Early Infant Diagnosis of HIV and the associated factors among children born to HIV positive mothers in Kapchorwa district

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Declaration

I declare that the entirety of the work contained therein is my own work, original work, that am the sole author thereof and that I have not previously in its entirety or in part submitted it for obtaining any qualification.

Name of Researcher……..

Signature……..

Date...../……./2014

Name of supervisor…….

Signature…….

Date…../……/2014

Dedication

This work is specially dedicated to my lovely children: Trevor Mashandich, Aldrine Chepnoen, Modesta Cherop and Titus Towett for they are a special gift from God, may they be blessed in life.

I also dedicate this to my patients- people living with HIV and AIDS (especially the HIV+ mothers and their children); working with you really inspired me to acquire more qualifications to improve the quality of service offered to you all, long live.

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Acronyms and Abbreviations

AHSPR Annual Health Sector Performance Report

AIDS Acquired Immune Deficiency Syndrome

ART Anti Retroviral Therapy

ARVs Anti Retrovirals

CHER Children with HIV Early ART

DAIDS

DBS Dry Blood Sport

DNA Deoxyribo-Nucleic Acid

EID Early Infant Diagnosis

e MTCT Elimination of mother to child transmission of HIV

FDP

HAART Highly Active Anti retroviral Therapy

HIV Human Immune deficiency Virus

LTFU Lost To Follow Up

MOH Ministry of Health

NIH National Institute of Health

OR Odds Ratio

PCR Polymerase Chain Reaction

PI Principal Investigator

PMTCT Prevention of Mother to Child Transmission of HIV

SA South Africa

STAR-E Strengthening Tuberculosis and AIDS Response-Eastern

UDHS Uganda Demographic and Health Survey

UNAIDS United Nations Program on HIV & AIDS

UNICEF United Nations Children's Fund.

USAID United States Agency for International Development

WHO World Health Organization

Operational definitions

Early Infant Diagnosis: Early infant diagnosis in this study is defined as an HIV diagnosis done for an infant/child six weeks from birth using DNA/PCR test.

Exposed infants: These are infants aged 0-11 months born to HIV positive mothers.

Follow up: To maintain contact with a person so as to monitor and evaluate the effects of earlier activities or treatments. According to WHO, any patient who does not return for review for at least 3 months (90 days) is referred to as lost to follow up (LTFU).

Abstract

Background: Based on the most recent global estimates, 2.3 million children younger than 15 years of age are living with HIV, (UNAIDS, 2010) and in line with this, mother to child transmission of HIV results in approx. 370,000 infant infections worldwide each year, (UNAIDS/UNICEF/WHO, 2011). Many countries are moving towards national coverage of services for eMTCT; however most children born to women who are HIV positive are not being systematically monitored and followed up during the post partum period.

Main objective: To establish the factors associated with EID of HIV among the children born to HIV positive mothers in Kapchorwa district.

Methodology: A total of 130 respondents who had at least an exposed child and were attending HIV care services were interviewed face to face after consent. This was conducted in Kapchorwa district in three health facilities that are offering ART and EID of HIV services. Every respondent was assessed for eligibility using the stipulated criteria for example whether the exposed child was within the age bracket of 6 weeks to 18 months. A researcher administered questionnaire was the data collection tool that had mostly closed ended questions. Univariate and bivariate analysis was used for statistical analysis.

Results: Of the 130 respondents interviewed, majority 79(60.8%) of them were age between 25-35 years and 118(90.8%) were biological mothers of the exposed children. As regards parity, 91(70%) of the respondents had less than 4 children and only one (0.8%) of them was male.

More than half of the exposed children 74(56.9%) were aged less than 14 months and 66(50.8%) were male. Among the exposed children, 59(45.4%) of them were tested at six weeks as recommended while more than half (54.6%) had delayed diagnosis.

The factors that were found to be significantly associated with EID were linkage (referral) from entry points to EID care points (P-value 0.001) and disclosure of the child's HIV status (P-value 0.012).

Conclusion: The level of Early Infant Diagnosis in this study was slightly higher than the national level figures. Linkage from all entry points to the EID care point and disclosure of the

child's HIV status were found to be significant variables that influenced EID of HIV among the exposed children.

1- **Recommendations**: Mothers/caregivers must be encouraged to disclose their child's HIV status to someone they trust so as to enhance the care the child receives. Secondly an appropriate linkage (referral) mechanism should be instituted by each setup designed to offer pediatric HIV care services to minimize lost cases. Every health worker – the new and old should undergo in service training on EID of HIV to enhance service delivery at every entry point. Further inquiry should be done on a large scale for example at a regional level so as to make comparison to generalize the findings to a bigger population therefore this calls for more funding into paediatric HIV interventions.

CHAPTER ONE: INTRODUCTION

1.1 Background to the study

This study sought to establish the factors associated with Early Infant Diagnosis of HIV among the exposed children in Kapchorwa District. This chapter describes the background to the study, statement of the problem, the objectives, the research questions, justification and the conceptual framework of the study.

Based on the most recent global estimates, 2.3 million children younger than 15 years of age are living with HIV, UNAIDS, (2010) and in line with this, mother to child transmission of HIV results in approx. 370,000 infant infections worldwide each year, UNAIDS/UNICEF/WHO, (2011).

Many countries are moving towards national coverage of services for elimination of mother to child transmission of HIV (eMTCT); however most children born to women who are HIV positive are not being systematically monitored and followed up during the post partum period.

Experience from S. Africa reveals that without a systematic & structured plan that includes Early Infant Diagnosis at six weeks, up to 85% of HIV exposed infants are lost to follow up from PMTCT sites by one year of age. Patton J., et al, (2007).

In Africa, it is recognized that the introduction of Early Infant Diagnosis (EID) techniques is an important step in the fight against HIV and AIDS resulting in identification of infants who need services as early as possible. This enables these children to have early access to services and therefore improving their quality of life and chances of living into adulthood.

A recent trial in South Africa, children with HIV early ART (CHER) demonstrated a 76% reduction in morbidity and a 75% reduction in mortality when HIV infected infants are initiated on ART before three months of age and before clinical signs and symptoms of HIV are developed. Claranello L, et al. (2011). This therefore calls for the need to address the factors associated with EID of HIV among the exposed children.

According to PMTCT fact sheet Uganda (2012), few infants born to HIV+ mothers receive EID of HIV services for example only 6% in 2009 and 11% in 2011 within two months of birth, follow up is one eminent factor of Early Infant Diagnosis of HIV as revealed by a study done in South Africa (Patton J., et al. (2007). However, other studies for example one done in Zambia identified other factors as maternal receipt of ART, distance, and size of household. Cook E., et al. (2008). Prong 4 of PMTCT aims at providing appropriate treatment, care and support to women living with HIV, their children and families where EID is a prerequisite.

Similarly, in a study done in Uganda, it was reported that rapid tests for HIV could rule out infection in more than 30% of infants aged between 3-6 months, 66% for those aged 6-9 months. (Homsy J., Downing R, Finkbeiner T., et al. (2007). This has guided the revision of the treatment guidelines for infants, thus confirming the need for EID of HIV among exposed children. WHO, (2002). EID of HIV and the associated factors among children born to HIV+ mothers in Kapchorwa district are unknown; therefore the aim of this study was to establish the factors associated with EID of HIV among the exposed children so as to suggest functional interventions to improve pediatric HIV care hence elimination of mother to child transmission of HIV by 2015.

WHO released new guidance on EMTCT in 2010 which covered PMTCT, Early Infant Diagnosis (EID), ART and infant feeding- and the Ugandan MoH adopted these guidelines in

2011. In August 2012, the Uganda MoH decided to adopt option B+ as the national policy based on the understanding that option B+ provides significant benefits and propels the country further towards EMTCT targets.

1.2 Background to the study area

Kapchorwa district is located in eastern part of Uganda, bordered by Kween District to the east, the Republic of Kenya to the south, and Bulambuli District to the north and west. It is situated on the slopes of Mt Elgon and consists of one county and 15 sub counties. There are a total of 30 health units in the district including one hospital and out of these only five facilities provide EID services with the hospital inclusive. From January 2012 to June 2013, there were a total of 150 exposed children registered with EID sites (Kapchorwa District HMIS data-unpublished June 2013). However, for various reasons not all of them were tested as early as six weeks as recommended This study was conducted in all the EID sites in Kapchorwa district for the major reason that they are wide spread throughout the district so the sample identified will be representative of the entire district and therefore could be generalized to the entire population of the district.

1.3 Statement of the problem

EID is a cornerstone of pediatric HIV care because it leads not only to appropriate and timely care but also prevention of post partum HIV transmission and improve overall infant outcomes (UNICEF, 2009). However, according to Annual Health Sector Performance Report AHSPR, (2011/2012), the National average for EID is currently 28.3% compared to 40% as the national target while Kapchorwa district is at 25.9%.

HIV related child mortality rates for the exposed children remain high despite growing access to ART globally and yet this would be reversed with Early Infant Diagnosis as an entry point. In resource limited settings, up to 30% of untreated HIV infected children die before their 1st birthday and more than 50% die before they reach the second birthday, Newell. L., et al (2004).

A key challenge inhibiting timely initiation of pediatric ARV therapy is the loss to follow up of mothers-infant pairs for Early Infant Diagnosis. Other studies indicate that major barriers to EID of HIV include; loss to follow up, stigma and distance to the EID sites. The benefits of EID include; early detection and prompt treatment leading to a better prognosis for the children.

This delay to make a diagnosis complicates further management of children exposed to HIV which impacts negatively not only on the infant, but also the mother, family and the whole healthcare system. MOH endorsed the PMTCT program in 2006 to improve pediatric HIV care including Early Infant Diagnosis; however the coverage of EID is still low. It is against this background that this study has sought to establish the factors associated to EID of HIV among the exposed children in Kapchorwa district so as to suggest functional strategies to improve EID of HIV hence improved pediatric HIV care and hence elimination of mother to child transmission .

1.4 Research objectives

1.4.1 General objective:

To establish the factors associated with EID of HIV among children born to HIV positive mothers in Kapchorwa District.

1.4.2 Specific objectives:

- ❑ To determine the proportion of HIV exposed children who have had EID of HIV done in Kapchorwa district.
- ❑ To determine the socio-demographic factors of mothers/caregivers associated with EID of HIV among children born to HIV infected mothers in Kapchorwa district.
- ❑ To establish the health system factors associated with EID of HIV among children born to HIV infected mothers in Kapchorwa district.
- ❑ To identify maternal factors associated with EID of HIV among children born to HIV positive mothers in Kapchorwa district.

1.5 Research questions

- ❑ What is the proportion of exposed children who have EID of HIV done in Kapchorwa district?
- ❑ What are the socio-demographic factors associated with EID of HIV among children born to HIV infected mothers in Kapchorwa district?
- ❑ What are the health system factors associated with EID of HIV among children born to HIV infected mothers in Kapchorwa district?
- ❑ What are the maternal factors associated with EID of HIV among children born to mothers infected with HIV in Kapchorwa district?

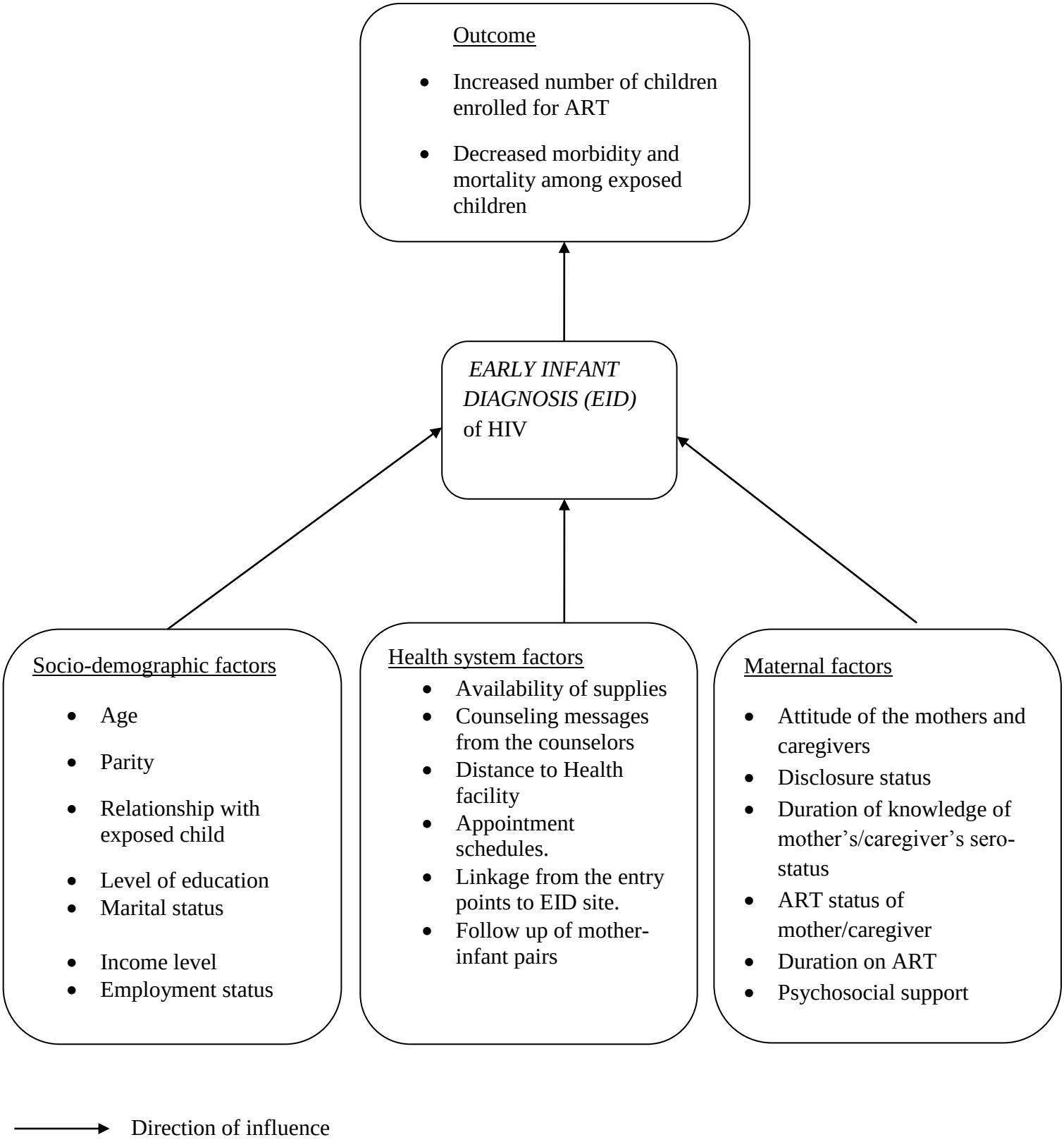
1.6 Justification of the study

Current strategies for preventing HIV infection from mother to child like PMTCT option B+ are often taken seriously till delivery. However follow-up is low and yet 65 infants are born daily with HIV. *The new vision* 14th Sept (2012). There is need to identify the factors associated with EID of HIV so that those infants who may have missed prevention through PMTCT option B+ can be detected as early as possible and hence initiated into care UNAIDS (2012).

Studies conducted in the area of EID of HIV have not adequately addressed the factors associated with EID among the exposed children. Therefore, information generated from this study would fill this gap; it would help in the design of appropriate and effective interventions by Kapchorwa District, Government of Uganda and other stakeholders to address the key factors associated with EID of HIV. This would lead to reduction in HIV related child morbidity and mortality hence a decrease in the burden of pediatric HIV.

Therefore the aim of this study was to establish the factors associated with EID of HIV among children born to HIV positive mothers so as to suggest functional interventions to improve pediatric HIV care.

1.7 Figure 1: Conceptual framework on early infant diagnosis of HIV and the associated factors among the exposed infants born to HIV+ mothers in Kapchorwa district



Description of the conceptual framework

Early Infant Diagnosis plays a key role in pediatric HIV especially if done as early as possible. From the conceptual frame above, the independent variables; the factors are sought to be associated with EID of HIV among the exposed children. They are categorized as either socio-demographic, health system or maternal in nature and they interplay to affect EID of HIV among exposed children either positively or negatively. The expected outcome is both reduced morbidity and mortality, and then increased number of children diagnosed and started on ART.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This literature review is built on past/previous studies conducted in Uganda and elsewhere in the area of EID of HIV among infants/children born to HIV positive mothers. Reviewing was done systematically according to the study objectives to analyze the contributions of the various researchers on EID of HIV visa vie the associated factors. It explored the different factors that influence Early Infant Diagnosis from socio-demographic, health system and at maternal level from various studies conducted elsewhere for purposes of comparison of the level of influence.

2.2 Proportion of HIV exposed children who have EID of HIV done

Following a study conducted in three immunization clinics in Kwazulu Natal in South Africa by NIGEL. R., et al (2009), to determine the feasibility and acceptability of universal testing of HIV for all 6-weeks old infants brought for immunization to achieve EID of HIV and referral for treatment and care services, it was revealed that 9.2% (54 out of 584) of the samples from the infant tested positive for DNA PCR and majority of the mothers said they were comfortable testing their infants at the immunization points and would recommend it to others. It was concluded that screening all infants at immunization points is acceptable and feasible as a means of identification of HIV infected children hence referral for early initiation into care.

In another related study carried out in Tanzania by Biribonwoha. N., et al (2010), whose aim was to introduce an EID pilot program using HIV DNA Polymerase chain reaction (PCR) with the intent of making EID nationally available, it was found out that of the 441 infants who had an HIV DNA PCR test at a median age of 4 months, 75 (17%) of them were PCR positive. The

results of this study informed the national roll-out of the EID program currently underway in Tanzania.

Results from a retrospective observational cohort study conducted in Malawi by Braun M., et al (2004-2008) to assess the continuity of care and outcome of pediatric HIV prevention, testing and treatment services, focusing on early infant diagnosis, it was found that of the infants enrolled into the study, 7,875 infants (53.7%) of the exposed infants received HIV DNA PCR testing, 1,084 (13.8%) were HIV infected and it was concluded that initiation of ARVs increased the likelihood of survival seven fold (OR 7.1, 95% CI 3.68 – 13.70) and this can only be possible through Early Infant Diagnosis of HIV. These statistics documented clearly indicate that EID yields results where other measures of PMTCT may have missed, this can help achieve the millennium development goal target of zero HIV infections among the infants by 2015.

2.3 Socio-demographic factors

Following a CHER study in South Africa (trial phase 3 randomized, open label) conducted by Violari A., et al (2008) in collaboration with (DAIDS) of the National Institute of Health (NIH) on early antiretroviral therapy and mortality among HIV-infected infants. It was revealed that early HIV diagnosis and early ART reduced early infant mortality by 76% and HIV prognosis by 75%. This is a clear evidence that early infant diagnosis of HIV as early as possible is a key determinant in infant survival rates.

Boender S, et al (2012) conducted a study to assess the factors related to the timing of treatment initiation among the HIV infected children attending three clinical sites in Uganda that is Kampala, Fort portal and Mbale regional centres of excellence. The clinical and

demographic determinants associated with early disease, and of the 306 children initiated on first line regime, 72% presented late, (OR = 2.83, P=0.014), those living without parents (OR 3.93, P = 0.002), unemployment of care givers (OR = 4.26 P = 0.001), lack of parental HIV prophylaxis (OR = 5.66, P = 0.028) and high transport costs to the clinic (OR = 2.83 P = 0.072). Other additional risk factors identified in this study were: caregivers' unawareness of the HIV symptoms, fear, stigma and they concluded that the problem of late presentation requires multifactoral approach, addressing both the Health system and individual level factors.

In Zambia, a study was done by Torpey. K., et al (2012) to analyze HIV/EID data to estimate rates of perinatal HIV transmission among 28,300 children aged between 0-12 months born to HIV positive mothers from five Zambian provinces from September 2007 to July 2010. It was revealed that 58.6% had a PCR test conducted between 6 weeks and 6 months. Overall from September 2007 to July 2010, 12.2% of the PCR results were positive. From Sept 2007 to Jan 2009, from Feb 2009 to July 2010, proportions of positive PCR results were 15.1% and 11.0% respectively indicating a significant difference. An estimated 45.9% of the mothers were below 30 years of age and 93.3% had disclosed their HIV status. 32.7% received AZT + sdNVP, 30.9% received HAART, 19.6% received sdNVP only and 12.9% received no ARVs. They concluded that ARV drugs reduce vertical transmission of HIV in program setting and non-chemo prophylactic factors also play a significant role in HIV transmission. The overall change in the proportions of the PCR results over time is more likely an indication of better PMTCT implementation. Determination of the outcomes of PMTCT in program settings is feasible but requires accurate documentation and analysis as well.

2.4 Health system factors

In a cohort retrospective study conducted in Mozambique, of the 443 mother infant pairs, 217 (49%) of mothers enrolled in the HIV care and only 110 (25%) infants were brought for EID of HIV. In this study, the predictors of follow up for EID were noted as larger household size (OR= 1.3, 95% CI= 109-1.53), independent maternal source of income (OR= 10.8, 95% CI 3.42-34.0) and maternal receipt of ART (OR= 3.15, 95% CI 1.02-9.73).The median age of 1st test among 105 infants was 5 months and 16% of those tested were infected with HIV.

Chatterjee, A. et al (2011) conducted a research as a multi country review to examine when and where the EID of HIV service is being maximally utilized to improve health outcomes for HIV exposed infants. The four countries across Africa and Asia included: Senegal, Cambodia, Uganda and Namibia. The existing documents and data were reviewed and key informant interviews were conducted which revealed that only 22% in Senegal, 37% (Uganda), and 38% (Cambodia) of the infants testing positive by DNA PCR were subsequently initiated onto treatment.

In Namibia, which had almost universal coverage of EID of HIV, more than 70% of the PCR positive infants were initiated on ART IN 2008. This calls for a strong system in place for EID of HIV to help identify these infants as early as possible hence early initiation of care. Through this study, it was concluded that more programmatic attention and support is needed to test and initiate HIV exposed infants into care and this is feasible for a rural low income countries like Uganda to achieve high national coverage of infant testing and treatment.

In another related study conducted in Rwanda by Binagwaho. A. et al (2008-2010), more than 30,000 children were newly infected with HIV each year and only 28% were able to benefit from EID. The MOH identified the major challenges as poor counseling skills, lack of follow up of the care givers of the exposed infants, lack of coordination with the maternal and child health programs and long delays between collection of samples and return of results.

By increasing geographical access, integrating EID with vaccination programs, investing in a robust mobile phone reporting system, Rwanda increased population coverage of EID from approximately 28-72.4% from 2008-2011. From this, Rwanda rapidly scaled up and improved its EID program but challenges persist for linking infants to care.

Similarly, according to the annual PMTCT report for STAR-E, unpublished (2012), loss to follow up of mother-infant pairs was noted to be high with most of the mothers not coming after the first visit which was associated with poor counseling messages by health workers in the facilities.

A retrospective review conducted in Uganda by Kiyaga. C., et al (2005) for three years in 20 EID collection sites, preliminary analysis showed significant attrition rates post testing of approximately 43% of infants tested for EID as never receiving their results at three referral hospitals and continued attrition of HIV positive infants prior to enrolling in ART services. The major challenges reported were delay to return the test results and lack of follow up. They recommended early testing and follow up to ensure maximum impact of EID services.

2.5 Maternal factors

In a cross-sectional study conducted in South Africa by AIDS Care (2010) on the factors influencing uptake of HIV services including EID among infants and children, it was reported that maternal guilt, fear of negative consequences resulting from disclosure of the HIV positive results to the children were a major hindrance to the uptake of these services.

According to Sherman., et al, (2004), a small exploratory study was done among 31 HIV positive mothers who were interviewed and it was revealed that their mean age was 28.9 years with a range from (21-42 years) and the average parity was 2.6 births, 53% were unemployed and most of them (42%) were living with partner and 29% were married. 2(7%) of the infants tested were HIV positive. This was consistent with 8.7% voluntary testing rate among mothers enrolled in the overall diagnostic study. This being a small exploratory study among a clinic based convenience sample, the experiences and opinions documented here reveal issues for programmatic consideration in both EID and pediatric HIV testing in general and linkage was reported as vital to EID of HIV.

Other available literature reveals that the survival of infants also depends on the care offered by the mother in relation to access to ARV'S, good nutrition including Vit A and other micronutrient supplementation for both the infant and the mother FDP, (2010).

In regard to the mother's awareness, it is important that the HIV positive mothers should be fully aware of the effects of HIV on the growth and development of their children if infected with HIV. This could provide the necessary motivation for the mothers to come forward for screening of HIV in their children before they start to have regression in their development. (Adeniyi 2013). Following from above, in the same study conducted in South Africa by

Adeniyi 2013, also HIV counselors should be aware of the consequences of HIV infection in the growth and development of the children , this will provide a more direct and focused counseling that will motivate the change in attitude towards EID in exposed infants.

Following the CHER study in SA (2010), all children less than 1 year infected with HIV must be commenced on ART as soon as possible. The effectiveness of the therapy can only be tested if administered early to eligible infants, therefore the HIV positive infants must first be diagnosed at six weeks follow up visit.

The goal of EID is to identify HIV infected infants prior to the development of the signs and symptoms of clinical disease which will facilitate prompt treatment and follow up Hassan., et al (2011).

2.6 Conclusion

The concern for EID of HIV with the aim of reducing or eMTCT is very crucial in pediatric HIV. The literature reviewed indicates that EID of HIV among the exposed children is still low and this is attributed to various reasons ranging from socio-demographic, Health system and maternal factors.

There is need to find out the extent to which these factors affect EID among the exposed children in general as this would enable institution of appropriate corrective measures.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

This chapter describes the study design, study population, sample size calculation, sampling procedure, study variables, data collection techniques, data collection tools, plan for data analysis, quality control measures, ethical issues and the plan for dissemination.

3.2 Study design

A descriptive cross-sectional study design using both quantitative and qualitative methods was used for data collection because this study set out to determine the proportion of EID of HIV and the associated factors at the same time hence this was the most suitable study design.

3.3 Population

Target population: This included HIV positive mothers and caregivers who had children aged between six weeks to eighteen months.

Accessible population: All HIV positive mothers and caregivers with exposed children who attended the ART clinics, and EID services in Kapchorwa District between July and September 2013.

Study population: This included HIV positive mothers and caregivers with exposed children attending the ART clinics and EID services in Kapchorwa District who consented to participate in this study.

Eligibility: The inclusion and exclusion criteria

Inclusion criteria: HIV positive mothers and caregivers with exposed children who attended ART clinic and EID services in Kapchorwa District and consented to take part in this study.

Exclusion criteria: HIV positive mothers and caregivers with exposed children but were very ill, mentally ill or deaf.

3.4 Sample size calculation: This was done using the Keish and Leslie formula, given by:

$$n = (Z)^2 \times PQ/d^2$$

Where n = Sample size required.

Z = Standard normal deviation at C.I (1.96)

P = Proportion of infants who have had EID for HIV in Kapchorwa District in 2011/2012 (AHSPR 2011/2012).

Q = 1-p (proportion of infants who have not had EID for HIV).

d = Level of statistical significance (0.05)

$$n = \frac{1.96)^2 \times 0.259\ (1- 0.259)}{(0.05)^2}$$

n = 295 respondents were to be selected to participate in this study.

To cater for non response, a rate of 10% was to be included. 10/100 X 295

= 324.5 = 325 respondents

However, since the target population is less than 10,000, the required sample size was calculated using the formula:

$$nf = \frac{n}{(1 + n)/N}$$ (Reference: Mugenda M, Mugenda G., 2003)

Where: nf is the desired sample size when the target population is less than 10,000

n is the desired sample size when the target population is more than 10,000

N is the estimate of the population size.

nf = 325/ (1+325)/150

= 147 respondents.

Therefore 147 respondents were the sample size calculated and were expected to be interviewed.

3.5 Sampling procedures: Convenience sampling procedure was used to identify all the facilities that provide EID of HIV in the district using information from the District Health Office because only a few of the facilities that provide HIV care do offer EID of HIV services to exposed children and their mothers/caregivers. Then, on a daily basis, the PI and the trained research assistants moved to these facilities as a team, then as the clients came to the facility for the services, the HIV positive mothers who met the inclusion criteria were sampled using convenient sampling method because they were few and available at the facility at that time, these were then selected to participate in this study after their full consent that was documented on the consent form. The team did this after obtaining permission from the District Health Officer and the in charge of the facility to carry on this exercise.

3.6 Study variables

The dependent variable: This is EID of HIV among children born to HIV positive mothers. Early Infant Diagnosis in this study is defined as a diagnosis done for an infant/child from six weeks of birth using DNA/PCR test after obtaining a dry blood spots (DBS) from the child. EID was measured by a documented HIV test result with DNA/PCR test using DBS samples at six (6) weeks.

The independent variables: These are the socio-demographic, health system and maternal factors associated with EID of HIV among the children born to HIV positive mothers. These included:

The socio-demographic factors like the age of the mother, mother's level of education, income, marital status, and the employment status were taken into consideration.

Health system factors like supplies for DBS, counseling messages, distance from the health facility, appointment schedules, and linkages to EID sites and the follow up plan.

Maternal factors like mother's attitude towards EID, disclosure of child's status, the ART status, knowledge of EID, and belonging to a psychosocial support.

3.7 Sources of data

Data was obtained from HIV positive mothers and caregivers who had HIV exposed children aged between 6 weeks to 18 months and verification of the EID register was done to confirm result and the date of the first DBS for DNA/PCR test.

3.8 Instruments/Tools

Description of the tool: A pre-tested questionnaire with closed ended questions was used to collect quantitative data from the participants. The tool was written in English and the research assistants were selected considering their ability to translate easily whenever necessary into the local language for a few respondents that needed clarity in the local language.

Pre-testing: This was done among 10 HIV positive mothers/caregivers with children receiving HIV services within these facilities a week before the actual data collection started since the clients come from all over the district. This was to ensure validity and reliability so that corrections were made before the final data collection exercise from the facilities identified.

Reliability: This is greatly affected by random error that is in three categories for example random error due to inaccuracy of the instrument which will be addressed by pretesting of the questionnaire. Random error due to inaccuracy of the scoring by the researcher will be addressed by the coding which has already been done on the questionnaire prior to the data collection indicating the data being collected will already be coded hence decreasing the errors. The third type of error that can affect reliability is unexplained error which is difficult to control for in general.

Validity being the degree to which results obtained from the analysis of the data represents the phenomenon under study. To ensure this, the questions in the questionnaire were developed in line with the variables that are outlined in the conceptual framework for accuracy and meaningfulness of the inferences of the data that was collected.

3.9 Data collection techniques

A researcher administered questionnaire technique was used to collect the data as the HIV positive mothers or caregivers had varying levels of education. The PI was assisted by the research assistants who underwent a two days training on this exercise to get familiar with the concept and the data collection tool. This captured both the qualitative and quantitative data about early infant diagnosis of HIV among the children born to HIV positive mothers and the associated factors. The questionnaire had mainly closed ended questions with very few open ended ones.

3.10 Plan for data management

Filled in questionnaires were checked by the researcher immediately as the research assistants handed in to check for completeness and appropriate responses so that the missing information was easily rethought from the mother before she left.

The data was kept under lock and key to ensure confidentiality.

Then cleaning and coding of the data was done for easy analysis.

Double entry into epidata software and then exported to SPSS (Statistical Package for Social Scientists) for analysis.

3.11 Data analysis plan

Descriptive statistics were presented in tables and graphs, used for the continuous and categorical variables.

The continuous variables were summarized into: the mean, standard deviation, interquantile range, median and histograms.

The categorical variables were summarized and presented in tables, pie charts and bar graphs.

a) **Bi variate analysis:** The relationship between the independent and dependent variable were tested where the chi square and logistics regression were used to test the relationship between the categorical independent variables and the dependent variable (Early Infant Diagnosis). P value = 0.05 was considered as the level of significance for the relationship between the dependent and independent variables.

b) **Multivariate analysis:** Was not done because of the small sample size obtained. Therefore,

the strength of association could not be done because of the small sample size as determined by the target population that was less than 10,000. P-values of 0.05 were used to determine the level of significance. Data was then entered into the statistical package for social sciences (SPSS) for analysis and an output was made.

3.12 Quality control measures for minimization of Errors/Bias

- Pre - testing and revision of the questionnaire as appropriate was done.
- There was a training of the research assistants for two days prior to the data collection exercise; this was to ensure that they were familiar with the main concepts of this study.
- Immediate checking of the filled in questionnaires on a daily basis for completeness was done.

- Use of serialized/numbered questionnaires to keep track and ensure confidentiality is kept.
- Double entry and coding of the results before analysis was done.
- Proof reading of the draft report before final submission to the University.

3.13 Ethical issues.

- There was no use of the respondent's name on the questionnaire, only serial numbers were used to ensure anonymity and confidentiality.
- Permission was thought from IHSU Administration who availed an introductory letter.
- Permission was also sought from Kapchorwa District Health Office to conduct the research.
- Informed consent was obtained from all complying clients and this was verified on the questionnaire with either a thumb print or respondent's signature. These participants were informed of the purpose of this study, the benefits, risks and their study rights in the local language for example the right to freely withdraw from the study at anytime.
- Study participants were interviewed face to face in privacy to ensure that they were free to respond to any of the questions in a conducive environment.

CHAPTER FOUR: RESULTS

4.1. Introduction

This chapter presents the study findings of 130 respondents although 147 were to be interviewed; however 130 were accessible during the period of data collection. The study aimed at establishing the associated factors of EID among the exposed children born to HIV positive mothers attending HIV care services in Kapchorwa district. The variables examined in this chapter have been the basis under which data was analyzed. After the data collection, it was cleaned, coded then entered into epidata where it was exported to SPSS for analysis. Descriptive analysis, bivariate analysis, chi square test and linear regression analysis were used for analysis. Tables and graphs have been used in the presentation of the information. However, multivariate analysis was not done because of the small sample size.

4.2. The socio- demographic characteristics of the mothers/caregivers of the children born to HIV positive mothers attending HIV care services in Kapchorwa district

Table 1 reveals that majority of the respondents 79(60.8%) were aged 25-35 years, only 2(1.5%) were aged between 45-54 years as compared to 23(17.7%) aged between 15-24 years. 118(90.8%) were biological mother and only 12(12%) were caregivers. Regarding parity, 91(70%) of the respondents had less than 4 children while 39(30%) had more than 4 children. Only 1 (0.8%) respondent was a male while 129(99.2%) were females. 58(44.6%) had acquired primary level of education while only 2(1.5%) had reached tertiary level and 28(21.5%) had not attended school at all. For marital status, 92 (70.8%) were married compared to 10(7.7%) who were single. For income level, 103(83.1%) of the respondents earned less than 100,000 shillings compared to only 1(1.7%) who earned between 200,000-300,000 shillings per month, only 14(10.8%) of them were employed while the majority 116(89.2%) were unemployed.

Table 1: Socio-demographic characteristics of caregivers in Kapchorwa district

Variable	Category	N	%
Age of care givers	15-24	23	17.7
	25-34	79	60.8
	35-44	26	20.0
	45-54	2	1.5
Relationship with child	Mother	118	90.8
	Caregiver	12	12.0
Parity	≤4 children	91	70.0
	>4 children	39	30.0
Sex of caregiver	Male	1	0.8
	Female	129	99.2
Level of education	None	28	21.5
	Primary	58	44.6
	Secondary	42	32.3
	Tertiary	2	1.5
Marital status	Single	10	7.7
	Married	92	70.8
	Widowed	8	6.2
	Separated/divorced	20	15.4
Income	<100,000	108	83.1
	100,000-200,000	20	15.4
	200,000-300,000	1	1.7
Employment status	Employed	14	10.8
	Unemployed	116	89.2

Level of significance 0.05

4.3. Demographic characteristics of the exposed children

Table 2 reveals that majority of the children 74(56.9%) were aged less than or equal to 14 months as compared to 56(43.1%) who were aged more than 14 months. As regards the sex of the children, 66(50.8%) were male compared to 64(49.2%) who were female.

Table 2: Demographic characteristics of children

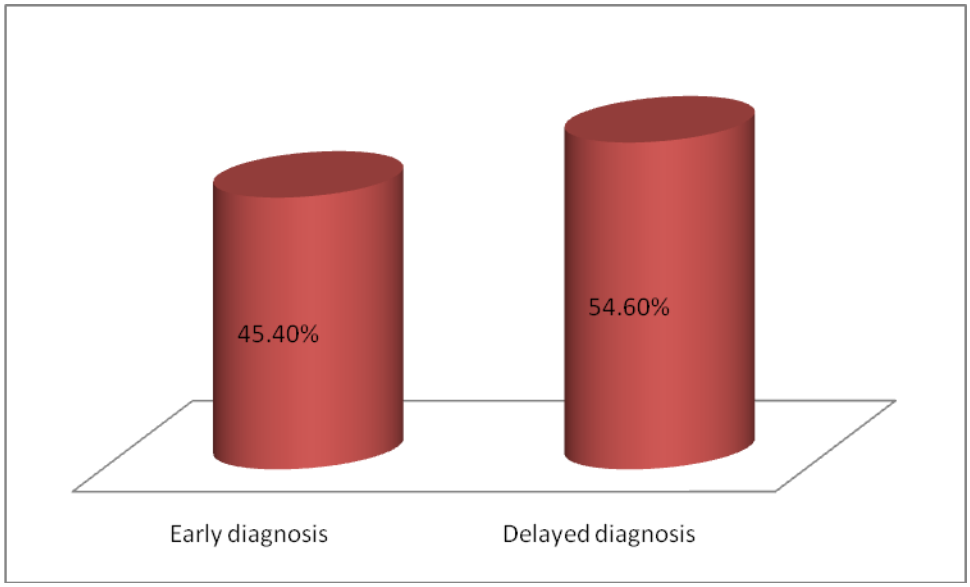
Variable	Category	N	%
Age	≤14 months	74	56.9
	>14 months	56	43.1
Sex	Male	66	50.8
	female	64	49.2

Level of significance 0.05

4.4. Distribution of the children according to when the HIV diagnosis was made

Of the 130 exposed children, 59(45.4%) had EID of HIV at six weeks compared to 71(54.6%) who had delayed diagnosis of HIV.

Figure 2: Distribution of the exposed children according to when HIV diagnosis was made



4.5. Socio demographic characteristics of the mothers/caregivers associated with Early Infant Diagnosis of HIV among the exposed children

Table 3 reveals that of the caregivers aged between 15-24 years who were 23(17.7%) of all the respondents, 13(22%) of these were associated with Early Infant Diagnosis as compared to only 10(14.1%) who were associated with late diagnosis. (X^2 = 2.949, P = 0.399). For those aged 25-34 years who were 79(60.8%), 35(59.3%) of these were associate with early infant diagnosis whereas 44(62.0%) were associated with late diagnosis. In addition, those aged 45-54 years were only 2(1.5%) of all the respondents, none of them was associated with early infant diagnosis meanwhile the 2(2.8%) were associated with late diagnosis.

As regards the relationship of the respondents to the exposed child, it has been revealed that out of the 130 respondents, 118(90.8%) were the biological mother of the exposed child. Of these 54(91.5%) were associated with early infant diagnosis while of the 12(9.2%) are just caregivers to the exposed child. Of the biological mothers, 54(91.5%) of them are associated with early infant diagnosis as compared to 5(8.5%) of the caregivers who are also associated

with early infant diagnosis. Of the biological mothers, 64(90.1%) are associated with late diagnosis compared to 7(9.9%) of the caregivers who are associated with late diagnosis of HIV among the exposed children born to HIV positive mothers in Kapchorwa district. ($X^2 = 0.074$, $P = 0.786$) as shown in the table 3 below.

As regards the parity of the respondents, 91(70.0%) of them had less than four (4) children of which 37(62.7%) of them were associated with early infant diagnosis, while 54(76.1%) were associated with late diagnosis; ($X^2 = 73$ of and $P = 0.098$). This is compared with 39(30.0%) of the respondents who have more than 4(four) of which 22(37.3%) are associated with early infant diagnosis and 17(23.9%) of these are associated with late diagnosis of HIV among the exposed children born to HIV+ mothers in Kapchorwa district.

The findings in table 3 also reveal that only 1(0.8%) is male and is not associated with early infant diagnosis while 129(99.2%) of them are female and of which 59(100%) were associated with early infant diagnosis as compared to 0 of the male, In addition, 1(1.4%) of the male is associated with late diagnosis whereas 70(98.6%) of the female are associated with late diagnosis. This indicates that there is no association between the sex of the respondents and Early Infant Diagnosis of HIV among the exposed children. ($X^2 = 0.837$ and a $P = 0.36$).

From table 3 below, according to the level of education, of the 130 respondents, 28(21.5%) had no education at all, while those who had attained primary level were 58(44.6%), those who had attained secondary level were 42(32.3%) and tertiary level were only 2(1.5%). Among the respondents who were associated with Early Infant Diagnosis, 13(22%) had no education at all, while 23(39.0%) had attained primary education, 22(37.3%) had attained secondary education

and only 1(1.7%) had acquired tertiary education. From this study, education level did not show any significant association with Early Infant Diagnosis (P = 0.653).

In regard to marital status, of all the respondents who were associated with EID, 3(5.1%) were single, 41(69.5%) were married, 3(5.1%) were widowed and 12(20.3%) were separated/widowed. This reveals that marital status in this study is independent of Early Infant Diagnosis (P = 0.407).

With income level, table 3 below shows that of the respondents who are associated with Early Infant Diagnosis, 46(78.0%) earn less than 100.000 shillings compared to 8(20.3%) who earned between 100.000-200.000 shillings and only 1(1.7%) was earning between 200.000 and 300.000 shillings. This revealed that there is no association between income level and Early Infant Diagnosis (P = 0.353).

According to Employment status, 7(11.9%) of those associated with Early Infant Diagnosis were employed as compared to 52(88.1%) who were unemployed. This indicated that employment is not associated with Early Infant Diagnosis according to this study (P = 0.713).

Table 3: Socio-demographic factors of care givers associated with early infant diagnosis of HIV among children born to HIV positive mothers in Kapchorwa district

Variable	N (%)	Early Dx	Late Dx	χ^2	P-value
Age of care givers					
15-24	23(17.7)	13(22.0)	10(14.1)	2.949	0.399
25-34	79(60.8)	35(59.3)	44(62.0)		
35-44	26(20.0)	11(18.6)	15(21.1)		
45-54	2(1.5)	0(0.0)	2(2.8)		
Relationship with child					
Mother	118(90.8)	54(91.5)	64(90.1)	0.074	0.786
Caregiver	12(9.2)	5(8.5)	7(9.9)		
Parity					
≤4 children	91(70.0)	37(62.7)	54(76.1)	2.732	0.098
>4 children	39(30.0)	22(37.3)	17(23.9)		
Sex of caregiver					
Male	1(0.8)	0(0.0)	1(1.4)	0.837	0.360
Female	129(99.2)	59(100.0)	70(98.6)		
Education level					
None	28(21.5)	13(22.0)	15(21.1)	1.627	0.653
Primary	58(44.6)	23(39.0)	35(49.3)		
Secondary	42(32.3)	22(37.3)	20(28.2)		
Tertiary	2(1.5)	1(1.7)	1(1.4)		
Marital status					
Single	10(7.7)	3(5.1)	7(9.9)	2.904	0.407
Married	92(70.8)	41(69.5)	51(71.8)		
Widowed	8(6.2)	3(5.1)	5(7.0)		
Separated/divorced	20(15.4)	12(20.3)	8(11.3)		

Income					
<100,000	108(83.1)	46(78.0)	62(87.3)	2.080	0.353
100,000-200,000	20(15.4)	8(20.3)	8(11.3)		
200,001-300,000	1(1.7)	(1.7)	1(1.4)		
Employment status					
Employed	14(10.8)	7(11.9)	7(9.9)	0.135	0.713
Unemployed	116(89.2)	52(88.)	64(90.1)		

Level of significance 0.05

4.6. Health facility factors associated with Early Infant Diagnosis of HIV among children born to HIV positive mothers in Kapchorwa District

Of the respondents who were associated with EID, 58(98.3%) said supplies were always available compared to only 2(1.7%) who said there were frequent stock outs of the supplies revealing that there is association between availability of supplies and Early Infant Diagnosis (P = 0.271).

57(96.6%) of those who were associated with EID of HIV said the counseling messages were adequate while only 2(3.4%) of these said the counseling messages were inadequate indicating no association between the counseling messages and EID of HIV ($X^2 = 0.561$, P = 0.454).

According to table 4 below, 40(67.8%) of those who were associated with EID of HIV stayed less than 5kms from the Health facility while 4(6.8%) of them stayed within 5kms from the health facility and 15(25.4%) were staying more than 5kms from the facilities indicating no association between the distance from the health facility and EID of HIV among the exposed children in Kapchorwa district. ($X^2 = 4.617$, P = 0.099).

Of the respondents who were associated with EID, 57(96.6%) had a copy of the appointment schedule, only 2(3.4%) did not have it and non said had lost it showing that there was no association between the appointment schedule and EID ($X^2 = 3.841$, $P = 0.147$)

51(86.4%) of those who were associated EID of HIV had a monthly follow up visit, while only 3(5.1%) had a follow up visit once every two months/bimonthly and 5(8.5%) of them had a follow up whenever necessary revealing that frequency of the follow up is not dependent on EID ($X^2 = 841$, $P = 0.147$).

Considering linkage from entry point to EID (referral), of the respondents who were associated with EID of HIV among the exposed children, 6(10.2%) were referred verbally, another 6(10.2%) were referred with a written referral form while 40(67.8%) were escorted physically by a Health Worker and only 7(11.9%) were by self referral. This revealed a significant relationship between linkage (referral) and EID of HIV of the exposed children ($X^2 = 17.248$, $P = 0.001$).

Table 4: Health facility factors associated with early infant diagnosis of HIV among children born to HIV positive mothers in Kapchorwa district

Variable	N(%)	Early Dx	Late Dx	χ^2	Pvalue
Availability supplies					
Always available	129(99.2)	58(98.3)	71(100)	1.213	0.271
Frequent stock out	1(0.8)	1(1.7)	0(0.0)		
Counseling message					
Adequate	127(97.7)	57(96.6)	70(98.6)	0.561	0.454
Inadequate	3(2.3)	2(3.4)	1(1.4)		
Distance from health facility					
<5 Km	75(57.7)	40(67.8)	35(49.3)	4.617	0.099
About 5 Km	13(10.0)	4(6.8)	9(12.7)		
>5 Km	42(32.3)	15(25.4)	27(38.0)		
Appointment schedule					
Have a copy	123(94.6)	57(96.6)	66(93.0)	1.766	0.414
Don't have a copy	5(3.8)	2(3.4)	3(4.2)		
Lost it	2(1.5)	0(0.0)	2(2.8)		
Frequency of F/up					
Once every month	107(82.3)	51(86.4)	56(78.9)	3.841	0.147
Once every 2 months	14(10.8)	3(5.1)	11(15.5)		
Whenever necessary	9(6.9)	5(8.5)	4(5.6)		
Linkage to EID					
Verbally	13(10.0)	6(10.2)	7(9.9)	17.248	0.001
Written referral	29(22.3)	6(10.2)	23(32.4)		
Escorted by H/worker	64(49.2)	40(67.8)	24(33.8)		
Self referral	24(18.5)	7(11.9)	17(23.9)		

4.7. Maternal factors associated with Early Infant Diagnosis of HIV among children to HIV positive mothers in Kapchorwa District

Table 5 below shows that out of all the respondents, 119(91.5%) had disclosed the child's HIV status while 11(8.5%) had not done the disclosure. Of the respondents who were associated with EID, 58(98.0%) had disclosed the child's HIV status while only 1(1.7%) had not disclosed. This reveals that there is a significant relationship between EID of HIV and disclosure status of the baby ($X^2 = 6.386$, $P = 0.012$).

Among those who were associated with EID of HIV, 56(94.9%) were generally treated well by the family members after disclosure of the child's HIV status, 3(5.1%) were treated fairly and none of them was treated unfairly indicating no significant relationship between social support and EID of HIV among the exposed children ($X^2 = 2.324$, $P = 0.313$).

Considering those who were associated with EID of HIV, 37(62.9%) had had the knowledge of HIV status less than two years ago while 22(37.3%) of them had had the knowledge for more than two years, this indicates no significant relationship between duration of knowledge of HIV status and EID of HIV among the exposed children. ($X^2 = 0.015$, $P = 0.902$).

According to the ART status, of the respondents who were associated with EID of HIV, 40(67.8%) were on ART compared to 19(32.2%) who were not on ART. There was no indication of a significant relationship between the ART status and EID of HIV. ($X^2 = 0.095$, $P = 0.758$).

Of the respondents interviewed, 40(67.8%) had been on ART for less than two years as compared to 19(32.2%) who had been on it for more than two years resulting into insignificant relationship between duration on ART and EID of HIV among the exposed children ($X^2 = 0.274$, $P = 0.601$).

Table 5 below revealed that only 5(3.8%) belonged to a psychosocial support group,, while 125(96.2%) of the respondents did not belong to any psychosocial support group. Of those who were associated with EID of HIV, only 3(5.1%) belonged to a psychosocial support group while 54(94.9%) did not belong to any psychosocial support group ($X^2 = 0.448$, $P = 0.503$).

Table 5: Maternal factors associated with Early Infant Diagnosis of HIV among children born to HIV positive mothers in Kapchorwa district

Variable	N (%)	Early Dx	Late Dx	χ^2	P-value
Ever disclosed child's status					
Yes	119(91.5)	58(98.0)	61(85.9)	6.386	0.012
No	11(8.5)	1(1.7)	10(14.1)		
Social support-disclosure					
Well	119(91.5)	56(94.9)	63(88.7)	2.324	0.313
Fair	9(6.9)	3(5.1)	6(8.5)		
Unfair	2(1.5)	0(0.0)	2(2.8)		
Duration of knowledge of HIV status					
≤2 years	81(63.3)	37(62.7)	44(63.8)	0.015	0.902
>2years	47(36.7)	22(37.3)	25(36.2)		
ART status					
Yes	85(66.4)	40(67.8)	45(65.2)	0.095	0.758
No	43(33.6)	19(32.2)	24(34.8)		
Duration on ART					
≤2 years	89(70.1)	40(67.8)	49(72.1)	0.274	0.601
>2years	38(29.9)	19(32.2)	19(27.9)		
Belong to psychosocial support					
Yes	5(3.8)	3(5.1)	2(2.8)	0.448	0.503
No	125(96.2)	56(94.9)	69(97.2)		

Level of significance 0.05

CHAPTER FIVE: DISCUSSION

5.1 Introduction

This study set out to establish the factors associated with Early Infant Diagnosis among the children born to HIV positive mothers in Kapchorwa District. It was also set to establish the proportion of children who have had EID of HIV. This chapter therefore will attempt to appraise the findings from the present study and put them in the perspective of existing literature on the topic of Early Infant Diagnosis of HIV and the associated factors. The major outcomes of this study, EID of HIV and delayed diagnosis were modeled as functions of various socio-demographic, Health System and maternal factors.

5.2 Proportion of EID of HIV

The proportion of the exposed children who had undergone Early Infant Diagnosis of HIV at the recommended six weeks, which is 45.4% of all the exposed children that took part in this study, was slightly above the national average of 40%. This could be due to the fact that this study has been done almost a year apart so with the existing interventions by both the Ministry of Health and other implementing partners, the improvement can be justified. The implication of this is that most of the exposed children can be identified and the appropriate interventions started early hence minimal complications and better quality of life for the children.

This finding is in line with the PMTCT fact sheet 2012, where few infants born to HIV positive mothers receive EID of HIV services; 6% in 2009, 11% in 2011 as revealed by Patton J., et al (2007). However, the general trend indicates that as the years go by there seems to be improvement hence the need to strengthen the interventions.

In addition, another study carried out in Malawi by Braun., et al, (2004-2008) is in agreement, 53.7% of the exposed infants received the HIV DNA PCR test, and this is slightly above the results of this study. Another study conducted in Rwanda by Binagwaho. A., et al (2008-2010), found that more than 30,000 children were newly infected with HIV each year and only 28% of these were able to benefit from EID. This gap left a lot to be desired in addressing the factors that influence EID of HIV in this country implying that from the Public health point of view, if this gap is not reduced, more and more children will be infected with HIV hence contributing to a bigger population affected and infected with HIV.

5.3 Socio-demographic characteristics of the respondents.

This study revealed that there is no association between age of the respondent and EID of HIV. The findings are consistent with a similar study in Zambia conducted by Torpey. K ., et al (2012), to estimate the rate of perinatal HIV transmission among 28,300 infants aged between 0-12 months born to HIV positive mothers, it was revealed that an estimated 45.9% of the mothers were below 30 years. The findings of this study show that the age bracket 25-34 years had more association with EID of HIV among the exposed children. The possible reason could be that most of the respondents studied were from this age bracket.

Although there was no significant relationship between sex of care giver and EID of HIV, majority of the caregivers were female. This was so probably because women are the primary caregivers of these exposed children. In addition, women generally have better health seeking behavior than men. This is contrary to study by (Boender. S., et al. 2012) in three clinical sites in Uganda conducted to assess the factors related to timing of treatment initiation, “those living with parents” was revealed as a significant factor. (OR= 3.93 P = 0.002).

From this study, the education level did not show any significant association with EID of HIV at bivaraiate level of analysis (P = 0.653) although education increases an individual's level of knowledge and facilitates access to information.

Although majority of the respondents were married, however, at bivariate analysis, marital status was not significantly associated with EID of HIV in this study, (P = 0.407).

This study found out that most of the respondents were unemployed compared to the rest of the employment category. According to the study, few of those who were employed were associated with EID of HIV among the exposed children. This was probably due to the fact that most of the respondents interviewed were in the unemployed category. Secondly, following from above, most of the respondents had low level of education (primary), therefore, majority of them are not in formal employment. At bivariate level of analysis, there was no significant association between employment and EID of HIV. (P = 0.713). This study finding is consistent with other study by Boender. S., et al (2012) where unemployment of care givers was found to be significant (OR = 4.26 P = 0.001).

According to income level, majority of the respondents were low earners. This could be explained by the fact that most of the respondents were not in formal employed and majority of these were self employed on small scale. This study revealed that there was no association between income level and EID of HIV of the exposed children at bivariate level of analysis (P = 0.353). However, in another study in Mozambique, income level was significantly associated with EID of HIV (OR=10.8, CI=3.42-34.0). This could be so because of methodological differences as this was a cohort retrospective study and a bigger sample size of 443 mothers was used.

5.4 Health system factors associated with EID of HIV

From this study, availability of supplies was regarded highly. This could be explained by the fact that most of these respondents had had their children tested though they could not ascertain the importance of early diagnosis which is at six weeks. All they knew was about the child being tested but the timing was not an issue to them. However, at bivariate analysis, there was no significant association found between availability of supplies and EID of HIV. (P = 0.271).

Counseling messages was yet another variable considered in this study and it was revealed that counseling messages were adequate enough for them to make informed decisions concerning the health of their exposed children at univariate level. The findings in this study at bivariate level reveal that EID of HIV is independent of the counseling messages to the care givers by the health workers. (P = 0.454). This study is not in agreement with findings in the annual PMTCT report for STAR-E (unpublished 2012), where loss to follow up of mother-infant pairs was noted to be high with most of the mothers not coming after the first visit which was associated with poor counseling messages by health workers in the facilities. Similarly, in another study in Rwanda by Binagwaho et al (2008-2010) and Adeniyi., (2013), also reported that poor counseling skills affected uptake of EID services in the country. The implication of this would be more children missing out on EID hence increased cases of pediatric HIV.

How far a care-taker stayed from the health facility was thought to be another important factor in EID of HIV, and from this study, it was revealed that most of the respondents stayed at a distance less than 5 kilometers form the Health facility. At bivariate analysis, there was no relationship found between EID of HIV and the distance of the respondent from the Health facility (P = 0.099).

Majority of the respondents had a copy of the appointment schedule for the exposed child. This indicated that the system had been designed to have the baby reviewed at given intervals and the caregivers were adhering to it by keeping and presenting a copy at every visit. At bivariate analysis, appointment schedule was not associated with EID of HIV (P = 0.414). However, appointment schedule acts as a reminder for the caregiver to keep track of the required visits for better outcome.

The frequency of follow up was also another variable that was taken into consideration during the conduction of this study. It was revealed that although most of the respondents had a monthly follow up visit , no significant association was found at bivariate level of analysis (P = 0.147). Other studies else where for example from South Africa revealed that without a systematic & structured plan that includes Early Infant Diagnosis at six weeks, up to 85% of HIV exposed infants are lost to follow up from PMTCT sites by one year of age(Patton J., et al, 2007). In addition, another study conducted in Uganda by Kiyaga. C., et al (2005) in 20 EID collection sites, showed significant attrition rates post testing. Approximately 43% of infants tested for EID never received their results at three referral hospitals and there was continued attrition of HIV positive infants prior to enrolling in ART services. The major challenges reported were delay to return the test results and lack of follow up.

Linkage from the entry points to the EID care point (referral) was considered and most of the respondents were escorted physically by a health worker. This was so because many mothers or caregivers had been found to get lost on their way to the care point. However at bivariate analysis, linkage was found to have a statistically significant relationship with EID of HIV of the exposed children (P = 0.001). Another study by Sherman., et al (2004) is in agreement and also documented linkage as an important factor in EID. The public Health implication of this

linkage is that each and every exposed child will have an opportunity to access the necessary care as early as possible in the appropriate time hence reduce on the complications in regard to pediatric HIV.

5.5 Maternal factors associated with EID of HIV

Disclosure of the exposed child's HIV status had a significant association with EID of HIV at bivariate analysis level (P = 0.012). This finding is contrary to another study done in South Africa by AIDS Care (2010) where disclosure of the child's HIV positive status was found to be a hindrance to the uptake of EID services. However disclosure has been found to play a key role in the care of children diagnosed with HIV.

The findings from this study also indicate that social support after disclosure of the child's status was not dependent on EID of HIV of the exposed children (P = 0.313). Majority reported that they were treated well even after the disclosure of the child's HIV status and none of them was treated unfairly, indicating that the community level of sensitization has improved. The public health implication of this is that the level of stigma in the community will be minimal hence better outcome and more people will be able to seek attention as early as possible.

Another important variable considered in this study was the duration of knowledge of HIV status; most of them had had the knowledge of HIV status less than two years ago meaning that majority were newly diagnosed in the recent past. However at bivariate level of analysis, there was no significant association (P = 0.902). Other studies do not concur with this finding; following a study conducted in three immunization clinics in Kwazulu Natal in South Africa by Nigel. R., et al (2009), it was concluded that screening all infants at immunization points is acceptable and feasible as a means of identification of HIV infected children hence referral for

early initiation into care. Therefore, passing on the knowledge about EID of HIV as early as possible yields good results implying that these people also become good ambassadors.

ART status of the respondents was another factor thought to be significant in EID of HIV. However, from this study, it was revealed that the ART status of the respondent had no association with EID of HIV (P = 0.758). The study conducted in Malawi by Braun M., et al (2004-2008) is contrary to the findings in this study since it was concluded that initiation of ARVs increased the likelihood of survival seven fold (OR 7.1, 95% CI 3.68 – 13.70) and this can only be possible through Early Infant Diagnosis of HIV. The findings in this study are also contrary to a study conducted by Violari A, et al (2008) in collaboration with DAIDS of the National Institute of Health (NIH) on early antiretroviral therapy and mortality among HIV-infected infants. It was revealed that early HIV diagnosis and early ART reduced early infant mortality by 76% and HIV prognosis by 75%.

5.6 Methodological issues

The results of this study must be considered with caution because of the following methodological issues:

- The mothers or caregivers may have given the responses that they felt the researcher needed to hear leading to information bias and resulting in higher scores.

- Most of the variables studied were not significantly associated with Early Infant Diagnosis of HIV probably because the sample size was small and the required sample size was still not reached during data collection due to a small target population. Therefore the study lacked the power to detect the strength of the association since multivariate analysis could not be done.

CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

1. The level of Early Infant Diagnosis in this study was slightly higher than the national level figures.

2. Linkage from all entry points to the EID care point was found to b a significant variable.

3. Disclosure of the child's HIV status was also found to be a significant variable that influences EID of HIV among the exposed children.

6.2 Recommendations

These recommendations are made against the findings of the study and they include:

1- The study revealed that disclosure of the child's HIV status was significantly associated with EID of HIV therefore mothers/caregivers must be encouraged to disclose to someone they are free with for a better outcome.

2- Secondly, the study further found out that linkage of the exposed child to the EID of HIV care points is also significantly associated with EID of HIV. Therefore, appropriate referral mechanisms should be instituted by each setup designed to offer pediatric HIV care services.

3- Every health worker involved in the management of pregnant and lactating mothers and generally mothers of reproductive age should undergo in service training on EID of HIV for both the new and already serving Health Workers. Every health worker should be an agent of change in identifying the exposed children and bring them for care as appropriate.

The Government must invest in awareness campaign on EID of HIV all over the country and Health Workers should be empowered to make the difference wherever they are working.

4- There are pointers indicating that the integration of the HIV test for the exposed children to the six week immunization schedule is the direction to go in identifying the HIV exposed children. This integration of the two programs is the pathway to the goal of achieving zero infection and mortality of children from the HIV related illness by 2015. Other avenues for integration may be the postnatal care and the OPD programmes.

5- There is urgent need for science to develop at least same-day technique of diagnosis of HIV in children similar to the rapid test in adults, so that the dropout rate or loss to follow up with the DNA/PCR can be reduced to 0% if there is a point of care (same-day test with results). This is a future direction for pediatric HIV care as a whole.

6- Further inquiry should be done on a large scale for example at a regional level so as to make comparison to generalize the findings to a bigger population therefore this calls for more funding into paediatric HIV interventions.

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Appendix A: Informed consent

Topic: Early Infant Diagnosis of HIV and its determinants among exposed children born to HIV positive mothers in Kapchorwa district

Hello, my name is ***Achebet Sylvia***; I am the Principal Investigator in this study which is intended to investigate Early Infant Diagnosis and its determinants among children born to HIV infected mothers in Kapchorwa district.
To achieve this purpose, your honest and genuine participation is very important and is highly appreciated in order to improve on pediatric HIV care.

Consent
I request you to answer the questions and your individual responses are strictly confidential and will be used for the purpose of this research only. You are free to participate or withdraw at will any time. However your honest response to these questions will help us to understand the situation and contribute to the measures undertaken to eradicate mother to child transmission of HIV infection.

Risks, Benefits and Costs:
There are no risks involved, no direct benefits and no costs incurred in you taking part in this study; however the information got from this study will help policy makers, health care providers and other stakeholders in planning appropriate interventions to curb pediatric HIV infection and hence zero infections among the newborns by 2015.

Would you be willing to participate? Yes ☐ No ☐

If yes proceed and sign/ thumb print below

Signature or thumb print of the respondent

…… Date…..…/……/2013

Name of person administering questionnaire (Optional)

…… Date…..…/……../2013

Signature of person administering questionnaire

…….
Appendix B: Study Questionnaire

Early Infant Diagnosis and the associated among children born to HIV infected mothers in Kapchorwa District

Questionnaire serial number……..

NB: Place a code e.g. 1 along the each item according to the response given by the participant.

A: Socio-demographic characteristics

Serial No	*Questions*	*Response categories*	*Code*
1	Age of respondent in years	1. 15-24 2. 25-34 3. 35-44 4. 45-54	
2	Relationship with child	1. Mother 2. Caregiver	
3	Parity	1. </= 4 children 2. > 4 children	
4	Sex of respondent	1 Male 2 Female	
5	Level of education	1 Never went to school 2 Primary 3 Secondary 4 Tertiary	
6	Marital status	1 Single 2 Married	

		3 Widowed 4 Separated/Divorced	
6	Income:	1. < 100,000 2. 100,000-200,000 3. 200,001-300,000 4. > 300,000	
7	Employment status: What do you do to earn a living?	1.Employed 2. Unemployed	

B: Health System factors

Serial no	*Question*	*Response categories*	*Code*
8	Are the supplies for testing the babies for HIV available?	1. Always available 2. Sometimes available 3. Frequent stock outs	
9	Are the counseling messages from Health workers adequate?	1.Adequate 2. Inadequate 3. Not sure	
10	What is the distance from your home to this Health facility?	1 </= 5 Kms 2 > 5 Kms 3 about 5 Kms	
11	Do you have an appointment schedule for the baby?	1. Have a copy 2. Don't have a copy 3. Lost it	
12	Follow up: How often do you	1 Once every month	

	come for HIV related services here?	2 Once every two months 3 Whenever necessary	
13	Linkage from entry points to EID: How were you referred to this clinic?	1. Verbally 2. Written referral 3. Escorted by H/Worker 4. Self referral	

C: Maternal factors

Serial no	Question	Response categories	Code
14	Attitude: Do you think it's a good idea to test children as early as this?	1. Yes 2. No 3. Not sure	
15	Have you disclosed the baby's HIV status to any one?	1. Yes 2. No	
16	How have you been treated by the family after disclosure?	1 Well 2 Fairly 3 Unfairly	
17	If HIV+, When were you diagnosed to have HIV?	</= 2 years >2years	
18	Are you already on ART medicines?	1.Yes 1. No	
19	For how long have you been on ART?	1 </= 2years 2 > 2years	

20	Do you belong to any psychosocial-support group?	1 Yes 2 No	
21	Do you think the group has been of help in regard to your health?	1 Yes 2 No	

Information concerning the child

22. Age in months ☐

23. Date of birth ☐ ...../...../.....

24. Sex a) Male ☐ b) Female ☐

25. At what age was the first HIV test done? ☐ ...../...../...

26. a) Appropriate time of testing ……

27. Diagnosis status

0. Early ☐

1. Delayed ☐

28. HIV status

a) Positive ☐ b) Negative ☐ c) Awaits result ☐

Thank you

APPENDIX C: WORKPLAN

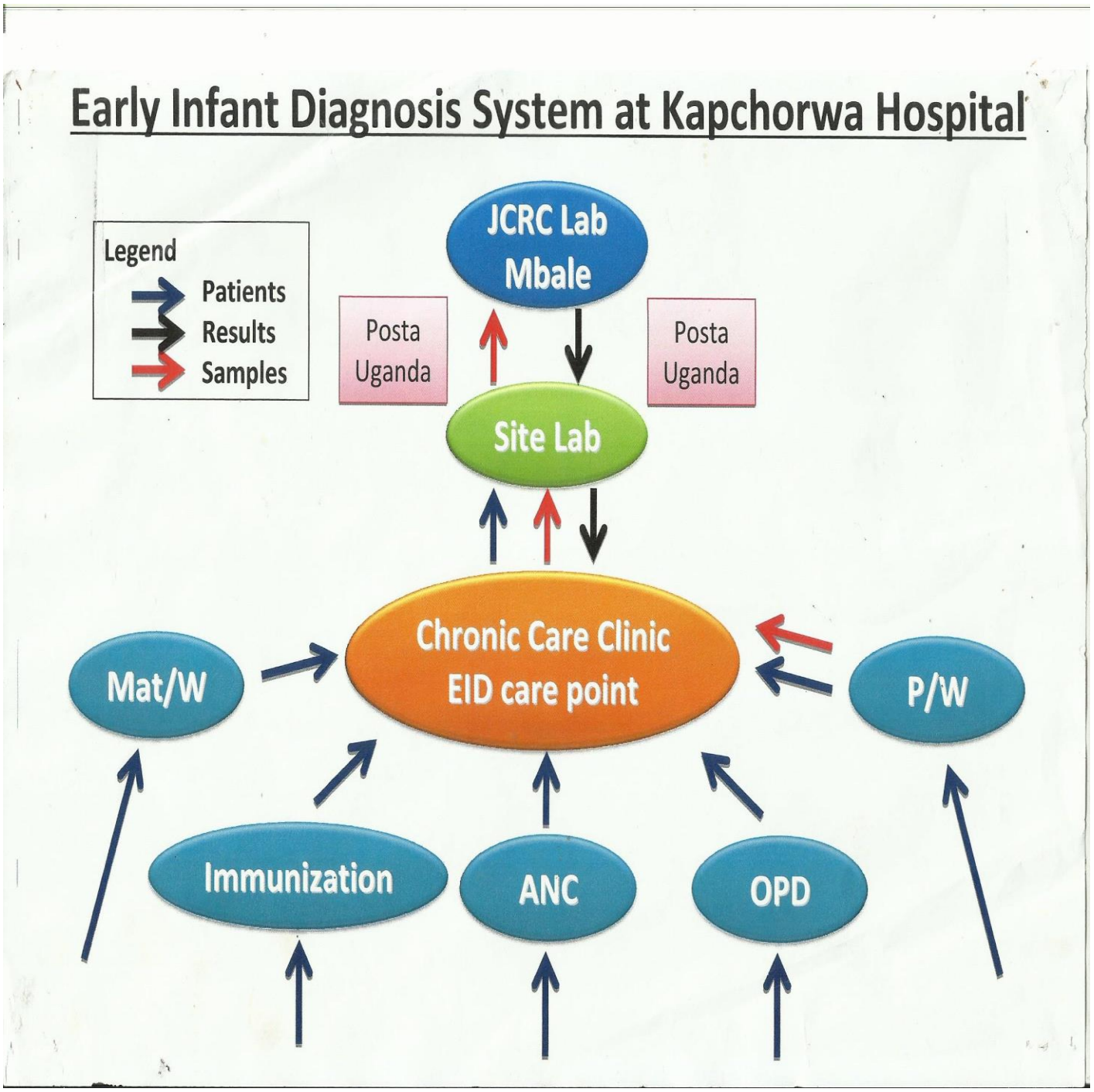
Activity	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**

Proposal writing						
Identifying RAs						
Training RAs						
Pretesting questionnaires						
Data collection						
Data entry, analysis						
Results interpretation						
Report writing						
Handing in draft report						
Editing report						
Final approval of report						
Dissemination of report						

Appendix D: Proposed research budget

Item	Description	Rate/Unit	Total cost

Research fee	1	1,000,000	1,000,000
Ream of papers	5	15,000	75,000
R/ Assistants Facilitation	5	50,000	250,000
Data analysis	1	500,000	500,000
Printing/Binding	4	30,000	120,000
Contingency	10%	194,500	194,500
Grand Total			**2,139,500**


Early Infant Diagnosis System at Kapchorwa Hospital
Legend
Patients
Results
Samples
JCRC Lab Mbale
Posta Uganda
Posta Uganda
Site Lab
Chronic Care Clinic EID care point
Mat/W
P/W
Immunization
ANC
OPD

IHSU INTERNATIONAL HEALTH SCIENCES UNIVERSITY

PART OF INTERNATIONAL MEDICAL GROUP

Office of the Dean, Institute of Health Policy & Management

Kampala, 26th July 2013

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

Re: Assistance for Research

Greetings from International Health Sciences University.

This is to introduce to you **Ms. Achebet Sylvia, Reg. No. 2012-MPH-FT-012** who is a student of our University. As part of the requirements for the award of a Masters Degree of Public Health of our University, the student is required to carry out field research for the submission of a Research Project

Ms.Achebet would like to carry out research on issues related to: **Early infant diagnosis of HIV and associated factors among children born to HIV positive mothers in Kapchorwa district.**

I therefore request you to render the student such assistance as may be necessary for her research.

I, and indeed the entire University are thanking you in anticipation for the assistance you will render to the student.

Sincerely Yours,

INSTITUTE OF HEALTH POLICY AND MANAGEMENT IHSU

Prof. David Ndungutse Majwejwe
Director, Institute of Health Policy & Management