EARLY INFANT DIAGNOSIS AND TREATMENT OF HIV AMONG EXPOSED AND INFECTED INFANTS IN BABADOGO AND KARIOBANGI SLUMS, NAIROBI COUNTY, KENYA.

BY

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APRIL, 2014
DECLARATION
This thesis is my original work and has not been presented for a degree in any other university.

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DEDICATION

This work is dedicated to the loving memory of my grandmother, the late Mrs. Grace Mwelu Matheka for her encouragement to pursue my dreams and to my parents, Prof. and Mrs. R. M. Matheka for their great love and support. May God bless you.
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<th>Abbreviation</th>
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<tbody>
<tr>
<td>AIDS</td>
<td>Acquired Immune Deficiency Syndrome</td>
</tr>
<tr>
<td>ANC</td>
<td>Ante Natal Care</td>
</tr>
<tr>
<td>ART</td>
<td>Antiretroviral Therapy</td>
</tr>
<tr>
<td>ARV</td>
<td>Antiretroviral drugs</td>
</tr>
<tr>
<td>CCC</td>
<td>Comprehensive Care Clinic</td>
</tr>
<tr>
<td>CPT</td>
<td>Cotrimoxazole Prophylaxis Therapy</td>
</tr>
<tr>
<td>CWC</td>
<td>Child Welfare Clinic</td>
</tr>
<tr>
<td>DNA</td>
<td>Deoxyribonucleic Acid</td>
</tr>
<tr>
<td>EID</td>
<td>Early Infant Diagnosis</td>
</tr>
<tr>
<td>HAART</td>
<td>Highly Active Antiretroviral Therapy</td>
</tr>
<tr>
<td>HEI</td>
<td>HIV Exposed Infant</td>
</tr>
<tr>
<td>HCT</td>
<td>HIV Counseling and Testing</td>
</tr>
<tr>
<td>HIV</td>
<td>Human Immunodeficiency Virus</td>
</tr>
<tr>
<td>KDHS</td>
<td>Kenya Demographic and Health Survey</td>
</tr>
<tr>
<td>KII</td>
<td>Key Informant Interview</td>
</tr>
<tr>
<td>MNCH</td>
<td>Maternal Newborn and Child Health</td>
</tr>
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MOH  Ministry of Health
MOMS  Ministry of Medical Services
MOPHS  Ministry of Public Health and Sanitation
MTCT  Mother to Child Transmission of HIV
NACC  National AIDS Control Council
NASCOP  National AIDS and STIs Control Programme
OIs  Opportunistic Infections
OR  Odds ratio
PMTCT  Prevention of Mother to Child Transmission of HIV
RH/FP  Reproductive Health/ Family Planning
RNA  Ribonucleic Acid
UNAIDS  United Nations Joint Programme on HIV/AIDS
UNICEF  United Nations International Children’s Fund
Up24 Ag  Ultrasensitive p24 Antigen
WHO  World Health Organization
SSA  Sub Saharan Africa
DEFINITION OF TERMS

ARV prophylaxis for HIV exposed infants: Refers to all infants born to mothers living with HIV put on antiretroviral prophylaxis from birth or within 6 to 12 hours regardless of the regimen used for preventing mother-to-child transmission or of breastfeeding, for extended antiretroviral therapy or other antiretroviral medicine for the mother during breastfeeding.

Cotrimoxazole prophylaxis for HIV exposed and infected infants: Refers to all HIV-exposed infants offered cotrimoxazole preventive therapy (CPT) from age 6 weeks till their HIV status is established unless contraindicated.

Early infant HIV diagnosis: Refers to Virological testing of HIV at 6 weeks of age for infants known to be exposed to HIV, or serological testing of HIV in infants with unknown exposure status.

HIV treatment for HIV infected infants: Refers to ART initiated to all children aged less than 18 months confirmed to be infected with HIV regardless of CD4 cell count, CD4 percentage or who attain WHO clinical stage within 2 to 4 weeks after diagnosis.

HIV-exposed infant: Refers to an infant born to an HIV-infected mother but the HIV status of the infant is not yet known.

HIV-infected infant/child: Refers to an infant whose HIV infection has been confirmed by a positive virological test for children aged less than 18 months or a positive serological test for children aged 18 months and over.
**Infant:** in the context of this study, it refers to an infant will refer to a child aged 0-18 months, the period that the EID algorithm covers.

**Mother-to-child transmission of HIV (MTCT):** Refers to the transmission of HIV from an infected mother to her baby during pregnancy, labour and delivery and breastfeeding.

**Prevention of Mother to Child Transmission (PMTCT):** Refers to phrase for programmes, services and interventions whose goal is to reduce the risk of MTCT.
ABSTRACT

Studies indicate that by the end of 2010 there were about 34 million people living with HIV worldwide and 2.7 million new infections which consisted of 390,000 estimated children under the age of 15 years, mainly through Mother-to-Child Transmission. An estimated 1.5 million people are living with HIV in Kenya whose total population of 38,765,000 and an HIV prevalence rate of 6.3%. Although Early Infant Diagnosis (EID) and HIV treatment for HIV exposed infants are readily available and provided free of charge in public health facilities, only 35% of HIV exposed infants received EID before the age of 6 weeks in Kenya in 2012 while only 21% of children living with HIV were receiving antiretroviral therapy in Kenya in 2010. Nairobi province has the second highest HIV prevalence (8.2%) particularly in Babadogo (15%) and Kariobangi (9.4%) slums. The general objective of the study was to establish the determinants of early infant diagnosis and treatment of HIV exposed and infected infants in Babadogo and Kariobangi slums in Nairobi County. The specific objectives of the study were to determine the mother’s knowledge and practices on Prevention of Mother to Child Transmission of HIV, to identify the determinants of early infant diagnosis of HIV in exposed infants and to establish the determinants of timely treatment initiation for HIV infected infants in Babadogo and Kariobangi slums. Permission to carry out the research was sought from Kenyatta University Ethical Review Committee, the Ministry of Education Science and Technology and the Nairobi City Council. Informed consent was sought from the respondents after they had been informed about the objectives of the study. A descriptive cross-sectional design was used in this study. Semi-structured interview schedule, focus group discussion guide and a key informant interview schedule were the instruments of data collection. These tools were pre-tested among HIV positive mothers with infants in Dandora Health Centre. Quantitative data was analyzed using the Statistical Package for Social Scientists (SPSS) version 20. Hypothesis testing was done using chi-square and Fisher’s exact test and significance established at p<0.05. Multiple logistic regression was used to identify the independent predictors of EID at 6 weeks. The study findings indicated an average level of knowledge on PMTCT (53.8%) among the respondents. The main determinants of EID at 6 weeks were maternal knowledge on PMTCT ($\chi^2=52.981, df=2, P=0.000$), maternal practices on PMTCT such as the type of PMTCT intervention received during pregnancy ($\chi^2=29.478, df=2, P=0.000$) and the place of delivery ($\chi^2=33.793, df=2, P=0.000$). The main predictors of EID at 6 weeks were delivering in a health facility (public or private) (OR=0.171; 0.065-0.451; p=0.000) and receiving psychosocial support (OR=0.173; 0.075-0.398; p=0.000). The Fischer’s exact test showed no statistical association between the independent variables and timely treatment initiation. The study concluded that level of knowledge on PMTCT and in particular EID among the study population was low and recommends integration of PMTCT and pediatric HIV care and treatment services into the MNCH setting as well as establishment of effective linkages and referral mechanisms between PMTCT and treatment services.
CHAPTER ONE: INTRODUCTION

1.1 Background to the study

Studies indicate that by the end of 2010, an estimated 34 million people were living with HIV worldwide. There were approximately 2.7 million new HIV infections in 2010, including an estimated 390,000 among children younger than 15 years of age, mainly through Mother-to-Child Transmission (MTCT) (UNAIDS, 2011). HIV can be transmitted from a mother to her child during pregnancy, labour and delivery and postnatally through breastfeeding. Almost all infections in infants can be avoided by timely delivery of known, effective interventions to prevent MTCT. Current guidelines require that all infants who are exposed to HIV should be tested, even if their mothers received antiretroviral drugs (ARVs) for Prevention of Mother to Child Transmission of HIV (PMTCT) (WHO/NASCOP, 2011).

Evidence has shown that HIV infection follows a more aggressive course among infants and children than among adults. Without access to life-saving drugs, including antiretroviral therapy and preventive interventions such as cotrimoxazole prophylaxis, about one-third of infants die in their first year, and 50% by their second year (Newel et al., 2004). Pediatric HIV infection is a growing health challenge worldwide, with an estimated 1,500 new infections every day. In developed countries, well established prevention programs keep MTCT rates at less than 2%. However, in developing countries, where transmission rates are 25-40%, interventions are available to only 5-10% of women.
Children with untreated natural infection progress rapidly to disease, especially in resource-poor settings where mortality is greater than 50% by 2 years of age. As in adult infection, antiretroviral therapy has the potential to rewrite the natural history of HIV, but is accessible only to a small number of children needing therapy (Prendergast et al., 2007)

Every year, large numbers of children become infected with HIV before they are born, at delivery or when breastfeeding. Many children born to women with HIV are not being systematically monitored, and some children are identified as infected with HIV only when they become very sick (MOH, 2012). For infants with HIV, starting treatment within the first 12 weeks of life can reduce their chance of dying by three quarters. Conversely, waiting to start treatment after the age of 12 weeks may mean that a child’s immune system is already severely compromised (WHO, 2010).

1.2 Statement of the problem

Kenya is home to one of the world’s most severe HIV and AIDS epidemics. An estimated 1.5 million people are living with HIV in a country with a total population of 38,765,000 and an HIV prevalence rate of 6.3% (NASCOP, 2010). Nairobi province has the second highest HIV prevalence rate (8.2%) in the country, particularly in the slums. The HIV prevalence among women attending ANC in Babadogo and Kariobangi health centers, which serve the surrounding slum population, is 15% and 9.4% respectively (NASCOP, 2011). Although Early Infant Diagnosis (EID) and treatment for HIV exposed infants is readily available and provided free of charge in public health facilities, only 64% of HIV exposed infants had EID done before the age of 2 months in
Kenya in 2010 (WHO/UNICEF/UNAIDS, 2011). In 2010, the Percentage of children living with HIV receiving antiretroviral therapy in Kenya was only 21% (WHO/UNAIDS/UNICEF, 2011).

Due to factors such as stigma and discrimination, low levels of knowledge and poverty, Children often present late to HIV programs in resource-limited settings such as Babadogo and Kariobangi slums in Nairobi (Boender et al., 2012).

Early initiation of treatment significantly reduces AIDS-related mortality in infants and young children, highlighting the urgent need to expand access to virological testing for infants and prompt initiation of treatment. When ART is administered as early as possible in the course of infection, it can help children living with HIV lead longer, healthier lives (WHO/UNAIDS/UNICEF, 2011). Sadly, most children in need of ART in Kenya still do not have access to it. The changing of guidelines on when to start ART in an HIV infected infant may also contribute to inconsistency in practice. To date there is very little scientific data on the determinants of and level of adherence to pediatric HIV diagnosis and treatment of HIV exposed infants in Nairobi.

1.3 Justification of the study

Without treatment, an infant infected with HIV in Africa has a 35 percent chance of dying by the first birthday and a 53 percent chance of dying second birthday (Newell et al., 2004, Prendergast et al., 2007). In addition, Early HIV diagnosis and early antiretroviral therapy reduces early infant mortality by 76% and HIV progression by 75% (Violari et al., 2008). Although HIV care and treatment services for children exposed to and living with HIV are expanding in resource-limited settings, they are still
inadequate. There is still a major gap in coverage of antiretroviral therapy between children and adults. Of the 2.02 million children estimated to need antiretroviral therapy worldwide in 2010, only 23% had access versus 51% adults (WHO/UNAIDS/UNICEF, 2011).

The study aimed at identifying key issues on EID and treatment of HIV exposed and infected infants which will go a long way in supporting the implementation of national strategies on EID and treatment of HIV exposed infants. The findings of this study will be useful in addressing the priority area of scaling up EID and treatment of HIV exposed and infected infants. It will also be important in those regions of Kenya where HIV currently accounts for a significant proportion of child mortality and where the AIDS epidemic is impeding progress in reducing child mortality, in order to achieve Millennium Development Goal number four (MOH, 2011).

1.4 Research questions

1. What is the mother’s knowledge level and practices on Prevention of Mother to Child transmission of HIV?

2. What are the determinants of early infant diagnosis at 6 weeks in HIV exposed infants?

3. What are the determinants of timely treatment initiation for HIV infected infants?
1.5 Hypotheses

1.5.1 The null hypothesis of the study

The study was guided by the following null hypotheses

Ho: There is no relationship between the mother’s knowledge level and practices, infant’s characteristics and service delivery determinants and early infant diagnosis of HIV exposed infants at 6 weeks.

Ho: There is no relationship between the mother’s knowledge and practices, infant’s characteristics and service delivery determinants and timely treatment initiation among HIV infected infants.

1.6 Research objectives

1.6.1 General objective

To identify the determinants of early infant diagnosis and treatment of HIV exposed and infected infants in Babadogo and Kariobangi slums in Nairobi County.

1.6.2 Specific objectives

1. To determine the mother’s knowledge level and practices on Prevention of Mother to Child transmission of HIV.

2. To identify the determinants of early infant diagnosis at 6 weeks in HIV exposed infants.
3. To identify the determinants of timely treatment initiation for HIV infected infants.

1.7 Significance of the study
The findings of this study will offer significant contribution particularly in the design of programmatic interventions aimed at addressing barriers to, and scaling up EID and treatment.

1.8 Assumptions of the study
This study had assumed that mothers of HIV exposed infants were available, would accept to participate in the study and provide truthful information.

1.9 Delimitation and limitation of the study

1.9.1 Delimitation
The study involved HIV positive mothers with infants aged 6 to 18 months residing in the slums surrounding Babadogo and Kariobangi health centres in Nairobi County.

1.9.2 Limitation
The study used a sample drawn from mother infant pairs attending health care facilities for services such as immunization, growth monitoring, nutrition and sick child clinics as well as paediatric CCCs, excluding mother infant pairs who do not utilize these services.
1.10 Conceptual framework

The conceptual framework below identifies the service delivery factors, mother characteristics; infant characteristics and socio-economic and cultural determinants of adherence to EID and treatment of HIV exposed infants.
Figure 1.1: Conceptual framework

**SERVICE DELIVERY FACTORS**
- Waiting time
- Health care worker training
- Availability of EID and treatment guidelines
- Drug and commodity supply
- Infrastructure
- Referrals from perinatal care
- Integration of PMTCT services into MNCH settings

**MOTHER CHARACTERISTICS**
- Knowledge and practices on PMTCT

**INFANT CHARACTERISTICS**
- Age, sex
- Immunization status
- Nutrition status
- Other illnesses

**SOCIO-ECONOMIC AND CULTURAL FACTORS**
- Age, sex, educational level and employment status of mother
- Social support for the mother
- Fear and Stigma

**ACCESSIBILITY TO SERVICES**

Source: adopted and modified from Weiser et al., 2003
CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

This chapter deals with the literature associated with early infant diagnosis and treatment of HIV among HIV exposed and infected infants. The chapter also addresses the current knowledge gaps in the area of early infant HIV diagnosis and treatment for HIV exposed and infected infants.

2.1 Prevention of mother to child transmission of HIV

Mother-to-child transmission of HIV (MTCT) is the transmission of HIV from an infected mother to her baby during pregnancy, labour and delivery and breastfeeding. It is also known as “vertical transmission” or “perinatal transmission”. Over 90% of pediatric HIV is acquired through MTCT. Prevention of Mother to Child Transmission (PMTCT) is common term used for programmes, services and interventions whose goal is to reduce the risk of MTCT. PMTCT services include HIV testing and counseling (HTC) during ANC, labour and delivery and postpartum, provision of ARV drugs to mother and infant, safer delivery practices, safe infant feeding information, counseling and support, treatment or appropriate referrals to comprehensive treatment, care and social support for mothers and families (NASCOP, 2011).

2.2 A Global perspective on early infant diagnosis and treatment of HIV

The proportion of women living with HIV has stabilized at 50% globally (UNAIDS, 2011). In 2010, around 390,000 children were infected with HIV and only 28% of infants were reported to have been tested for HIV within the first two months of birth.
In addition, only 23% of HIV exposed infants received cotrimoxazole prophylaxis while the coverage of ART among children was 23% in 2010. In most of the 22 priority countries for eliminating MTCT, less than 50% of the estimated number of pregnant women eligible for antiretroviral therapy received it in 2010 (UNAIDS2011).

2.3 A sub Saharan African perspective on early infant diagnosis and treatment of HIV

In 2010, an estimated 68% of all people living with HIV resided in sub-Saharan Africa, a region with only 12% of the global population. The region continued to account for 70% of all new HIV infections globally (UNAIDS, 2011). While the proportion of women living with HIV has remained stable at 50% globally, women are more affected in sub-Saharan Africa accounting for 59% of all people living with HIV (UNAIDS, 2011).

The sub Saharan Africa region has the highest number of pregnant women living with HIV, the estimated number of pregnant women living with HIV was 1,360,000 in 2010 (UNAIDS, 2011). Evidence shows that the prevalence of HIV infection among young women in sub-Saharan Africa is disproportionately higher than among young men. This high number of pregnant women living with HIV contributes to the high number of HIV exposed and infected children in the region. In 2010, the reported number of children 0-14 years receiving ART was 387,500 (21%) of the 840,000 children estimated to be in need of ART in sub Saharan Africa (UNAIDS, 2011).
2.4 A Kenyan perspective on early infant diagnosis and treatment of HIV

Kenya is home to one of the world's harshest HIV and AIDS epidemics. An estimated 1.5 million people are living with HIV while 1.2 million children have been orphaned by AIDS (NACC/NASCOP, 2010). The Kenya AIDS Indicators Survey (2007) estimated the average HIV prevalence among the general population aged 15-49 years at 7.4 percent while the Kenya Demographic and Health Survey (KDHS, 2008/9) estimated prevalence for the same population at 6.3 percent (NACC, 2010). Kenya is one of the Sub Saharan African countries reporting a high prevalence of HIV/AIDS, estimated at 6.3% in adults aged 15 – 49 years (KDHS, 2008/9), with a higher prevalence in females, 8.0%, almost double that of men, 4.3%. Kenya is also one of the 22 countries which account for nearly 90% of pregnant women with HIV with an estimated 70,000 to 100,000 women living with HIV becoming pregnant in 2010 (NASCOP, 2011) and therefore remains one of the countries contributing high numbers of children living with HIV globally (UNAIDS, 2011). The high incidence of pediatric infection contributes directly to infant and young child mortality, complicates child malnutrition, and requires lifelong and expensive treatment (NACC/NASCOP, 2010).

Whilst many people in Kenya are still not being accessed with HIV prevention and treatment services, access to treatment is increasing and more than half of adults who need treatment are actually receiving it. In comparison, the number of children in need of ART that are receiving it is extremely low. An estimated 170,000 children are eligible to receive treatment, yet only around 21% have access to it (WHO/UNAIDS/UNICEF, 2011). This can be attributed to low coverage of EID and
demonstrates that Kenya has a long way to go in providing universal access to HIV treatment, prevention and care to infants and children (MOH, 2010).

Some of the challenges in scaling up quality PMTCT services include low utilization of ANC services, with about 47% (KDHS, 2008/9) of pregnant women making at least four antenatal clinic visits; only 43 per cent giving birth at a health facility; inefficacious regimes for PMTCT (about 33 per cent of HIV-positive pregnant mothers are treated with Nevirapine only); lack of integration of PMTCT services with Reproductive Health and Family Planning (RH/FP) services, and lack of integration of early infant diagnosis in MCH continuum, resulting in missed opportunities for pediatric treatment (MOH, 2010).

The linkage of HIV infected children to care and treatment remains weak resulting in the high rate of loss to follow-up among HIV-exposed infants in the postnatal period (MOH, 2010). In addition, many infants, even when tested, do not receive their results or are not given antiretroviral therapy following an HIV-positive diagnosis (Amin et al., 2012).

2.5 National guidelines for early infant diagnosis and treatment in Kenya

The National AIDS and STI Control Programme (NASCOP) recommends that all HIV-exposed infants should be offered routine HIVDNA PCR testing at the 6 weeks visit or at the earliest opportunity for infants seen after 6 weeks of age. Furthermore, all children aged less than 18 months, confirmed HIV-infected; should be put on ART
regardless of CD4 cell count, CD4 percentage or who attain WHO clinical stage within 2 to 4 weeks after diagnosis (NASCOP, 2011).

2.6 Early infant diagnosis and treatment of HIV

Worldwide, over 2 million children are infected with HIV, 90% of whom live in sub-Saharan Africa (UNAIDS2011). Many HIV-infected infants and children die from HIV related causes without their HIV status being known or receiving HIV care. The goal of early infant diagnosis (EID) is to identify HIV infected infants prior to the development of clinical disease to facilitate treatment and follow up. For infants who are virologically negative, it provides an opportunity to plan and counsel on appropriate feeding to reduce the risk of infection whilst maintaining adequate nutrition. Data from studies in resource-limited settings confirm that, for infants who acquire HIV before or around delivery, disease progression occurs very rapidly in the first few months of life, often leading to death. In recent studies in South Africa, up to 80% of infected infants, who were well at 6 weeks, progressed to become eligible to start ART by 6 – 12 months of age.

Early determination of HIV exposure and definitive diagnosis is critical to allow early initiation of potentially lifesaving ART (WHO, 2010). HIV serological testing (antibody testing) can diagnose infection in adults and children more than 18 months of age. Because of the passage of maternal HIV antibodies across the placenta to the baby, a positive HIV serological test in infancy does not confirm HIV infection in the infant, but does indicate maternal HIV infection and exposure of the infant. HIV serological
tests used for clinical diagnostic testing should have a minimum sensitivity of 99% and specificity of 98%, under standardized and validated laboratory conditions (WHO, 2010). In order to diagnose HIV infection definitively in infants less than 18 months of age, assays that detect the virus or its components (i.e. virological tests) are required.

Virological tests that can be used in infants and children include assays to detect HIV DNA, assays to detect HIV RNA, and ultrasensitive assays to detect p24 antigen (Up24 Ag) (WHO, 2010). HIV virological assays used for the purpose of clinical diagnostic testing should have a sensitivity of at least 95% and a specificity of 98% or more under quality-assured, standardized and validated laboratory conditions (WHO, 2010). All children aged less than 18 months, confirmed HIV-infected should be put on ART regardless of CD4 cell count, CD4 percentage or WHO clinical stage (NASCOP, 2011).

2.7 Determinants of adherence to EID and treatment in HIV exposed and infected infants

2.7.1 Maternal determinants

Maternal knowledge and practices on HIV in general and MTCT specifically are a very important determinant of adherence to EID and treatment of HIV among HIV exposed infants. Studies on knowledge regarding PMTCT of HIV among infected mothers in Kenya have found that while many infected women were knowledgeable about breastfeeding as a means through which MTCT of HIV could occur, only about half knew of the risks during pregnancy and delivery. This has been attributed to a lack of a well-established HIV prevention counseling particularly in regard to reproductive
health. The lack of knowledge on EID and unawareness of HIV symptoms among mothers and caregivers has been attributed to late enrollment into pediatric HIV programs in resource limited settings (Boender et al., 2012; Aminet al., 2012).

Maternal loss to follow up and younger maternal age are also important determinants of adherence to EID and pediatric HIV treatment. A study conducted in rural Kenya showed that out of the 68% of the infants enrolled into EID after 2 months of age 65% dropped out before follow up to the 18th month and 43% of the dropouts occurred within 2 months of enrolment. Maternal factors associated with infant drop out were maternal loss to follow up and younger maternal age (Aminet al., 2012).

2.7.2 Socio-economic and cultural factors

The social and cultural environment is a significant determinant of health seeking behavior. In the context of HIV, fear and stigma have been noted as important barriers to utilization of EID and pediatric HIV treatment (Boender et al., 2012). Poverty, unemployment and lack of social support have also been identified as major challenges in accessing EID and HIV treatment services for HIV exposed infants (Aminet al., 2012).

2.7.3 Infant characteristics

Infant characteristics such as age and perinatal HIV prophylaxis have been found to be important determinants of adherence to EID and HIV treatment. A study aimed at assessing factors related to the timing of treatment initiation among HIV infected
children in Uganda concluded that 72% of children initiating first line regimens presented late. Risk factors for late presentation were age below two years and lack of perinatal HIV prophylaxis (Boender et al., 2012). The general health of the infant is also an important determinant of adherence to EID and HIV treatment in HIV exposed infants. Parents of healthy children do not often see the need to have them tested.

2.7.4 Service delivery factors

The delivery of EID and HIV treatment services to HIV exposed infants is a key determinant of adherence to EID and HIV treatment. While optimum service delivery will ensure good access to and utilization of services, poor service delivery will lead to inaccessibility of services and consequently poor adherence to EID and HIV treatment among HIV exposed infants. The lack of integration of EID and pediatric HIV treatment services into MNCH settings has been a great hindrance to adherence to EID and pediatric HIV treatment (Cherutich et al., 2008, MOH, 2010). Due to lack of integration of EID and pediatric HIV treatment services into MNCH settings, there have been inconsistent referral from perinatal care to postnatal care. This has been a great barrier to the provision of EID and pediatric HIV treatment services. In order to ensure good quality services, service providers need to be trained and be knowledgeable on EID and treatment of HIV in HIV exposed infants. A study conducted in rural Kenya concluded that majority of the EID service providers had inadequate training, knowledge and understanding of EID (Amin et al., 2012). The availability of EID and HIV treatment services as well as consistent supply of drugs will ensure good access to and utilization
of services. When mothers know that medicine and services are available for their infants if they test positive for HIV, they are more likely to have their children tested. Timely delivery of results is also necessary to ensure clients return to the health facility after testing.
CHAPTER THREE: MATERIALS AND METHODS

3.1 Introduction

This chapter describes the research methodology and instruments that were used to conduct the research study.

3.2 Research design

A descriptive cross-sectional design was used to determine the level of adherence to EID and treatment of HIV exposed and infected infants and to examine the relationship between adherence to EID and treatment of HIV and the various factors which may influence it. This study design was chosen because it enables one to observe, describe and document aspects of a situation as it naturally occurs in a given population, which is the main aim of this study.

3.3 Variables

3.3.1 Independent variables

The independent variables in this study include socio-demographic, socio-economic and socio-cultural characteristics of the mother/caregiver such as age, gender and marital status, level of education, ethnicity, employment, current income and religion. Other independent variables of the study were maternal knowledge and practices on PMTCT, infant characteristics such as age, sex, general health, immunization and nutritional status and health care service factors such as health care worker training, availability,
affordability, accessibility, acceptability and utilization of EID and treatment of HIV services.

3.3.2 Dependent variables

The dependent variables of the study were adherence to Early Infant Diagnosis (EID) and treatment of HIV in HIV exposed children. Early infant diagnosis of HIV is defined as Virological testing of HIV at 6 weeks of age for infants known to be exposed to HIV or serological testing of HIV in infants with unknown exposure status. The other dependent variable is treatment of HIV infected infants which was measured and compared to national guidelines on treatment initiation for HIV infected infants which stipulate that all children aged less than 18 months, confirmed HIV-infected; should be initiated on ART regardless of CD4 cell count, CD4 percentage or WHO clinical stage immediately (within 2 to 4 weeks after diagnosis (WHO, 2010, NASCOP, 2011).

3.4 Location of study

3.4.1 Babadogo and Kariobangi Locations in Nairobi County

Nairobi is the capital city of Kenya and is situated at an elevation of about 1660 m (about 5450 ft.) in the highlands of the southern part of the country. Nairobi is Kenya's principal economic, administrative, and cultural center and is one of the largest and fastest growing cities in Africa. Babadogo and Kariobangi are residential estates located 15 km north east of Nairobi city in Kasarani district. They comprise of both apartments and slum-type dwellings. Kariobangi has slum type dwelling and is made up
of nine villages which are split into two parts, Kariobangi North and Kariobangi south. The study was done in Babadogo and Kariobangi North Health Centres whose catchment population includes the Korogocho slum which houses some 120,000 dwellers crammed within one single square kilometer consisting of 7 villages.

3.4.2 Justification on choice of study area

Nairobi County, formerly Nairobi province, has the second highest prevalence of HIV in Kenya which stands at 8.2% among mothers attending antenatal care clinics (NASCOP, 2010). The study was carried out in Babadogo and Kariobangi slums of Nairobi County which have among the highest prevalence of HIV among women attending antenatal clinics centers (15% for Babadogo and 9.4% for Kariobangi health centres) (NASCOP, 2010).

3.5 Study population

The study targeted HIV positive mothers with infants attending the child welfare clinics (CWC), sick child clinic, nutrition clinic and pediatric comprehensive care clinics (CCC) in Babadogo and Kariobangi North health centres. Health care professionals involved in the provision of EID and pediatric HIV treatment were also targeted in the study.
3.5.1 Inclusion criteria

HIV positive mothers with infants aged 6 to 18 months attending the child welfare clinics (CWC), sick child clinic, nutrition clinic and pediatric comprehensive care clinics (CCC) in Babadogo and Kariobangi North health centres and residing in the slums of Babadogo and Kariobangi.

3.5.2 Exclusion criteria

HIV positive mothers with infants aged 6 to 18 months attending the child welfare clinics (CWC), sick child clinic, nutrition clinic and pediatric comprehensive care clinics (CCC) in Babadogo and Kariobangi North health centres that do not reside in the slums of Babadogo and Kariobangi or were too ill to participate in the study.

3.6 Sampling techniques and sample size determination

3.6.1 Sampling technique

Multistage sampling approach was adopted for this study. First, purposive sampling of the study area was done due to the high prevalence rate of HIV among women attending ANC clinic in Babadogo (15%) and Kariobangi (9.4%) health centres. Secondly, simple random sampling of participants was used whereby all eligible participants coming to the health centres on a particular field day were assigned numbers and participants chosen randomly to participate in the interview.
3.6.2 Sample size determination

The desired sample size was determined using a formula by Fisher *et al.* (1998) for a population of less than 10,000 as shown below:

\[ N = Z^2 pqD/d^2 \]

Where: \( N \) is the desired sample size.

\( Z \) standard normal deviation 1.96, which corresponds to 95% confidence level.

\( p \) is the proportion of the target population estimated to have the desired characteristics (corresponds to 15% and 9.4% which is the prevalence of HIV infection among women attending ANC in Babadogo and Kariobangi health centres respectively (NASCOP, 2010).

\( q = 1.0 - p \)

\( D \) degrees of freedom, 0.05

\( d \) design effect=1

\[ (1.96)^2 * 0.15 * 0.85/0.05^2 + (1.96)^2 * 0.094 * 0.906/0.05^2 \]

=195+130=325

\( nf = n/l + (n/N) \)
nf = (195/1 + 195/2432) + (130/1 + 130/2231)

nf = \approx 133 + 105

= 238 respondents.

3.7 Pre-test of research instruments

The data collection tool was pre-tested with HIV positive mothers with infants aged 6 to 18 months in Dandora Health Centre which had similar characteristics to the facilities of interest and within Nairobi County to ensure that the tools collected the intended information (validity) and that they consistently measured the variables in the study (reliability).

3.7.1 Validity

Validity of the data collection instruments was established through the pre-test of the research instruments to check the instrument's ability to collect the required information on the various study variables.

3.7.2 Reliability

The reliability of the data collection instrument was established through the pre-test of the research instruments by checking the consistency of the responses given by respondents.
3.8 Data collection techniques

Data was collected using interviewer-administered interview schedules after the respondents had given consent to be interviewed. Four (4) focused group discussions were also conducted with HIV positive mothers with infants during their support group meetings. Key informant interviews with professionals, clinical officers and nurses, involved in the provision of EID and pediatric HIV treatment services were also conducted.

3.9 Logistical and ethical considerations

Permission to carry out the research was sought from the Graduate School, Kenyatta University. Ethical clearance was obtained from the Kenyatta University Ethics Review Committee. A permit to carry out the research was also obtained from the National Council for Science and Technology (NCST) of the Ministry of Higher Education, Science and Technology and the Nairobi City Council. Informed consent was sought from the respondents after they had been informed about the study. Confidentiality and anonymity of the information and respondents was assured through use of codes that were given to respondents. All interviews were conducted in privacy in a tent that was situated a distance from the clinic with no other people present.

3.10 Data analysis

Data cleaning was done simultaneously during data collection. At the end of every field day, data was checked for completeness and entered into Statistical Package for Social
Scientists (SPSS) version 20. Data from focus group discussions and key informant interviews was transcribed at the end of each field day and analyzed by content analysis. Quantitative data was analyzed using the Statistical Package for Social Scientists (SPSS) version 20. Hypothesis testing was done using chi-square test and Fisher's exact test and significance established at p<0.05. Multiple logistic regression was used to identify independent predictors of EID at 6 weeks.
CHAPTER FOUR: RESULTS

4.0 Introduction

This section presents the results obtained for the variables of the study from the tools that were employed to collect both quantitative and qualitative data. Quantitative data was collected using a semi-structured interview schedule while qualitative data was collected using focus group discussion and key informant interview schedules. The chapter also presents discussions of the findings in relation to similar studies that have been done and thus attempts to explain results where they may have differed with literature.

4.1 Results

4.1.1 Socio-demographic characteristics of the respondents

A total of 238 mother-infant pairs participated in this study, 133 (55.90%) were from Babadogo and 105 (44.10%) were from Kariobangi. All respondents were biological mothers of the infants.

4.1.1.2 Participants distribution by age of the mother

Figure 4.1 shows that 129 (54.20%) of the respondents were mothers aged between 21-30 years, 31-40 years were 28.6%, 20 years and below were 15% while those above 40 years were 2.10.
Figure 4.1: Distribution of respondents by age

4.1.1.2 Distribution of respondents by education level

The results show that 71.40% of the respondents had only primary school education, 18.90% had secondary education, 5% had tertiary level education while 4.6% had no formal education at all.
Figure 4.2: Distribution of respondents by highest level of education

4.1.1.3 Distribution of the respondents based on the marital status

Figure 4.3 indicates that 67.60% of the respondents were married, 17.6% were separated or divorced, 12.6% were single and 2.1% were widowed.
Distribution of respondents by marital status (n=238)

Figure 4.3: Distribution of respondents by marital status

4.1.1.4 Distribution of respondents by monthly household income

The results show that 71.40% of the respondents had an average household monthly income of below Kshs 2000, 16.4% took home between Kshs 2001-5000, 9.2% reported an average monthly household Kshs 5001-10000 while 2.9% reported earning more than Kshs. 10, 000.
Figure 4.4: Distribution of respondents by monthly household income

4.1.2 Mother’s knowledge on prevention of mother to child transmission of HIV (PMTCT)

4.1.2.1 Determination of PMTCT knowledge index

To determine the level of maternal knowledge on PMTCT of HIV fifteen (15) questions were. A response was considered valid if it provided the correct answer, that is, ‘YES’. One point was given for every valid response and zero for invalid response. Respondents overall knowledge on PMTCT of HIV was rated on scale of 0-15 point scale, where 0-4 points was low knowledge, 5-9 points was average knowledge, and 10-15 points was high knowledge. The general knowledge of the population was taken by the number who provided valid responses for all the 15 questions. The findings are summarized in figure 4.5. The figure indicates that 53.8% of mothers with infants aged
6 to 18 months attending clinics had a low level knowledge on PMTCT, 40.30% average knowledge while 5.90% had a high level knowledge.

![Graph showing the level of maternal knowledge on MTCT](image)

**Figure 4.5: Graph showing the level of knowledge of respondents**

### 4.1.2.2 Mother’s knowledge on Early Infant Diagnosis

When asked if they understood the importance of EID, 68.10% of the respondents indicated that it was to know their child’s HIV status, 22.70% did not see any importance in having their child tested for HIV, 8.40% were of the idea that it was to identify HIV infected infants while 0.80% indicated it was to prevent HIV infections in the child.
Figure 4.6: Importance of EID

4.1.2.3 Mother’s knowledge on treatment of HIV exposed infants

The results show that 81.10% were aware that HIV exposed infants required medications while 18.90% did not know of any medications required by HIV exposed infants. When asked to name the drugs required by an HIV exposed infants, 70.40% were able to name ARVs (Nevirapine) as one of the drugs required by HIV exposed infants, 48.80% named cotrimoxazole while 5% named other (figure 4.7).
Figure 4.7: Distribution of mother’s knowledge on specific drugs for HEI

However, when asked what the benefits of ARVs and Cotrimoxazole were, 51.30% were aware of the benefits of ARVs while 75.60% were not aware of the benefits of Cotrimoxazole.

4.1.3 Mother’s practices on prevention of mother to child transmission of HIV (PMTCT)

4.1.3.1 Distribution of respondents based on the time since last HIV diagnosis

The results indicate that slightly over a third (39.90%) of the respondents had been diagnosed the last 12 to 24 months before the study, 37.4% over the last 24 months, 16.80% in the last 6-12 while 5.90% of the respondents had been diagnosed within the last six months before the study.
Distribution of respondents based on time since last HIV diagnosis (n=238)

<table>
<thead>
<tr>
<th>Time Since Last HIV Diagnosis</th>
<th>Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 6 months</td>
<td>5.90%</td>
</tr>
<tr>
<td>6-12 months</td>
<td>16.80%</td>
</tr>
<tr>
<td>12-24 months</td>
<td>39.90%</td>
</tr>
<tr>
<td>&gt;24 months</td>
<td>37.40%</td>
</tr>
</tbody>
</table>

Figure 4.8: Distribution of respondents based on duration since HIV diagnosis

4.1.3.2 Distribution of respondents based on reasons for HIV diagnosis

When asked why they had taken an HIV testing the first place 68.5% of the respondents reported that they had been diagnosed with HIV during a routine test during pregnancy, 19.7% were tested when feeling sick and unwell while only 9.6% were tested on voluntary basis (table 4.1).
Table 4.1: Summary of how HIV diagnosis was made

<table>
<thead>
<tr>
<th>What prompted HIV testing (n=238)</th>
<th>Frequency</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>During pregnancy (PMTCT)</td>
<td>163</td>
<td>68.5%</td>
</tr>
<tr>
<td>Sick or feeling unwell</td>
<td>47</td>
<td>19.7%</td>
</tr>
<tr>
<td>Voluntary Counseling and Testing</td>
<td>23</td>
<td>9.6%</td>
</tr>
<tr>
<td>Home based HIV testing and Counseling</td>
<td>2</td>
<td>0.8%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>238</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

4.1.3.3 Antenatal care clinic attendance

Majority of the respondents, 93.40%, reported attending at least one ANC during which 97% of them were tested for HIV.

4.1.3.4 Intervention received for PMTCT during pregnancy

When the respondents were asked whether they received any intervention after diagnosis 38.70% of them reported that they had received ARV prophylaxis for PMTCT during their pregnancy, 37.40% received ART while 23.90% received no intervention at all (figure 4.9)
4.1.3.5 Place of delivery

Figure 4.10 shows that 73.50% of the respondents reported having delivered in a health facility with the help of skilled birth attendants while 26.50% of the respondents had home deliveries (figure 4.10).
### 4.1.4 Child characteristics

**Table 4.2: Summary of child characteristics**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Category</th>
<th>Observation</th>
<th>frequency</th>
<th>proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (months)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6-9</td>
<td>103</td>
<td>43.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9-12</td>
<td>46</td>
<td>19.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12-18</td>
<td>89</td>
<td>37.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>total</td>
<td>238</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
<td>122</td>
<td>51.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>116</td>
<td>48.7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>total</td>
<td>238</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Nutritional Status</td>
<td>No malnutrition</td>
<td>190</td>
<td>79.8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Moderate Acute Malnutrition</td>
<td>39</td>
<td>16.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Severe Acute Malnutrition</td>
<td>9</td>
<td>3.8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>total</td>
<td>238</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Immunization status</td>
<td>Up to date</td>
<td>206</td>
<td>86.6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Missing</td>
<td>32</td>
<td>13.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Not immunized</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>total</td>
<td>238</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>ARV Prophylaxis initiation</td>
<td>Yes</td>
<td>168</td>
<td>66.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>80</td>
<td>33.6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>total</td>
<td>138</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Cotrimoxazole initiation at 6 weeks</td>
<td>Yes</td>
<td>114</td>
<td>47.9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>124</td>
<td>52.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>total</td>
<td>238</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>
Table 4.2 shows that 43.30% of respondents reported that their child was aged between 6 to 9 months while those aged between 9 to 12 months were 19.3% and 51.30% were males while 48.30% were female. It is also indicated that 79.80% of the infants in the study were of normal weight and height for their age while 16.40% and 3.80% of infants had moderate and severe malnutrition at respectively. The study further established that 86.60% of infants were immunized while 13.4% had missing vaccinations. In addition, the respondents were asked whether their child had been initiated on ARV prophylaxis at birth. Two thirds (66.40%) of the respondents reported that their child had been initiated on ARV prophylaxis at birth while 33.60% were not initiated on ARV prophylaxis at birth. When asked whether the child had been initiated on CPT at 6 weeks as per the requirements for HIV exposed infants, slightly over half (52.10%) of the respondents reported that their child had not been initiated on CPT at 6 weeks as per requirements while 47.90% of infants were initiated on CPT at 6 weeks (See also table 4.2 above).

4.1.5 Determinants of EID among HIV exposed infants

4.1.5.1 Level of adherence to EID

The participants were asked if their child had been tested for HIV by DBS at 6 weeks of age and the answer to this question was confirmed from the mother-child booklet and clinic records. The results show that 56.7% of the infants had been tested for HIV by DBS at the 6th week of age while 43.3% had not been tested.
Figure 4.11: Early infant diagnosis at 6 weeks

4.1.6 Determinants of EID

4.1.6.1 Socio demographic characteristics of HIV positive mothers as determinants of EID

Table 4.3 illustrates the uptake of EID among the different socio-demographic categories with a Chi-Square test of significance among the different categories of the socio-demographic characteristics. The table indicates that differences in of EID uptake at 6 weeks among infants across the mothers' age ($\chi^2=9.423, df=3, p=0.024$) and average monthly household income ($\chi^2=21.589, df=3, p=0.000$) categories were found to be statistically significant ($p<0.05$). However, adherence to EID was not significantly associated with the mother's level of education ($\chi^2=2.327, df=3, p=0.507$) and marital status ($\chi^2=5.819, df=3, p=0.121$)
Table 4.3: Socio-demographic characteristics as determinants of EID

<table>
<thead>
<tr>
<th>Socio-demographic characteristic</th>
<th>Infant tested at 6 weeks</th>
<th>Chi-square test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes Frequency</td>
<td>Proportion (%)</td>
</tr>
<tr>
<td><strong>Age (years)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;20</td>
<td>22</td>
<td>16.3</td>
</tr>
<tr>
<td>21-30</td>
<td>82</td>
<td>60.7</td>
</tr>
<tr>
<td>31-40</td>
<td>28</td>
<td>20.7</td>
</tr>
<tr>
<td>&gt;40</td>
<td>3</td>
<td>2.2</td>
</tr>
<tr>
<td><strong>Level of education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>none</td>
<td>5</td>
<td>3.7</td>
</tr>
<tr>
<td>Primary</td>
<td>96</td>
<td>71.1</td>
</tr>
<tr>
<td>Secondary</td>
<td>25</td>
<td>18.4</td>
</tr>
<tr>
<td>Tertiary</td>
<td>9</td>
<td>6.7</td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>single</td>
<td>13</td>
<td>9.6</td>
</tr>
<tr>
<td>married</td>
<td>97</td>
<td>71.9</td>
</tr>
<tr>
<td>Separated/divorced</td>
<td>24</td>
<td>17.8</td>
</tr>
<tr>
<td>widowed</td>
<td>1</td>
<td>0.7</td>
</tr>
<tr>
<td><strong>Household income</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;2000</td>
<td>81</td>
<td>60.0</td>
</tr>
<tr>
<td>2001-5000</td>
<td>30</td>
<td>22.2</td>
</tr>
<tr>
<td>5001-10000</td>
<td>18</td>
<td>13.3</td>
</tr>
<tr>
<td>&gt;10000</td>
<td>6</td>
<td>4.4</td>
</tr>
</tbody>
</table>

Table 4.3 further illustrates that infants whose households made less than Kshs. 2,000 per month were the least likely to have been tested at 6 weeks accounting for 84.6% of infants not tested at 6 weeks. This shows that there exists a very strong association between household income and adherence to EID at 6 weeks of age. It is therefore imperative for programs seeking to scale up adherence to EID to have an economic
stability component, such as Income Generating Activities (IGA) to boost the economic stability of affected households. This will go a long way in ensuring that lack of a steady household income does not become a competing priority for the needs of the HEI.

4.1.6.2 Mother’s knowledge and practices as determinants of EID at 6 weeks

Table 4.4: Mother’s knowledge and practices as determinants of adherence to EID at 6 weeks

<table>
<thead>
<tr>
<th>Mother’s knowledge and practices</th>
<th>Infant tested at 6 weeks</th>
<th>Chi square test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>Proportion</td>
</tr>
<tr>
<td></td>
<td>Frequency</td>
<td></td>
</tr>
<tr>
<td>Knowledge on PMTCT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low knowledge</td>
<td>46</td>
<td>34.1</td>
</tr>
<tr>
<td>Average knowledge</td>
<td>76</td>
<td>56.3</td>
</tr>
<tr>
<td>High knowledge</td>
<td>13</td>
<td>9.6</td>
</tr>
<tr>
<td>PMTCT intervention during pregnancy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARV prophylaxis</td>
<td>58</td>
<td>43.0</td>
</tr>
<tr>
<td>ART</td>
<td>62</td>
<td>45.9</td>
</tr>
<tr>
<td>No intervention</td>
<td>15</td>
<td>11.1</td>
</tr>
<tr>
<td>Place of delivery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public health facility</td>
<td>65</td>
<td>48.1</td>
</tr>
<tr>
<td>At home</td>
<td>18</td>
<td>13.3</td>
</tr>
<tr>
<td>Private facility</td>
<td>52</td>
<td>38.5</td>
</tr>
</tbody>
</table>
Table 4.4 indicates that maternal knowledge and practices on PMTCT and adherence to EID at 6 weeks is significant associated. All the factors of mothers’ knowledge and practices were significantly associated with EID at week 6 of age (p=0.000 for all PMTCT variables).

4.1.6.2.1 Mother’s knowledge on PMTCT

Mother’s knowledge on PMTCT was found to be strongly associated with adherence to EID at 6 weeks ($\chi^2=52.981$, df=2, p=0.000) (table 4.4). The results show the paramount importance of patient education throughout the continuum of care in PMTCT. It is crucial that all health care providers educate all HIV positive women on PMTCT during pregnancy, labour and delivery, post natal care and subsequent CWC visits.

4.1.6.2.2 Mother’s practices on PMTCT

Various practices such as the use of ARV prophylaxis or treatment of HIV positive mothers and skilled birth attendance during labour and delivery are known to prevent MTCT. The duration time before the date of the mothers’ HIV diagnosis and adherence to EID at 6 weeks significantly associated ($\chi^2=23.029$, df=3, p=0.000), with infants whose mothers had been diagnosed with HIV more than 24 months before the study more likely to have been tested at 6 weeks accounting for 45.90% of infants tested at 6 weeks.

The study also established that the type of PMTCT intervention received during pregnancy was strongly associated with adherence to EID at 6 weeks ($\chi^2=29.478$, df=2,
p=0.0000), with infants whose mothers did not receive any intervention being least likely to have been tested at 6 weeks accounting for 40.8% of infants not tested at 6 weeks. Infants whose mothers received ART were also more likely to be tested at 6 weeks, and they accounted for 45.90% of infants tested at 6 weeks. These results show that those mothers who had lived with HIV for more than 24 months or were already receiving ART were most likely to have their children tested at 6 weeks. This can be attributed to their having accepted their HIV diagnosis and having more knowledge on PMTCT and HIV in general.

The result also indicate that the place of delivery was strongly associated with adherence to EID at 6 weeks ($\chi^2=33.793$, df=2, p=0.000), with mothers who delivered at home being the least likely to have their infants tested at 6 weeks accounting for 43.70% of infants not tested at 6 weeks. Mothers who delivered in a public health facility were more likely to have their infants tested at 6 weeks accounting for 48.10% of infants tested at 6 weeks. This is most likely attributed to the fact that those mothers have more knowledge gained as a result of attending public health facilities which have staff dedicated to HIV positive mothers and HEI as opposed to those who deliver at home or in private health facilities.

4.1.6.3 Infants characteristics as determinants of adherence to EID at 6 weeks

The study also wished to establish whether infant characteristics had an effect on adherence to EID at 6 weeks. The findings are summarized in Table 4.5 below. The result shows that infant’s characteristics were associated with adherence to EID at 6
weeks (p=0.000). The age of the infant was a determinant of adherence to EID at 6 weeks ($\chi^2=20.896$, df=2, p=0.000), with infants in the youngest age group (6-9 months) being more likely to be tested at 6 weeks, accounting for 54.80% of infants tested at 6 weeks; the infant’s immunization status and adherence to EID were significantly associated ($\chi^2=26.630$, df=1, p=0.0000), with infants whose immunization was up to date being more likely to be tested at 6 weeks, accounting for 96.30% of infants tested at 6 weeks. This can be attributed to the fact that the first immunization visit coincides with the age of EID, 6 weeks, leading to most of the infants being tested during immunization visits. The result further shows that infant’s ARV initiation at birth and EID at 6 weeks were significantly associated ($\chi^2=29.062$, df=1, p=0.000) as well as CPT initiation at 6 weeks and adherence to EID at 6 weeks ($\chi^2=118.395$, df=1, p=0.000).
Table 4.5: Summary of infant’s characteristics as determinants of adherence to EID at 6 weeks

<table>
<thead>
<tr>
<th>Infant’s characteristic</th>
<th>Category</th>
<th>Infant tested at 6 weeks</th>
<th>Chi square test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Frequency</td>
<td>Proportion</td>
</tr>
<tr>
<td>Age (months)</td>
<td>6-9</td>
<td>74</td>
<td>54.8</td>
</tr>
<tr>
<td></td>
<td>9-12</td>
<td>26</td>
<td>19.3</td>
</tr>
<tr>
<td></td>
<td>12-18</td>
<td>39</td>
<td>29.4</td>
</tr>
<tr>
<td>Sex</td>
<td>Male</td>
<td>72</td>
<td>53.3</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>63</td>
<td>46.7</td>
</tr>
<tr>
<td>Immunization status</td>
<td>Up to date</td>
<td>130</td>
<td>96.3</td>
</tr>
<tr>
<td></td>
<td>Missing</td>
<td>5</td>
<td>3.7</td>
</tr>
<tr>
<td>ARV prophylaxis initiation</td>
<td>Yes</td>
<td>109</td>
<td>80.7</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>26</td>
<td>19.3</td>
</tr>
<tr>
<td>CPT initiation at 6weeks</td>
<td>Yes</td>
<td>104</td>
<td>77.0</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>31</td>
<td>23.0</td>
</tr>
</tbody>
</table>
4.1.6.4 Independent predictors of EID at 6 weeks

Multiple logistic regression was used to identify the independent predictors of EID at 6 weeks as shown in Table 4.6 below.

Table 4.6 Independent predictors of Early Infant Diagnosis at 6 weeks

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>OR(95% CI)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal PMTCT knowledge (ref=high level of knowledge)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low level of knowledge</td>
<td>8.088 (0.737-88.766)</td>
<td>0.087</td>
</tr>
<tr>
<td>Average level of knowledge</td>
<td>1.954 (0.183-20.883)</td>
<td>0.580</td>
</tr>
<tr>
<td>PMTCT intervention (ref=no intervention)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARV Prophylaxis</td>
<td>0.306 (0.113-0.830)</td>
<td>0.020</td>
</tr>
<tr>
<td>ART</td>
<td>0.284 (0.101-0.795)</td>
<td>0.017</td>
</tr>
<tr>
<td>Place of delivery (ref=private facility)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public health facility</td>
<td>0.171 (0.065-0.451)</td>
<td>0.000</td>
</tr>
<tr>
<td>Home</td>
<td>1.377 (0.528-3.592)</td>
<td>0.514</td>
</tr>
<tr>
<td>Infant age (ref=12-18 months)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-9 months</td>
<td>0.418 (0.174-1.004)</td>
<td>0.051</td>
</tr>
<tr>
<td>9-12 months</td>
<td>0.360 (0.127-1.019)</td>
<td>0.054</td>
</tr>
<tr>
<td>Receiving psychosocial support</td>
<td>0.173 (0.075-0.398)</td>
<td>0.000</td>
</tr>
</tbody>
</table>

The strongest independent predictors of EID at 6 weeks, according to table 4.6 above are delivering in a health facility (public or private) (OR=0.171; (0.065-0.451); p=0.000) and receiving psychosocial support (OR=0.173; (0.075-0.398); p=0.000).
Other independent predictors of EID at 6 weeks were high maternal knowledge on PMTCT (p=0.001) and the mother being on ART (OR=0.284 (0.101-0.795), p=0.017) and ARV prophylaxis (0.306 (0.113-0.830) p=0.020).

4.1.7 Treatment initiation for HIV positive infants

The study also sought to establish treatment initiation for HIV positive infants. To determine this, the mother of the child was asked if the child had been initiated on treatment immediately (within 2 to 4 weeks) as stipulated by the guidelines (NASCOP, 2011). The answer given was checked against CCC records for confirmation. The result show that 89.40% of the respondents reported that their child was not started on treatment immediately while 10.6% were started on treatment immediately (figure 4.12).

![Figure 4.12: Treatment initiation in HIV infected infants](image-url)

**Figure 4.12:** Treatment initiation in HIV infected infants
4.1.7.1 Determinants of timely treatment initiation

Timely treatment initiation is an important factor in HIV management in infants hence the necessity to determine factors influencing its uptake. Fischer’s exact test was used to test for association between the independent variables and timely treatment initiation among HIV infected infant. The result show that none of the independent variables (socio demographic characteristics, maternal knowledge and practices on PMTCT, infant characteristics or socio demographic characteristics) were found to be significantly associated with timely treatment initiation among HIV infected infants (Table 4.7).
Table 4.7 Determinants of timely treatment initiation among HIV infected infants.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Was the child started on ART immediately</th>
<th>Fischer’s Exact Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>frequency</td>
<td>Proportion</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;30</td>
<td>4</td>
<td>80.0</td>
</tr>
<tr>
<td>&gt;30</td>
<td>1</td>
<td>20.0</td>
</tr>
<tr>
<td>Income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;5000</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td>&gt;5000</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Knowledge on PMTCT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Below average</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td>Above average</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>PMTCT intervention</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>No intervention</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td>Place of delivery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health facility</td>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td>Home</td>
<td>4</td>
<td>80</td>
</tr>
<tr>
<td>EID at 6 weeks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EID done at 6 weeks</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>EID not done at 6 weeks</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td>Age of the child</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;9 months</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>&gt;9 months</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td>Support group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belongs to a support group</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Does not belong to a support group</td>
<td>5</td>
<td>100</td>
</tr>
</tbody>
</table>
4.1.8 Service delivery determinants of adherence to EID and treatment of HEI

4.1.8.1 Factors that promote adherence to EID and the treatment of HEI

From the FGDs it emerged that EID and treatment services for both HIV exposed and infected infants were generally available in Babadogo and Kariobangi slums. Mothers can choose to use the City Council managed health centres, private clinics and clinics operated by Non-Governmental Organizations. The City Council health centres were the main providers for EID and treatment services as reported by the members of FGDs. The provision of EID services during routine immunization in the city council clinics, made it easy for mothers who go to these clinics to use the services as noted by a KII, ".....when we do EID during immunization, we also check on the HIV exposure status of the infant which removes the burden from the mothers of extra appointment.”

However, most of the private facilities and a few of those managed by NGOs do not offer these services and therefore refer clients who require the service to facilities that offer them. This discourages some the clients who could have otherwise utilized the service.

The mothers who participated in the FGDs were in agreement that EID and treatment for HIV exposed or infected infants were offered free of charge in all health facilities regardless of ownership and this was a facilitating factor for utilization of these services. One FGD discussant had this to say, “I know that all services for my child are free, so I can come to the clinic whenever need arises, if they charged us for all these tests and drugs, we could not afford it, it’s good that the tests and drugs are free.”
During FGDs the mothers indicated gratitude for support groups that had been formed in some of the health facilities for mothers of HEI. These support groups were available in two health facilities (Babadogo and Kariobangi health centres) from where data for this study was collected. Chi-square analysis indicated that belonging to a support group was significantly associated with adherence to EID at 6 weeks ($\chi^2=64.195$, $df=1$, $p=0.000$). Mothers who belonged to and regularly attended a support group were more likely to have their infants tested at 6 weeks of age which accounted for 70.40% of infants tested at 6 weeks as compared to none members.

Two main themes on the role of support groups emerged during FGDs with the mothers, namely social and emotional support and health education on care for HEI. Majority of the mothers who belonged to a support group attributed their regular attendance to the social and emotional support received from other members of the group as indicated by one FGD discussant: "when I come to the support group, my spirit are raised and I become more encouraged because I see other people going through more trying times than myself. Before I became a member, I was always depressed and at the verge of giving up in life, I had no hope for my child and myself. Ever since joining, I know I'm not alone, there is life after being tested positive which has given me great hope for my life.' These sentiments were echoed by support group FGD members. The members were in agreement that they now have a sense of belonging though some had been abandoned by their spouses. The emotional wellbeing of a mother is critical for taking care of a special needs child such as an HEI.
Maternal knowledge on PMTCT has a positive impact on adherence to EID, it is therefore of paramount importance that HIV positive mothers receive education on PMTCT. Support groups served as a source of health education information for mothers of HEI as one of the discussants explained; "here we learn a lot of things..., I have learned how to take care of myself as a PLWH and my HEI. I also know what tests and drugs are required for my child." During FGDs, it was observed that mothers who belonged to a support group were more confident when contributing to issues on PMTCT, EID and treatment for HIV exposed and infected infants compared to those who did not belong to a support group.

Integration of PMTCT services into the MNCH setting has been shown from literature to be effective in increasing utilization of EID services. It was observed from the FGDs and KII that EID services had been fully integrated into the MNCH setting in Babadogo and Kariobangi health centres which made it easier for mothers attending these clinics for routine CWC to access and utilize the PMTCT services as one KI noted; "when we do EID during immunization, we also check for HIV exposure status of the infant attending immunization thus removing burden from the mothers for extra appointments for it (EID)."

4.1.8.2 Factors that constrain adherence to EID and treatment for HIV exposed and infected infants

During focus group discussions on whether they had encountered any major problems seeking health care for their HEIs, the discussants seemed to agree that they had not
encountered any major challenges in seeking health care for their HEI. The members, however, noted that accessing health facilities was a hardship they had to endure as one discussant noted; “most of us have to walk long distances to get to the health facility because I cannot afford to pay for transport, but I try to take my child to the clinic even if I have to walk a long distance, when I am too weak, I miss an appointment.” Another contentious issue that emerged from the FGDs was having to wait for a long time, especially to get drugs, which is a constraint to utilization of treatment for both HIV exposed and infected infants. However, a Chi-square analysis indicated that waiting time was not significantly associated with EID at 6 weeks, ($\chi^2=0.209, df=3, p=0.976$).

It was established from KII that the staff from the health facilities had not been trained on the new EID and ART guidelines as noted by one KI; “for the last two years we have had a big problem in refresher training. We have not been trained on the new guidelines; we have just read about it on our own.” This is a worrying trend given that the guidelines are based on a public health as opposed to a clinical approach, which is what most clinicians are accustomed to. This could be a source of delay in treatment initiation particularly in very young infants who seem healthy thus their ART initiation is not seen as urgent. Linking HIV exposed or infected infants with the CCC for ARV prophylaxis or ART is crucial for utilization of available treatment services. It was noted from KIIIs that linkages between the MCH and the CCC were very weak, leading to a low rate of ARV and cotrimoxazole prophylaxis uptake as one KI noted, “all we
can do after EID is to refer the mother to the CCC to collect the required drugs but we have no way of ensuring that they get there or that they get the drugs”

There was also poor communication and coordination between the staff in the two clinics as the KI further observed, “We (staff) each deal with the clients separately, I cannot go to the CCC to asking them to issue drugs, that’s how we end up with infants who come to the clinic regularly, but have never been started on prophylaxis.”
5.1 Discussion of results

5.1.1 socio-demographic characteristics of the respondents

The results indicated that 129 (54.20%) of the respondents were aged between 21-30 and the age group least presented was that of above 40 years with 2.10% of respondents. The results indicate that the population consisted of young mothers which are associated with poor adherence to EID at 6 weeks. This finding is similar to that of Aminet al. (2012) who stated that younger mothers are less likely to adhere to EID. Furthermore, 71.40% of the respondents had only primary school education with 18.90% having attained secondary education and 5% tertiary level education. This result concur with the Nairobi Urban Health and Demographic Surveillance System (NUHDSS) (2008) which noted that most of the urban slums residents are either uneducated or dropped out of school at primary level (APHRC, 2008).

Regarding marital status, 67.6% of the respondents were married while 17.60% were separated or divorced. The percentage of those separated or divorced is higher in the study population compared to national divorce/separation rate of 6% among women (KDHS, 2008/9). This is partly due to the living conditions in the slums which strain marital relationships and also to the HIV positive status as explained by one FGD discussant: "Most of us (women living with HIV) have been abandoned by our husbands because of our HIV status, ...when I informed my husband that I was HIV
positive he left and I have never seen him since." The results also indicated that 65.5% of the respondents were unemployed while 5% were formally employed. Further, 71.40% of the respondents had an average household income of less than Kshs. 2,000.

These results agree with the NUHDSS (2008) which suggests that women in urban slums of Nairobi were without any income generation activity with some engaging in IGAs and a few in salaried employment (APHRC, 2008).

5.1.2 Mother’s knowledge on Prevention of Mother to Child Transmission of HIV (PMTCT)

The study established that 53.80% of the respondents had low knowledge level on PMTCT while 6.30% had high knowledge level. These figures were supported during FGDs where some discussant indicated that mother to child transmission was impossible because they were on cotrimoxazole, ARV prophylaxis or other treatments. These findings agree with those of Amin et al. (2012) who established that mothers believed that mother to child transmission is avoided when the mother is on ARV prophylaxis or cotrimoxazole treatment. This explains why it’s necessary to educate expectant HIV mothers on fetus exposure factors, such as maternal viral load during pregnancy, which may lead to MTCT so as to remove the false sense of security gained when on cotrimoxazole, ARV prophylaxis and treatment.

It was further established that 77.30% of the respondents had heard of EID while 22.70% had never heard of it. When further asked when they heard of EID, 55.50% indicated having heard of it first from a healthcare provider during antenatal care. These
results do not agree with those of a similar study by Amin *et al.* (2012) who observed that majority of caregivers had not heard of EID before they were enrolled into the EID program despite having undergone PMTCT counseling. This implies that the expansion of PMTCT counseling in the country has been scaled up. The presence of mentor mothers in the two health facilities from which data was collected can be attributed to the many mothers with adequate knowledge on EID.

It is noteworthy that none of the respondents reported hearing about EID from the mass media; both print and electronic in spite of ongoing Information Education Communication/Behavior Change Campaigns (IEC/BCC) encouraging parents of HIV exposed children to have them tested. Results further shows that 61.80% of the respondents were aware of the timing of EID at 6 weeks. This finding disagree with those of Amin *et al.* (2012) who observed that majority of caregivers were not aware of the exact number or timing of EID tests.

When asked if they understood the importance of EID, 68.10% of the respondents indicated that it was to know their child’s HIV status while 22.70% did not see any importance in having their child tested for HIV. The main aim of EID is to identify HIV infected infants early and to start them on treatment before the development of clinical disease. The results of this study indicate that none of the mothers were aware of the main importance of EID. This is a drawback because majority of the mothers just want to ‘know’ the HIV status of their child, without taking into consideration the implications of either a positive or negative HIV test result. This implies a need for
counseling particularly during the test itself to enable mothers make an informed decision whatever the outcome of the test.

The study established that 81.10% of the respondents knew that HIV exposed infants required medications while 18.90% did not know of any medications required by HIV exposed infants. When asked what the benefits of ARVs and Cotrimoxazole were, 51.30% of the respondents knew the benefits of ARVs while the 75.60% of respondents did not know of the benefits of Cotrimoxazole. These results suggest that mothers are more likely to use the various medications if they are aware of the benefits of using the drug for their child.

This implies that there is need to educate mothers on the various drugs that HEI require and their benefits in order to increase utilization of these drugs.

5.1.3 Mother's practices on Prevention of Mother to Child Transmission of HIV (PMTCT)

The results indicate that 39.90% of the respondents had been diagnosed in the last 12 to 24 months before the study while 5.90% of the respondents had been diagnosed within the last six months before the study. This shows that 5.90% of mothers were diagnosed after they had the index child, indicating missed opportunities to test pregnant women during pregnancy, delivery and the immediate postpartum period.

When asked what prompted HIV test 68.50% of the respondents reported that they had been diagnosed with HIV during a routine test done during pregnancy, followed by those who reported diagnosis due to other illnesses at 19.70%. This shows that testing
all pregnant women during ANC is a critical entry point to PMTCT interventions as well as to care for HIV positive women. The results further illustrate that 93.40% of respondents attended at least one ANC visit and 97% of these were tested for HIV during ANC. These results are similar to the national estimates of pregnant women who attend at least one ANC visit which is 92% according to KDHS (2008/9). Regarding HTC for all pregnant women, the results are also similar to national estimates for HTC of pregnant women which was put at 98% (NASCOP, 2012).

When asked whether after diagnosis they received any intervention, 76.10% of the respondents had received ARV prophylaxis for PMTCT during their pregnancy while 23.90% received no intervention at all. The results show that rate of ARV uptake in this study population (76.10%) is lower than national estimates which stand at 82% (NASCOP, 2012). This may be attributed to the late or no ANC clinic attendance among the women of this community as one KII observed; "The problem with this (slum) population is that majority are uneducated and ignorant so some do not see the importance of attending ANC and when they do, it is too late for any meaningful intervention."

When asked where they delivered their child 73.50% of the respondents had delivered in a health facility with the help of skilled birth attendants while 26.50% had home delivery. This indicates that skilled birth attendance rate is higher among the women of these communities compared to the national rate of 44% (KDHS, 2008/9). This can be attributed to the Output Based Aid (OBA) Reproductive Health Vouchers which are
available to this community through the provincial administration. These vouchers have greatly increased demand for and access to skilled birth attendance for the poor women in these communities.

5.1.4 Child characteristics

Child characteristics were also sought by this study. The results show that 43.30% of the respondents had a child aged between 6 to 9 months, which is the age group of infants most likely to be attending CWC as the child is still undergoing immunization. This finding agrees with the results of a study by Rollin et al. (2009) which concluded that screening of all infants at immunization clinics is acceptable and feasible as a means for early identification of HIV-infected infants and referral for antiretroviral therapy. The respondents were further asked whether their child had been initiated on ARV prophylaxis at birth. The result show that 66.40% of the respondents reported that their child had been initiated on ARV prophylaxis at birth.

This is similar to national figures on ARV initiation at birth which stands at 63% (NASCOP, 2012). The result further indicates that 47.90% of infants had been initiated on CPT at 6 weeks as per the requirements for HIV exposed infants.

5.1.5 Determinants of EID

5.1.5.1 Level of adherence to EID

The participants were asked if their child had been tested for HIV by DBS at 6 weeks of age and the response confirmed from the mother-child booklet and clinic records.
Results show that 56.70% of the infants had been tested for HIV by DBS at 6 weeks of age. This finding suggests that the level of EID at 6 weeks is higher than the national level of 35% (NASCOP, 2012). This can be attributed to the successful integration of EID into routine MNCH activities such as immunization, which allowed for effective and efficient follow up of HEI. A done study by Ong’etch et al. (2012), which compared service delivery in MNCH and CCC settings in Kenya concluded that infants exposed to HIV were more likely to attend follow-up visits if they were enrolled in MNCH centres than when they attended CCCs.

5.1.5.2 Socio-demographic characteristics as determinants of EID

The study established that the level of education and marital status of the mother did not play a significant role in adherence to EID at 6 weeks. The results agree with those of Amin et al. (2012) who observed no significant association between mother’s level of education and marital status and adherence to EID at 6 weeks.

The proportion of EID uptake at 6 weeks among infants across mother’s age, occupation and average monthly household income categories were found to be significantly associated (p<0.05). This finding agrees with those of Aminet al. (2012) who observed that mothers who were young were less likely to adhere to EID.

The results further show that there exists an association between household income and adherence to EID at 6 weeks. This suggests that programs seeking to scale up adherence to EID in a similar setting should have an economic stability component, such as Income Generating Activities (IGA) to boost the economic stability of affected
households. This will go a long way in ensuring that lack of a steady household income does not become a competing priority for the needs of the HEI.

5.1.5.3 Mother’s knowledge and practices on PMTCT as determinants of EID
Mother’s knowledge on various aspects of PMTCT was found to be significantly associated to EID adherence. The results show that having ever heard of EID and knowledge of the timing for EID (6 weeks) were found to be associated with adherence to EID at 6 weeks. This suggests the necessity of patients’ education throughout the continuum of care in PMTCT. It is crucial that all health care providers educate all HIV positive women during pregnancy, labour and delivery, post natal care and subsequent CWC visits.

Various practices such as use of ARV prophylaxis or treatment of HIV positive mothers and skilled birth attendance during labour and delivery have been known to prevent MTCT. The duration from the date of diagnosis was found to be significantly associated with infants whose mothers had been diagnosed with HIV more than 24 months before the study being more likely to have been tested at 6 weeks. This group accounted for 45.90% of infants tested at 6 weeks.

The type of PMTCT intervention received during pregnancy was also significantly associated with adherence to EID at 6 weeks with infants whose mothers did not receive any intervention being least likely to have been tested at 6 weeks and they accounted for 40.80% of infants not tested at 6 weeks. Infants whose mothers received ART were more likely to have been tested at 6 weeks which accounted for 45.90% of infants tested.
at 6 weeks. These results show that those mothers who had lived with HIV for more than 24 months or were already receiving ART were more likely to have their children tested at 6 weeks. This can be attributed to their having accepted their HIV diagnosis and having more knowledge on PMTCT and HIV in general.

The place of delivery was shown to be significantly associated with adherence to EID at 6 weeks with mothers who delivered at home being the least likely to have their infants tested at 6 weeks. Mothers who delivered in a public health facility were more likely to have their infants tested at 6 weeks which can be attributed to more knowledge gained by those who use public health facilities which have staff dedicated to HIV positive mothers and HEI as opposed to those who deliver at home or in private health facilities.

5.1.5.4 Infant characteristics as determinants of EID

A cross tabulation between infant characteristics and EID was performed to test for statistical significance between the variables using a chi square at p>0.05. The results indicate a significant association between the age of the infant and adherence to EID at 6 weeks with infants in the youngest age group (6-9 months) being more likely to be tested at 6 weeks (p=0.000). This may be attributed to the fact that younger children are still regularly attending CWC for growth monitoring and immunization where they are likely to be tested.

There was also a significant statistical association between the infant’s immunization status and adherence to EID with those infants, whose immunization was up to date being more likely to be tested at 6 weeks, accounting for 96.30% of infants tested at 6
weeks (p=0.000). The reason for this is likely that the first immunization visit coincides with the age of EID, 6 weeks, leading to most of the infants being tested during immunization visits. Integration of EID into the MNCH setting has proved to be a successful strategy increasing uptake of EID at 6 weeks (Ong’ech et al., 2012).

ARV and CPT initiation at 6 weeks after birth were also found to be significantly associated with adherence to EID at 6 weeks. This can be attributed to the fact that mothers of infants who were already on treatment for HEI were more likely to have heard of EID and therefore more likely to utilize the service.

5.1.6 Treatment initiation for HIV positive infants

The study also sought to establish treatment initiation for HIV positive infants. The findings show that 47% of the HIV infected infants were had not been initiated on treatment immediately (2 to 4 weeks) as stipulated in the treatment guidelines for infants (NASCOP, 2011). Although Fischer’s exact test analysis yielded no relationship between the independent factors and timely initiation treatment several reasons for not initiating ART immediately were identified during mothers’ FGDs.

5.1.6.1 Reason for not initiating ART immediately.

The main reason given by mothers whose infants had not been started on ART within 2 to 4 weeks after diagnosis was lack of time to take the infant to the CCC (54.80%). This may be attributed to competing priorities for the mother’s time especially that of earning a living through casual jobs as one FGD discussant explained; “Whenever I am
called in for a casual job I have to go even if I have a clinic appointment, feeding my children is my biggest challenge, I have to deal with it first”

The other reason cited was lack of information from health care providers (26%) while 11.90% blamed the clinic and health care providers. One FGD discussant had this to say; “when I was informed that my child was HIV positive, I accepted and wanted to start treatment but this required me to attend early morning counseling sessions which I could not because I needed to fend for my other children”. It was observed during data collection, that mothers of HEI were not counseled at all during EID which to some extent may suggest denial exhibited by some mothers of HIV positive infants.

During KII with health providers, the delay in treatment initiation was explained as denial of the infant’s HIV status by the mothers as one KI stated; “majority of the mothers are usually in denial after they are told that their child is HIV positive, counseling them until they are ready to start treatment for their infant takes time, tact and patience.” This was supported by another discussant who noted, “......initiation of treatment for infants and young children largely depends on the readiness of the mother or a caregiver, it’s even more difficult when mothers or caregivers are themselves ART defaulters. We have some cases where the mother is a defaulter for one reason or another; we first re-initiate the mother on ARVs then after a week or two we put the child on ARVs. We prefer that if the mother needs ARVS, she is first put on ARVs and then initiate the child.”
5.1.7 Service delivery determinants of EID and treatment of HEI

5.1.7.1 Factors that promote adherence to EID and the treatment of HEI

Availability and affordability of EID and treatment services for HEI extensively and repeatedly mentioned during FGDs as factors that promoted or hindered the utilization of these services. The fact that EID services were offered free of charge during routine immunization in the city council clinics, made it easy for mothers to access the service in these clinics.

Membership to and regular attendance of support group meetings was also a factor promoting adherence to EID at 6 weeks. Chi-square analysis indicated that belonging to a support group was significantly associated with adherence to EID at 6 weeks. Mothers who belonged to and regularly attended a support group were also more likely to have their infants tested at 6 weeks of age which accounted for 70.40% of infants tested at 6 weeks. This can partly be explained by the social support that mothers of HEI receive during these meetings which goes a long way in overcoming fear, stigma and discrimination. This acceptance and feeling of belonging combined with health education on the needs of HEI promotes the utilization of EID and treatment services. The results of this study agree with those done by CDC/UNICEF (2008) which concluded that mothers support groups are an important intervention that can effectively improve the results of the nationwide PMTCT programme. HIV-positive mothers support groups should be an integral part of any PMTCT programme. The aim is to help
HIV-positive pregnant women and mothers to address socio-cultural barriers, and provide them with information and psychosocial support.

Integration of PMTCT services into the MNCH setting was mentioned as an effective factor in increasing utilization of EID services during FGDs and KIIs. The results of this study agree with those of Ong’ech et al. (2012) who observed that infants exposed to HIV were more likely to attend follow-up visits if they were enrolled in MNCH centers than when they attended CCCs.

5.1.7.2 Factors that constrain adherence to EID and treatment for HIV exposed and infected infants

Geographical inaccessibility of and long waiting time for health services were noted to be important constraints to utilization of health services. The long distances that some of the mothers had to walk to get to the clinic, due to lack of money for transport, as well as long waiting time at the clinic resulted in missed opportunities for utilization of services. In addition, lack of adequately trained staff on the new EID and ART guidelines was also identified by KIIs as a constrain to utilization of these services. This is a worrying trend given that the guidelines are based on a public health as opposed to a clinical approach, which is what most clinicians are accustomed to. This could be a source of delay in treatment initiation particularly in very young infants who seem healthy hence their ART initiation is not seen as urgent.

Ineffective linkages and referral system between MNCH and CCC clinics was also noted by KIIs as a stumbling block to the treatment of both HIV exposed and infected
infants. This can be attributed to separation of treatment services for HIV exposed and infected infants from the MNCH setting. This finding agrees with that of Braun et al. (2011) who concluded that separate programs for maternal and infant HIV prevention and care services demonstrated high attrition rates of HIV-exposed and HIV-infected infants, elevated levels of mother-to-child transmission, late infant diagnosis, delayed pediatric antiretroviral therapy initiation, and high HIV-infected infant mortality.

5.2 Conclusions

1. The level of knowledge on PMTCT and in particular EID among the study population was low.

2. The main determinants of EID at 6 weeks were maternal age and average household income, maternal knowledge and practices on PMTCT and EID, infant’s age and immunization status as well as belonging to a support group. The first null hypothesis is therefore rejected.

3. The main independent predictors of EID at 6 weeks were high maternal knowledge on PMTCT, receiving a PMTCT intervention, delivery in a health facility and receiving psychosocial support.

4. Timely initiation of treatment is not determined by socio-demographic characteristics, maternal knowledge and practices on PMTCT and infant’s characteristics, the second null hypothesis is therefore accepted.

5. The study identified various service delivery barriers to timely initiation of treatment for HIV infected infants such as poor referral of HIV infected infants to care and lack of integration of PMTCT and pediatric CCC.
5.3 Recommendations

1. The government through NASCOP should initiate awareness creation programmes on EID in the general public through the mass media and other IEC materials to create public interest in EID and pediatric ARV prophylaxis and treatment.

2. The government should support the full integration of EID and pediatric ART into the MNCH settings and set up effective referral linkages for HIV infected infants, through the PMTCT program. This will most likely lead to a reduction in delays in the initiation of treatment for infected infants.

3. There is need to encourage formation of PMTCT psychosocial support groups in all health facilities providing PMTCT services given the crucial role played by these groups in improving utilization of EID and HIV treatment services.

4. There is need to train all healthcare workers on the new guidelines on initiation of ART in infants aged 0-18 months.

5.4 Suggestions for further research

1. There is need for further research on the barriers to pediatric treatment initiation at the community level.

2. There is need to establish the importance of partner involvement in PMTCT and treatment initiation in infected infants.

3. There is need to explore the linkage of HIV infected infants from HIV diagnosis to care and treatment.
REFERENCES


APPENDICES

APPENDIX I: SEMI-STRUCTURED INTERVIEW SCHEDULE

Name of the interviewer .................................................................

Interview number......Name of health facility........................................

Date of interview............place of residence....................................

PART ONE: SOCIO DEMOGRAPHIC, ECONOMIC AND CULTURAL INFORMATION


2. Age in years


3. What is the highest level of education you have attained?


4. What is your marital status?


5. What is your occupation?


6. How much income do you earn per month?
7. What is your religion?


8. How many children under five are in your household?

None [1]  Two [3]  

PART TWO: MOTHER'S/CAREGIVER'S KNOWLEDGE AND PRACTICES

a) Mother/caregiver knowledge

<table>
<thead>
<tr>
<th>Q no.</th>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
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<tbody>
<tr>
<td>9</td>
<td>Do you know if an HIV infected mother can pass HIV to her child?</td>
<td></td>
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<tr>
<td>10</td>
<td>If yes, can HIV be passed from an infected mother to her child during pregnancy?</td>
<td></td>
<td></td>
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<tr>
<td>11</td>
<td>If yes, can HIV be passed from an infected mother to her child during labour and delivery?</td>
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<tr>
<td>12</td>
<td>If yes, can HIV be passed from an infected mother to her child through breastfeeding?</td>
<td></td>
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<tr>
<td>13</td>
<td>Are there ways through which MTCT of HIV can be prevented?</td>
<td></td>
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<tr>
<td>14</td>
<td>Can MTCT of HIV be prevented by use of ARVs for HIV positive pregnant women during pregnancy?</td>
<td></td>
<td></td>
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<tr>
<td>15</td>
<td>Can MTCT of HIV be prevented by use of ARVs for HIV positive pregnant women during labour and delivery?</td>
<td></td>
<td></td>
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<tr>
<td>16</td>
<td>Can MTCT of HIV be prevented by use of ARVs for HIV positive women during postpartum and breastfeeding?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Can MTCT of HIV be prevented by use of ARVs for HIV exposed infants postnatally and during breastfeeding?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Can MTCT of HIV be prevented by avoidance of breastfeeding by HIV infected women?</td>
<td></td>
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<tr>
<td>19</td>
<td>Can MTCT of HIV be prevented by exclusive breastfeeding for 6 months by HIV infected women?</td>
<td></td>
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<tr>
<td>20</td>
<td>Can MTCT of HIV be prevented by use of safe delivery procedures such as use of skilled birth attendance?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Can MTCT of HIV be prevented by avoidance of mixed feeding before 6 months of age?</td>
<td></td>
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<tr>
<td>22</td>
<td>Do you know what EID of HIV is? <em>(allow the mother to define in her own word)</em></td>
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<tr>
<td>23</td>
<td>What is the timing (age) for EID?</td>
<td></td>
<td></td>
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<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
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</table>

24. Do you understand the importance of early infant diagnosis of HIV in infants born to HIV infected mothers?
Know my child's HIV status [1]
Identify HIV infected infants [2]
Start HIV infected infants on treatment [3]
Prevent HIV infection from occurring [4]
For peace of mind [5]

25. Are you aware of any treatments required by an HIV exposed child?


26. What is the benefit of giving ARVs to the HIV exposed child?

To reduce chances of HIV infection [1]
To prolong the life of the child [2]
To protect the child from opportunistic infections [3]
To slow the progression of HIV [4]

27. What is the benefit of giving cotrimoxazole to the HIV exposed child?

To reduce chances of HIV infection [1]
To prolong the life of the child [2]
To protect the child from opportunistic infections [3]
To slow the progression of HIV [4]

Mother/caregiver practices

28. When were you first diagnosed with HIV? (Indicate year of diagnosis)

Less than 6 months ago [1] 12 months to 24 months ago [3]

29. What made you go for HIV testing?

30. At what gestation were you diagnosed with HIV?
   First trimester       [1] third trimester       [3]

31. After diagnosis, did you receive? (Check on the clinic card if the mother is not sure)

32. Where did you deliver this child?
   In a public healthcare facility [1] In a private healthcare facility       [3]
   At home attended by a TBA[2] At home attended by family /neighbors [4]
   Other (specify)             [5]

PART THREE: INFANT CHARACTERISTICS

33. What is the age of your child?

34. What is the sex of the child?

35. What is the nutritional status of the child?

36. Is your child immunized?

37. Has your child been unwell since birth?
PART FOUR: EID AT 6 WEEKS

a) Identification of the HIV exposed child.

38. At what age was the child’s first visit to a health facility?

39. At the time of the child’s first visit to a health facility, was the HIV exposure status of the child known? *(Ask if the mother knew her own HIV status at the child’s first visit to a health facility)*
   Yes [1] No [2]

b) Adherence in EID

40. Was a routine DNA PCR test (DBS) offered at 6 weeks of age?
   I did not take my child to the CWC at 6 weeks [1]
   The nurse did not ask me about [2]
   I did not think it was important [3]
   My child looked healthy [4]
   I did not want to know my child’s HIV status [5]
   My husband/mother in law/family asked me not to have the child tested [6]
   I do not think my child has HIV [7]

41. Have you received the results of your child’s HIV test?
   Yes [1] No [2]

c) Adherence to ARV and cotrimoxazole prophylaxis for HIV exposed infants
42. Did your child start receiving nevirapine immediately (within 6-12 hours) after birth?

43. Did your child start cotrimoxazole prophylaxis therapy at 6 weeks?

   d) Adherence to ART

   (To be filled for PCR positive infants less than 18 months of age)

44. Was your child started on ART immediately after a positive DNA PCR result?
   Yes [1] No [2]

45. If not, why?
   I was not informed that my child needed treatment immediately [1]
   I did not have time to take my child to the pediatric CCC [2]
   I did not want my child to take the medicine [3]
   I don’t think my child is HIV positive [4]
   My child is healthy [5]

PART FOUR: HEALTHCARE SYSTEM

46. How long do you wait to be served at this clinic?
   Less than 30 mins [1] 30 mins-1 hour [2]
   1 hour to 2 hours [3] more than 2 hours [4]

47. Do you belong to and actively participate in a psychosocial support group?
   Yes [1] No [2]
APPENDIX II: FOCUS GROUP DISCUSSION SCHEDULE

1. What do you understand by EID of HIV in HIV exposed infants?
2. What do you understand by treatment of HIV exposed infants?
3. What explanations are usually given for EID and treatment of HIV exposed infants?
4. What has been your experience of EID?
5. What is your experience with ARV and cotrimoxazole prophylaxis recommended for HIV exposed infants?
6. What are the problems associated with EID and treatment of HIV exposed children in the community?
7. Are there problems you encounter in utilization of health facilities in seeking EID and treatment services in terms of the following
   a) Transport
   b) Availability of services
   c) Waiting time
   d) Cost
   e) Stigma and discrimination
8. What suggestions/recommendations do you have on how EID and treatment of HIV exposed infants can be improved in this area?
9. What support is available to you in the community and in your families?
10. What do you think could be done to help mothers and families taking care of HIV exposed infants in this community?
APPENDIX III: KEY INFORMANT INTERVIEW SCHEDULE

1. How long has this facility been providing EID and treatment services for HIV exposed children?
2. What has been your experience in provision of EID and treatment services for HIV exposed children?
3. What have been the successes in the provision of EID and treatment services for HIV exposed children?
4. What have been the challenges in the provision of EID and treatment services for HIV exposed children?
5. Have appropriate staff been oriented and recently updated on the provision of EID and treatment services for HIV exposed children using the new national guidelines?
6. Has all staff been oriented on the provision of EID and treatment services for HIV exposed children using the new national guidelines?
7. In the last six months, has your facility had all the supplies needed in the provision of EID and treatment services for HIV exposed children using the new national guidelines?
8. Does your facility follow up on HIV exposed infants? If yes, how does your facility follow up on the HIV exposed children?
9. If no, why does your facility not follow up on HIV exposed infants?
10. Are relevant and current client education materials available and displayed in the health facility?
APPENDIX IV: ETHICAL CLEARANCE

KENYATTA UNIVERSITY
ETHICS REVIEW COMMITTEE

Fax: 8711242/8711575
Email: kuerc.chairman@ku.ac.ke
kuerc.secretary@ku.ac.ke
Website: www.ku.ac.ke

P. O. Box 43844
Nairobi, 00100
Tel: 8710901/12
Tel: 8710901/12

Our Ref: KU/R/COMM/51/93

Date: October 22nd 2012

Grace Mwelu Makau
School of Public Health
Kenyatta University
P. O. Box 43844, Nairobi.

Dear Ms. Makau,

APPLICATION NUMBER KFU/069/161 OF 2012 - 'DETERMINANTS OF ADHERENCE TO EARLY INFANT DIAGNOSIS AND TREATMENT OF HIV AMONG HIV EXPOSED INFANTS IN BABA DOGO AND KARIOBANGI SLUMS, NAIROBI COUNTY - VERSION 2'

1. IDENTIFICATION OF PROTOCOL.

The application before the committee is with a research topic, Determinants of Adherence to Early Infant Diagnosis and Treatment of HIV Among HIV Exposed Infants in Baba Dogo and Kariobangi Slums, Nairobi County - version 2 dated 19th October 2012.

2. APPLICANT

Grace Mwelu Makau
School of Public Health
Kenyatta University
P. O. Box 43844, Nairobi.

3. SITE

Baba Dogo and Kariobangi Slums, Nairobi County - Kenya.

4. DECISION

The committee has considered the research protocol in accordance with the Kenyatta University Research Policy (section 7.2.1.3) and the Kenyatta University Ethics Review Committee Guidelines, and is of the view that against the following elements of review,

(i) Scientific design and conduct of study,
(ii) Recruitment of research participant,
(iii) Care and protection of research participants,
(iv) Protection of research participant's confidentiality,
(v) Informed consent process,
(vi) Community considerations.

AND APPROVED that the research may proceed for a period of ONE year from 22nd October, 2012.
5. **ADVICE/CONDITIONS**

i. Progress reports are submitted to the KU-ERC every six months and a full report is submitted at the end of the study.

ii. Serious and unexpected adverse events related to the conduct of the study are reported to this board immediately they occur.

iii. Notify the Kenyatta University Ethics Committee of any amendments to the protocol.

iv. Submit an electronic copy of the revised proposal to KU-ERC.

When replying, kindly quote the application number above.

If you accept the decision reached and advice and conditions given please sign in the space provided below and return to KU-ERC a copy of the letter.

PROF. NICHOLAS K. GIKONYO
CHAIRMAN ETHICS REVIEW COMMITTEE

I ... accept the advice given and will fulfill the conditions therein.

Signature .................. Dated this day ... of .......... 2012.

cc. Vice-Chancellor
    Director: Institute for Research Science and Technology
APPENDIX VI: NAIROBI CITY COUNCIL PERMIT


GRACE M. MAKAU
KENYATTA UNIVERSITY
P O BOX 43844-00100
NAIROBI

RE: PERMISSION TO CONDUCT RESEARCH - DETERMINANT OF ADHERENCE TO EARLY INFANT DIAGNOSIS AND TREATMENT OF HIV EXPOSED INFANTS.

I write to inform you that permission is granted but the following shall apply during the research.

• Payment of Kshs.5, 000/= (Five thousand shillings only) Research fee.
• You will be expected to adhere to the rules and regulations pertaining to the City Council of Nairobi.
• That during the period of research there will be no cost devolving to the Council.
• That you undertake to indemnify the Council against any claim that may arise from the Research.
• A copy of the findings must be submitted to the office of the undersigned.
• Research will be done in Babadogo and Kariobangi Health Centers.

By a copy of this letter the DPHN/DMOH District is requested to accord you the necessary assistance.

DR. ROBERT K. AYISI, HSC
FOR, TOWN CLERK

cc: DMOH/DPHN - District
APPENDIX V: NATIONAL COUNCIL OF SCIENCE AND TECHNOLOGY PERMIT

THIS IS TO CERTIFY THAT:
Prof./Dr./Mr./Mrs./Miss/Institution
Grace Mwelu Makau
of [Address] Kenyatta University
P.O.Box 43844-00100, Nairobi
has been permitted to conduct research in

Location
Nairobi

District
Province

on the topic: Determinants of adherence to early infant diagnosis and treatment of HIV among HIV exposed infants in Babadogo and Kariobangi Slums, Nairobi County,

for a period ending: 30th September, 2013.

Research Permit No. NCST/RCD/12A/012/142
Date of issue 5th October, 2012
Fee received KSH. 1,000

Applicant’s Signature

Secretary
National Council for Science & Technology