizing it. A variety of opportunistic infections result in death unless the replication of the virus is slowed by drugs that can suppress it (antiretroviral therapy). Opportunistic infections include tuberculosis (TB), recurrent bacterial pneumonia or sepsis, oropharyngeal candidiasis, chronic diarrhoea, chronic skin infections, and recurrent herpes zoster among others.

1.2 Background To Mother-To-Child-Transmission (MTCT)

The magnitude of the pandemic of human immunodeficiency virus (HIV) infection in developing countries is such that multiple approaches are required to show its spread and alleviate the burden on the health sector and society in general.[5] Primary prevention of

HIV transmission remains a key component of HIV/AIDS programmes, and should be led by Governments and donor agencies. [6]

Women of child bearing age constitute nearly half of the over 40million adults currently living with HIV/AIDS world-wide. [7] Mother-to-child -transmission (MTCT), restricted here to vertical transmission of HIV during pregnancy, delivery and the breast feeding period, is the major mode of acquisition of infection for young children, with an estimated 1600 of the 16,000 new infection each day, mostly in developing countries. [7] The increasing number of infected women and children has implications for both organization of equitable and sustainable health care and the prevention of vertical transmission.

1.3 Prevention of Mother – To – Child Transmission (PMTCT) Programme

This programme was instituted by the World Health Organization (WHO), to help to decrease the vertical transmission of HIV,that is transmission of HIV from a woman to her infant. The programme consisted in,

- HIV counseling and testing
- Antiretroviral treatment and prophylaxis
- Safer delivery practices
- Safer infant-feeding practices.

1.31 HIV Counseling and Testing

The positive results from clinical trials of the antiretroviral medications of Zidovudine (AZT), and Nevirapine (NVP), created the possibility of offering an affordable and feasible intervention worldwide, to reduce HIV transmission from an infected pregnant woman to her infant. Governmental and nongovernmental health services in many highly affected areas of Africa, Asia, Latin America, and Eastern Europe have responded by piloting and rapidly expanding programmes for prevention of mother-to-child transmission (PMTCT) of HIV.[8]

Since their inception in 1999, programmes have offered voluntary counseling and testing (VCT) to more than 800,000 pregnant women around the world.[9]

An important objective of voluntary counseling and testing is to identify which pregnant women are HIV- positive so that they can receive either a short or full course treatment of antiretroviral to prevent transmission of HIV to their infants. HIV counseling and testing also offers an opportunity to promote HIV prevention, encourage status disclosure, and foster couple communication on HIV and prevention of mother- to- child transmission. HIV counseling is routinely offered to all antenatal clinic attendees at facilities where prevention of mother- to- child transmission of HIV services are offered. The voluntary counseling and testing process aims to equip pregnant women with information and support to enable them make decisions that will favour a healthy pregnancy and delivery, as well as to prevent further sexual transmission of HIV.

1.32 Antiretroviral Treatment and Prophylaxis

In 1998, the efficacy of a short course of Zidovudine (ZDV) regimen administered orally during the last month of pregnancy and labour to non-breast feeding HIV-infected

women in Thailand was demonstrated, to show that mother- to- child transmission can be greatly reduced.[10]

In 1999, in Cote d'Ivoire and Burkina Faso, some women were given Zidovudine 300mg tablet twice daily for four weeks before delivery [11]. In the same Cote d'Ivoire and Bukina Faso, in the same year, another group of pregnant women were also given the same treatment for six weeks before, and one week postpartum [12].

These findings provided a strong rationale for the world-wide policy of the use of Zidovudine prophylasis adopted by UNAIDS,WHO and UNICEF in March 1998,[13] with a proposed phased approach considering the diversity of national and local capacities and of HIV prevalence in pregnant women.[13] Preliminary results of a trial in Eastern and Southern Africa indicated that a short regimen of Zidovudine (ZDV) and Lamivudine (3TC) combined may be more efficacious than Zidovudine alone in reducing mother-to-child transmission (MTCT) in breast feeding populations. [13]

Pilot projects in multiple countries have demonstrated the feasibility of implementing various counseling and testing (CT) and PMTCT interventions, including antiretroviral (ARV) prophylaxis. In 2002, 91% HIV positive pregnant women in Ukraine received ARV prophylaxis, (mainly single dose Nevirapine (sd NVP)) or short course of Zidovudine for PMTCT. The MTCT rate decreased from 30% in 2000 to10% in 2002.[14] In Southern Africa where HIV is very widespread among pregnant women, Botswana leads the way. High quality PMTCT services were provided in all the country's public facilities through maternal and child health, which serves over 95% of pregnant women. Tests results from between November 2006 and February 2007 indicate that less than 4% of babies born to HIV positive mothers in Botswana were

infected – a rate comparable with the USA and Western Europe.[15] About eighty percent of the treatment effect was explained by lowered maternal viral concentration at delivery. These findings called for the need to scale-up PMTCT interventions in pregnant women with risky behavior and late access to the national programme in 2003.

The prevention of mother- to- child transmission of HIV was the US President's Emergency Plan for AIDS Relief to pregnant women in 2003 in African countries, example Botswana, Kenya, Namibia, Ethiopia, Ghana, etc. It has been a central focus of the U.S Government global HIV/AIDS efforts. [16]

Another clinical trial was conducted in Zambia, during which efficacious antiretroviral regimens beyond single-dose Nevirapine were given to HIV positive pregnant women at various stages of pregnancy. The results indicated that transmission from mother-to-child decreased considerably,[17] The World Health Organization therefore recommends the use of combination antiretroviral therapy where feasible, and also recommends that all HIV-exposed infants be given an appropriate antiretroviral prophylaxis.[17]

An HIV positive woman can transmit the virus to her baby during pregnancy, labour and delivery, and through breastfeeding. If the pregnant woman takes no preventive medication and breastfeeds, then the chance of the baby becoming infected is around 20-45 %.[18]

By integrating a comprehensive prevention of mother -to-child transmission of HIV services, including prevention and treatment interventions, as an essential part of reproductive and child health (RCH) programmes, may significantly reduce the number of infants who are HIV infected. This will also promote better health for their mothers, families and the entire workforce in the country.

1.33 Safer Delivery Practices [19]

Vaginal delivery is the safest mode of delivery. Caesarean section is considered on obstetric grounds. This is an operation to deliver a baby through its mother's abdominal wall. This is usually done to protect the baby of an HIV positive mother from direct contact with her blood and other bodily fluids.[19] Where caesarean section is indicated, it must be performed promptly.

The following practices must be well noted:

- The risk of postpartum haemorrhage must be minimized
- Vaginal examinations must be performed only it is absolutely necessary, and with appropriate clean technique
- Prolonged labour must be avoided (partogram should be used to measure the progress of labour).
- Artificial rupture of membranes must be avoided.
- Unnecessary invasive procedures must be avoided.

1.34 Safer Infant – Feeding Practices [2,26]

Antiretroviral (ARV) treatment and prophylaxis has substantially reduced mother-to-child transmission (MTCT) of HIV.[14,16] ARV prophylaxis, however, does not provide long-term protection for the infant who is breastfeeding. Without intervention, 15% of infants breastfed by mothers who are HIV positive may acquire HIV infection throughbreastfeeding. Infant-feeding practices that carefully follow national guidelines can reduce the likelihood of MTCT through breastfeeding and reduce the risk of infant death from diarrhoea and other childhood infections.

The various feeding options are :-

1. Exclusive breastfeeding:

   The mother gives her infant only breast milk except for prescribed medicines. The exclusively breastfed child receives no food or drink other than breast milk, not even water. Duration of breastfeeding should not exceed six months. The shorter the child breastfeeds, the lower the risk of being infected.

2. Replacement Feeding:

   There are two types

   i) Commercial infant formula

   ii) Home-modified animal milk

3. Modified breastfeed:

   This is expressing and heat-treating breast milk. Heat treatment of expressed breast milk can kill the HIV virus and therefore eliminate the risk of mother-to-child transmission of HIV from breast milk.

1.4 Risk Factors For Transmission From Mother-To-Child [20]

Specific maternal factors that may put a woman at a higher risk of transmitting HIV to her infant include:

a. Risk Factors Occuring During Pregnancy:

High maternal viral load. This is the quantity of HIV in the mother's blood, which can be transmitted to her infant. This often occurs in recent or new HIV infection, re-infection or advanced AIDS.

Other maternal factors include ;

- Severe immuno suppression
- Viral, bacterial or parasitic placental infection (e.g. malaria)
- Sexually transmitted infections (STIs)
- Maternal malnutrition (indirect cause)
- Use of illicit drugs, tobacco and alcohol during pregnancy.

b.Risk Factors Occuring During Labour and Delivery

- Rupture of membranes more than four hours before labour begins.
- Invasive delivery procedures that increase contact with mother's infected blood or body fluids (e.g. episiotomy, foetal scalp monitoring.)
- First infant in multiple births
- Chorioamnionitis (from untreated sexually transmitted infection or other infections)
- Vaginal delivery as opposed to planned caesarean section.

c. Risk Factors Occuring During Breastfeeding

- High maternal viral load (new infection or advanced AIDS)

- Duration of breastfeeding
- Early mixed feeding (e.g. food or fluids in addition to breast milk)
- Breast diseases including engorgement, abscesses, sore, cracked nipple, mastitis.
- Poor maternal nutritional status.
- Oral disease in the baby (e.g. thrush or sores)

d.Risk Factors Affecting Foetal Factors that may increase the risk of HIV Transmission include:-

- Prematurity: preterm births tend to place the infant at a higher risk of MTCT of HIV as compared to full term births.
- Foetal Trauma: traumatic births and births where the foetal skin is traumatized from obstetric procedures increase the risk of MTCT, e.g. forceps delivery and vacuum extraction.[2]

1.5 HIV Antibody Testing Of Infants and Young Children [2, 21]

Early diagnosis of infection in infants is difficult, especially in resource-constrained settings, and is further complicated by breast feeding. Since maternal antibodies cross the placenta, all infants born to mothers infected with HIV will test antibody positive.

For children who are not breastfeeding, or where breastfeeding cessation occurred at least six weeks previously;

- A negative HIV antibody test result for a child 18 months or older indicates that the child is not HIV positive.
- A positive HIV antibody test at 18 months or older indicates the child is infected with HIV.
- A negative HIV antibody test result for a child age 9-18months indicates that the child is not infected with HIV.
- A positive HIV antibody test at 9-18months of age indicates that the child may have antibodies from the mother and the test should be repeated at 18months.

1.51 Children Who Are Breastfeeding [(2)].

If the test is negative at 18months of age or older, and the infant was breastfeeding in the last six weeks, the antibody test should be repeated six weeks after complete cessation of breastfeeding.

A positive HIV antibody test result at 18months indicates that the child is HIV infected.

1.6 The PMTCT Programme At St. Martin De Porres Hospital

1.61 Counseling and Testing

At the antenatal section a talk is generally given to all clients on anaemia, malaria, personal hygiene and HIV. The counseling section is in two parts; pre and post test counseling.

Pre Test Counseling

At the pre- test counseling section basic facts about HIV is given. These include;

- Mode of transmission and prevention
- Signs and symptoms of HIV
- How the fetus in utero can be infected
- How the baby can be infected during delivery and breastfeeding
- Sexually transmitted infections and HIV
- HIV testing processes
- Benefits and risks of HIV testing
- Informed refusal
- Confidentiality is highly stressed.

Pregnant women are taught all these to enable them to decide whether they could confidently know their status.

Those who feel they can do it agree to fill a consent form. On the form their detailed address, age, religion, educational background, and their knowledge of HIV is indicated.

After this the pregnant women who have agreed to do the test are taken through one -on-one counseling.

Confidentiality is assured at this section.

Important things to note during this section are;

a) Risk Assessment: This means wanting to know in ones mind the number of sexual partners the person might have had in her life time and if positive and wants to proof difficult then than the counselor will know how to calm her down.

b) Risk Reduction: This helps the client to know or choose how she can reduce the risk of HIV by the A.B.C. method,(ie, Abstinence, Being faithful to one's partner, or the use of Condom.)

c) It is also explained to the woman that the laboratory machine can not tell about the person who infected her or when she was infected.

d) Again it is explained that there are three results; (a) Negative Result (b) Positive Result (c) Indeterminate result.

If the woman tests negative, she is encouraged to remain negative for the rest of her life.

If the result is indeterminate, she is encouraged to re- test after six to eight weeks.

While waiting for the results, the counselor may ask the client what she would like to do. Some clients could say they will pray, others would like to watch the television, while others would just sit down quietly. All these answers are to help the counselor to know the next line of action.

The counselor again asks the client with whom she would you like to share the results with.

Majority would not like to share with anybody if positive. Few clients would like to share with their mothers, and very few with their husbands.

Post Test Counseling

At the post counseling section, the counselor may include the following;

- Recap the pre-test information. This is done to make sure the client remembers the important information.

- Indicate that the HIV test result is ready and provide it in a straight forward manner. In a neutral tone the counselor says: “Your test result is positive”.
- Pause and wait for the client to respond before continuing. The client is given time to express her emotions.
- The client’s understanding of the meaning of the results is ascertained by probing further.
- The client’s emotions and feelings are supported.
- The client is informed about PMTCT issues and how she can be supported by antiretroviral treatment or prophylaxis, infant feeding options, childbirth plans, and adequate nutrition.
- The client is also educated on positive living to prevent further infection.
- It is explained to her that the test result do not indicate that her partner is infected and that he will need to be tested.

If positive, she is encouraged to come in for clinical care whereby the client is given a folder, sent to the laboratory for some investigations to be done before treatment is started. These investigations include, CD4, CD8, haemoglobin level (Hb), blood urea and electrolytes,and critinine (BUE& Cr), Liver function test (LFT), and white blood cells (WBC), are done.

If the CD4 is below 350, adherence counseling is done. At this section the client and her monitor are taught about the antiretroviral medication, the side effects of the medication, and some other opportunistic infections.

1.62 Antiretroviral Treatment

a) If maturity of pregnancy is 28 weeks and CD4 is above 350 then the woman is put on a prophylaxis of Zidovudine and Lamivudine (Combivir) combination, one tablet twelve hourly, till delivery and she still continues till one week postpartum. If the person's haemoglobin (Hb) level is less than 8g/dl the person is given Stavudine and Lamivudine instead of the Combivir.

b) If the CD4 is less than 350, then irrespective of the maturity of the pregnancy she goes through the adherence counseling for three sections then, start the full treatment of either Zidovudine + Lamivudine +Nevirapine, twelve hourly daily, or Stavudine + Lamivudine + Nevirapine, twelve hourly daily.

1.63 Safer Infant Feeding Practices

During the Pre test counseling section, the client is asked about the feeding option she would like to choose;

(1) Exclusive Breast Feeding for 6 months, but currently it has been reduced to four months, or

(2) Replacement Feeding

About 90% of HIV positive mothers in Ghana, and those who come to St. Martin de Porres hospital, opt for exclusive breastfeeding due to financial constraints and also to avoid stigmatization from members of their household and the community.

1.64 Safer Delivery Practices

- Pregnant women are encouraged to come and deliver at the hospital.

- Midwives are advice to avoid frequent vaginal examinations to avoid early rapture of membranes.
- They are also to avoid unnecessary tears. Episiotomy is done only when it is very necessary.

After delivery their babies are given prophylaxis of single dose Nevirapine plus Zidovudine and Lamivudine syrup immediately after birth for either one week or six weeks depending on the mother's condition and the time she started medication.

Other positive mothers opt for caesarean section and breast milk substitutes

1.7 Antiretroviral Treatment (ART) [2]

The most effective way to prevent mother-to-child transmission of HIV involves a long course of antiretroviral drugs. The drugs involve in the treatment are:

- Zidovudine(AZT)/Lamivudine (3TC) + Nevirapine (NVP)
- Stavudine (D4T) + Lamivudine (3TC) + Nevirapine (NVP)

Stavudine is normally used to replace Zidovudine in those mothers who may have anaemia. This is because Zidovudine is contraindicated in severe anaemia (when Haemoglobin level is less then 8g/dl)

The mechanisms by which these regimens prevent or reduce MTCT of HIV include decreasing viral replication in the mother, leading to a decrease in viral load in the exposure to the infant and/or prophylaxis for the child during and after exposure to the virus.

Treatment usually starts after the first trimester. However, when the woman is severely ill the benefits of treatment outweighs any potential risk to the fetus.

1.71 Treatment For Infants

The infants of mothers on full treatment are given Zidovudine/Lamivudine suspension for one week plus a single dose Nevirapine.

1.72 Antiretroviral Prophylaxis For Mothers And Infants

Women who are not eligible for full antiretroviral treatment are offered antiretroviral prophylaxis to prevent MTCT of HIV.

- Ante partum: Zidovudine+ Lamivudine (AZT/3TC) -starting at twenty-eight(28) weeks of gestation.
- Intrapartum: Zidovudine+ Lamivudine (AZT/3TC), 12 hourly until delivery plus single dose Nevirapine (NVP) at the onset of labour for the mother.
- Post partum: Zidovudine+ Lamivudine (AZT/3TC), 12 hourly for one week.

In pregnant women with haemoglobin less than 8g/dl, Stavudine (D4T) replaces Zidovudine (AZT).

For the Infant: single dose Nevirapine (NVP) syrup within 48 hours of delivery, plus Zidovudine + Lamivudine (AZT/3TC)syrup, 12hourly for six weeks is given.

1.8 The Strategy For PMTCT In Ghana

There is a National document for the prevention of mother- to – child transmission of HIV in Ghana.

Reducing HIV infection in infants and young children re*quire*s a comprehensive approach which includes:

- Primary prevention of HIV infection.
- Prevention of unintended pregnancies among women infected with HIV.
- Prevention of HIV transmission from women infected with HIV to their infants.
- Provision of treatment, care and support to women infected with HIV, their infants, and their families.[21]

1.81 Provision Of Treatment, Care, And Support To Women Infected With HIV, Their Infants And Their Families.

Infants and children who are HIV-exposed require regular follow-up care, especially during the first two years of life-including immunizations, HIV testing, and ongoing monitoring of feeding, growth and development. Their mothers are given advise on how to take their medications, prevent and treat opportunistic infections; and also advise to eat properly or sometimes given nutritional food supplements when they are available.

1.9 Rationale For The Study

Each year, around 370,000 children aged below 15 years become infected with HIV worldwide. In Ghana about 3978 new infections in children are recorded each year. [22] Almost all of these infections occur in developing countries, and more than 90% are the result of mother –to-child transmission during pregnancy, labour and delivery, or breast

feeding. Without interventions, there is a 20-45% chance that the baby born to an HIV – infected mother will become infected. [22]

Most infant HIV infections could be averted. The problem is that very few of the world's pregnant women are being reached by prevention of mother-to-child transmission (PMTCT) services. Therefore by integrating a comprehensive PMTCT services (including prevention and treatment interventions) as an essential part of reproductive and child health (RCH) programmes may significantly reduce the number of infants who are HIV infected. This will also promote better health for their mothers and families. [22]

It was in view of this, that this study was undertaken to establish how effective the programme which started in 2002 has been as far as St. Martin de Porres hospital is concerned.

1.10 Aim of study

To determine the effectiveness of the prevention of mother-to-child transmission (PMTCT) of Human Immunodeficiency Virus (HIV) in children born to women who received PMTCT services.

1.11 Objectives

- To determine how early diagnosis of a pregnant women's HIV status can help in the prevention of mother-to-child transmission of HIV.
- To provide an overview on the management of HIV during pregnancy and labour.

- To determine whether the children born to HIV positive mothers are given medication or not.
- To determine the method of delivery of HIV positive pregnant women and to compare the method of delivery with the HIV status of the infant.
- To evaluate the feeding options chosen by the HIV positive mothers and to compare these options with the HIV status of the infant
- To determine the HIV status of children born by HIV positive mothers 18months and above after delivery.

CHAPTER TWO

2.0 METHODOLOGY

2.1Study area:

St. Martin de Porres Hospital is one of the two pilot sites where the prevention of mother- to- child transmission (PMTCT) of HIV programme started in the country as far back as 2001. It is situated at Agomanya in the Lower Manya Krobo District in the Eastern Region. This area is noted for its high prevalence rate of HIV and AIDS. Though the national prevalence rate as at 2008 was 1.7%, that of Eastern region was 4.5%, and the site prevalence rate, that of Agomanya alone was 8%.[4,23]

2.2 Study Samples

The study is aimed at all pregnant women who attended the antenatal clinic (ANC) at the St. Martin De Porres hospital between, January 2002- December 2007.

2.3 Sampling

Clinical folders for the forty pregnant respondents out of the two hundred and five HIV positive women who met the criteria for inclusion into the study were retrieved and reviewed.

Only forty were chosen because those were the only ones we could contact as at the time of the study and also fulfilled the criteria for the study.

Note: Respondents had all given birth as at the time of sampling.

2.4 Inclusion Criteria:

- All pregnant women who registered at the antenatal clinic and agreed to do the voluntary counseling and testing.
- All pregnant women who tested positive for HIV.
- All HIV positive pregnant women who delivered at the hospital between January 2002 and December 2007.
- All positive mothers who attended postnatal care until their infants' status were determined at eighteen months and above.

2.5 Exclusion Criteria:

- Pregnant women whose status was unknown.
- Children of HIV positive mothers born outside the facility.

2.6 How Data Collection Was Done

All mothers who met the criteria for inclusion into the study were forty. The folders of these mothers were retrieved and reviewed and data collected included demographic characteristics, antiretroviral treatment received during antenatal care and delivery. Type of delivery method received, antiretroviral prophylaxis given to infant, feeding option chosen for child, and the status of the child after eighteen months were also collected. The data collection was done between June and July 2009

2.7 Tool Used

A structured questionnaire was used to collect the information from the patient's folders.

CHAPTER THREE

3.0 Results

3.1 Registrants

ITEM	RESULT
Total no. of registrants	9490
Total no. who agreed to do VCT	6355
Total no. tested positive	849
Total no. positive mothers who delivered at the facility	205

From the above, 67% of all antenatal registrants between January 2002 and December 2007, agreed to do the voluntary counseling and testing. Out of that number, 13.4%

tested positive for HIV. About twenty-four percent (24.1%) of the positive pregnant women delivered at the facility. Only 19.5% of those who delivered at the facility met all the criteria to be included in the study.

3.2 Demographic Characteristics

Clinical folders of forty HIV positive women out of the two hundred and five, who delivered at the facility were retrieved and reviewed. The age range of all the respondents was twenty to thirty-nine, with the mean age being twenty-eight and half years. Respondents were identified to be residing in eleven different communities (Appendix 3 Table 1). A total of ten, representing 25% of the respondents fall within the age group of twenty- twenty-nine, whilst the remaining thirty, (75%) were between the ages of thirty – thirty nine.(Table 3.2 below).

Table 3.2 Respondent's age

		Frequency	Percent	Cumulative Percent
Valid	20-29	10	25.0	25.0
	30-39	30	75.0	100.0
	Total	40	100.0	

As many as eight, (20%) of the respondents were found to have been first diagnosed of HIV in the year 2002, and another eight (20%) were diagnosed in 2007. Six, (15%) in

2003, and five (12.5%) in 2004. Four (10%) of the respondents were diagnosed in 2005, and finally nine (22.5%) in 2006. (Table 3.3)

Table 3.3

First diagnosed of HIV

		Frequency	Percent	Cumulative Percent
Valid	2002	8	20.0	20.0
	2003	6	15.0	35.0
	2004	5	12.5	47.5
	2005	4	10.0	57.5
	2006	9	22.5	80.0
	2007	8	20.0	100.0
	Total	40	100.0	

The frequency of respondents who had their CD4 count being less than 150 as per their diagnosis was but just one, three had their counts between 151 and 250, seven had counts between 251 and 350 and as many as twenty-nine, made counts above 350. (Table 3.4) From the CD4 counts, it is realized that the one pregnant woman who had her CD4 count below 150, and the three who had their CD4 count between 151and250 were all in the clinical stage three, whereby they need to be on full treatment.

Table 3.4 CD4 count at the time of diagnosis

	Frequency	Percent	Cumulative Percent
Valid: less than 150	1	2.5	2.50

151-250	3	7.5	10.00
251-350	7	17.5	27.50
More than 350	29	72.5	100.00
Total	40	100	

The respondents were put on various kinds of treatment as at the time of pregnancy.

3.3 Management of HIV During Pregnancy And Labour

Out of the forty pregnant women, only one was diagnosed when the pregnancy was in the first trimester. Thirteen of the respondents were diagnosed when the pregnancy was in the second trimester, and twenty-six were already in the third trimester when they were diagnosed (Table 3.5).

Table 3.5 Maturity of pregnancy at the time of diagnosis

		Frequency	Percent	Cumulative Percent
Valid	First Trimester	1	2.5	2.50
	Second Trimester	13	32.5	35.00
	Third Trimester	26	65.0	100.00
	Total	40	100.0	

In total twenty-seven, (67.5%) of the respondents were administered with single dose Nevirapine, five (12.5%) took a combination of AZT and 3TC, another five,(12.5%) had

combinations of AZT, 3TC and NVP. Two were put on D4T and 3TC and just but one respondent was administered with D4T, 3TC and NVP (Table 3.6). It can be seen that five different antiretroviral combinations were used in these forty HIV positive pregnant women. The most common was single dose Nevirapine in twenty-nine women. This was so because, before 2005, that was the only medication given to the pregnant women, and it was given at the onset of labour. This was followed by different combinations of Zidovudine based therapies in ten women. Only three women had to be given combinations with Stavudine (D4T), due to their anaemic conditions.

3.6 Kind of treatment received during pregnancy

	Frequency	Percent	Cumulative Percent
Single dose Nevirapine	27	67.5	67.5
AZT+3TC	5	12.5	80.0
D4T+3TC	2	5.0	85.0
AZT+3TC+NVP	5	12.5	97.5
D4T+3TC+NVP	1	2.5	100.0
Total	40	100.0	

Now considering the duration of treatment before deliveries, pregnant mothers were given any of the treatment combinations as per (Table 3.6). As many as twenty-six (65%) of the pregnant mothers were given a single dose Nevirapine at the on set of labour. One (2.5%) was on medication for at most fifteen weeks, ten(25%) were also given medication for between fifteen to seventeen weeks, and three (7.5%) had been put on the medication for at least seventeen weeks before delivery,(Table 3.7).

When the policy changed in 2005, to start giving prophylasis to pregnant women from the gestation period of twenty-eight weeks, a pregnant woman was to take treatment for at least eight weeks before delivery. So for those who took their medication for between fifteen and seventeen weeks before delivery indicated that they were diagnosed early and also started treatment early. The three pregnant women who took medication for more than seventeen weeks were also diagnosed early and started treatment early.

The one pregnant woman, who took medication for less than fifteen weeks, did not start treatment on time, even though she was diagnosed early.

Table 3.7 Duration of medication before delivery

		Frequency	Percent	Cumulative Percent
Valid	One day at onset of labour	26	65.0	65.0
	less than 15weeks	1	2.5	67.5
	Between 15-17weeks	10	25.0	92.5
	more than 17weeks	3	7.5	100.0
	Total	40	100.0	

In all thirty-seven, (92 5%) of the pregnant mothers had spontaneous vaginal delivery (SVD) and three (7.5%) underwent caesarean section (CS), and no death was recorded whatsoever (Table 3.6).

Table 3.8 Cross-tabulation of type of delivery and status of child after 18months

Type of delivery:	Status of the child after 18months		Total
	Positive	Negative	
Spontaneous Vaginal Delivery	10	27	37
Caesarean Section	0	3	3
Total	10	30	40

3.4 Child Management

All the forty pregnant women who met all the criteria for inclusion into the study had single births.

All the forty HIV exposed babies received antiretroviral prophylaxis. Twelve babies (30%) were given medication for one week, four (10%) were given for six weeks, whereas twenty-four (60%) had NVP start dose (Table 3.9). For those who received only Nevirapine start dose, that was the policy at that time, that is, before 2005. When the policy changed and the pregnant mothers were given prophylasis from

gestation period of twenty – eight weeks onwards, the HIV positive exposed babies were also given medication for one week or seven days, in addition to the single dose Nevirapine. For those mothers who took medication for less than four weeks, their babies were given medication for six weeks.

Table 3.9 Child Duration of Receiving ART Prophylaxis

		Frequency	Percent	Cumulative Percent
Valid	one week	12	30.0	30.0
	Six week	4	10.0	40.0
	NVP start dose	24	60.0	100.0
	Total	40	100.0	

Again twenty-one (52. %) babies were on co-trimoxazole prophylaxis, whilst the remaining nineteen (47.5) were not (Table 3.10).

Table 3.10 Child on co-trimoxazole prophylaxis

		Frequency	Percent	Cumulative Percent
Valid	Yes	21	52.5	52.5
	No	19	47.5	100.0
	Total	40	100.0	

Considering the feeding options adopted by the nursing mothers. Twenty-seven (67.5%) of the mothers chose exclusive breastfeeding for six months. Five (12.5%), opted for replacement feeding, whilst the rest, eight (20%) practiced mixed feeding (Table 3.11). The children who tested positive at the end of the period under study, were among those whose mothers were diagnosed late, had CD4 count less than 350, and also practiced mixed feeding.

Table 3.11 Feeding option chosen

		Frequency	Percent	Cumulative Percent
Valid	Exclusive breast feeding for six months	27	67.5	67.5
	Replacement feeding	5	12.5	80.0
	Mixed feeding	8	20.0	100.0
	Total	40	100.0	

Considering the status of the children at eighteen months and above after ART and Co-trimoxazole prophylaxis, and the feeding options chosen by mothers, thirty (75%) of the children tested negative, and ten (25%) tested positive (Table 3.12).

Table 3.12 Status of the child after 18months

	Frequency	Percent	Cumulative Percent

Valid	Positive	10	25.0	25.0
	Negative	30	75.0	100.0
	Total	40	100.0	

Comparing the HIV status of infants with method of delivery and feeding practices

A cross analysis of the status of the children with respect to the delivery method and the feeding options adopted by the nursing mothers reveals that all the ten positive-testing children were those born through spontaneous vaginal delivery which means cesarean section recorded a 100% negative-testing children. Of the twenty-seven mothers who practiced exclusive breast feeding for six months, twenty-five (92%) babies tested negative. For all the five mothers who opted for replacement feeding, no child tested positive. However, all eight mothers who practiced mixed feeding had their children testing positive. (Table 3.13)

Table 3.13 Cross-tabulation of Feeding option chosen and Status of the child after 18months

		Status of the child after 18months		Total
		Positive	Negative	
Feeding option chosen	Exclusive breast feeding for six months	2	25	27
	Replacement feeding	0	5	5

	Mixed feeding	8	0	8
Total		10	30	40

CHAPTER FOUR

4.0 D I S C U S SI O N

4.1 The effect of The Intervention on Children Born To HIV Positive Mothers.

In the study, all forty HIV positive mothers who were monitored, received treatment either during the course of their pregnancy or at the onset of labour. All, forty children born to HIV positive mothers also received some medications. These medications helped to reduce the viral load of the mothers and eventually reduce the transmission of the virus from mother to child.

From the study, eighteen out of the twenty-six mothers who took NVP start dose at the onset labour had their infants tested negative after 18months and above, and eight tested positive. The only mother who took medication for less than fifteen weeks had the child tested positive. One out of the ten mothers who took medication between fifteen and seventeen weeks had the child testing positive. All three mothers who took medication for more than seventeen weeks had their infants testing negative.

4.2 Method of Delivery and HIV Status of Infants Born to HIV Positive Mothers

Transmission from mother-to- child, which is called vertical transmission of HIV during pregnancy, delivery and the breastfeeding, is the major mode of acquisition of infection for young children. In the study, all three mothers who delivered by caesarean section, had their infants tested negative. Ten, out of the twenty-seven who delivered spontaneous through the vagina had their infants tested positive.

From the study, it can be said that some of the interventions that can reduce Mother-to-Child transmission through spontaneous vaginal delivery were probably not practiced properly and that might have led to the children testing positive. Examples are; regular examination of the vagina, and prolonged labour.

4.3 Method of Feeding And HIV Status of Infants Born To HIV Positive Mothers.

HIV is found in breast milk, and if one breast feeds, the chance of passing the virus to the baby is high. However, from studies conducted in South Africa, it was concluded that the transmission rate of the virus depends on how long the infant is breast fed.[25]

Replacement feeding is considered the best option for HIV exposed infants, and is 100% recommended.

From the study, it was realized that those children who were fed on breast milk substitutes were all tested negative. This implies that their mothers disregarded the risk of revealing their own status of being HIV positive, of being a target for stigma and discrimination. These mothers also made sure they gave their infants the right quantities of food they required, and resisted pressure from friends and relatives to breast feed. The mothers were prepared to bear the cost involved, and therefore were able to sustain their infants on the feed until they were able to take other foods.

A randomized trial in Kenya (2001) indicated that children who were fed with the formula were free of HIV at two years. If one lives in an area where safe water is not available, the risk of life threatening conditions from a formula feeding may be higher than the risk from breastfeeding. [26]

Mixed feeding should be avoided completely in the first six months. This is when the infant is fed with both breast milk and other liquids such as formulas. This is because the immune system of the child is not well developed, and may result in recruitment of white blood cells into the gastrointestinal tract, providing additional target for HIV infection [25].

As indicated in the results, all the infants who were given mix feeding tested positive at eighteen months and above.

From the study, one mother who took medication for less than fifteen weeks and another who took medication between fifteen and seventeen weeks, had their infants tested positive. Through interactions with the mothers, two of them whose children tested

positive, confessed that they could not disclose their status to their partners and therefore continued to have unprotected sex with them. A mother who is a known prostitute could also not stay quietly, but went back to her work while still breastfeeding and that may have contributed to the child being infected.

4.4 CONCLUSION

If all pregnant women are given the necessary counseling and all accept to do the HIV testing before twenty-eight weeks of gestation, and take PMTCT medication for more than fifteen weeks if HIV positive, there will be a marked reduction risk of transmission of the virus to their infants. For mothers who may deliver per caesarean section, if they also breast feed their infants exclusively for six months and the infants receive their medication for either one week or six weeks, there is the possibility of having their infants testing negative at eighteen months and above. If they also do replacement feeding with all other protocols followed, there is the likelihood that all their infants will test negative.

4.5 Limitation

A limitation of the research is the lack of follow- up of the HIV positive children, after the eighteen months test.

4.6 Recommendations

- Counseling and testing should be incorporated in all reproductive and child health clinics, so that the status of the mothers would be detected early for early interventions to be started.
- Though the government is scaling up the HIV treatment centre's in the country, the equipment and laboratory reagents should also be made available for easy testing.
- More Health care providers should be trained and resourced to provide services whole heartedly and joyfully.
- Of late, there have been shortages of antiretroviral medicines in the country and if this continues it will not help to achieve the aims of the programme. People who test positive need to be put on medication and if there are no medications, transmission of the virus to the younger generation cannot be prevented.
- Great efforts need to be made to get the men convinced so that they can support their wives and they too get tested.
- Poverty is a major barrier to mothers who would prefer to use replacement feeding. Since they are sometimes unable to buy the feed, they are forced to mix feed by continuing feeds with the breast milk. If the mothers get support to buy the feed it may help them to adhere to instructions of not giving mixed feeds.

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APPENDIX 1

QUESTIONAIRE

1. Patient Details

1.1 Patient's ID

1.2 Age

1.3 Place of Residence/Address

2. Current Status of HIV

2.1 When were you first diagnosed as having HIV?

a) 2002 ☐ e) 2006 ☐

b) 2003 ☐ f) 2007 ☐

c) 2004 ☐ g) 2008 ☐

d) 2005 ☐ h) 2009 ☐

2.2 What was your CD4 count at the time of diagnosis?

a) <150 ☐ b) 150-250 ☐

c) 250-350 ☐ d) >350 ☐

2.3 What was the maturity of your pregnancy at the time of diagnosis?

a) <12 weeks ☐ d) 28-36weeks ☐

b) 12-20weeks ☐ e) >36weeks ☐

c) 20-28weeks ☐

3 Nature of Treatment Given

3.1 Were you put on any medication?

Yes ☐ No ☐

3.2 If yes to Q 3.1, what kind of treatment were you given

a) Single dose Nevirapine ☐

b) AZT+3TC or D4T+3TC ☐

c) AZT+3TC+NVP or D4T+3TC+NVP ☐

3.3 How long did you take the medication before you delivered?

a) One day at onset of Labour ☐

b) <15 weeks (pre-maturely) ☐

c) Between 15-17 weeks (Normal Delivery) ☐

d) > 17 weeks (Post Maturity) ☐

4 Type of Delivery

a) Spontaneous Vaginal Delivery ☐

b) Caesarean Section ☐

5 ART Treatment for Child

5.1 Did child receive ART Prophylaxis?

a) Yes ☐ b) No ☐

5.2 How long did child receive ART Prophylaxis?

a) One week

b) Six weeks ☐

c) NVP Start Dose ☐

6 What Feeding Option was Chosen for child.

a) Exclusive breastfeeding six months ☐

b) Expressing and heat-treating breast milk ☐

c) Mixed Feeding ☐

7 Was child on co-trimoxazole prophylaxis?

a) Yes

b) No ☐

8 Status of the child after 18 months

a) Positive

b) Negative ☐

APPENDIX 2 Tables

Table 1

Place of residence

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agomanya	13	32.5	32.5	32.5
	Kpongunor	7	17.5	17.5	50.0
	Nuaso	2	5.0	5.0	55.0
	Kpong	2	5.0	5.0	60.0
	Tema	1	2.5	2.5	62.5
	Accra	2	5.0	5.0	67.5
	Somanya	6	15.0	15.0	82.5
	Atua	1	2.5	2.5	85.0
	Odumase	4	10.0	10.0	95.0
	Dodowa	1	2.5	2.5	97.5
	Senchi	1	2.5	2.5	100.0
	Total	40	100.0	100.0	