

**PREDICTORS OF ADHERENCE TO CLINICAL APPOINTMENTS
AMONG CAREGIVERS OF INFANTS ON HIV CARE IN
KAKAMEGA COUNTY REFERRAL HOSPITAL, KENYA**

**BY
HABEL A. ALWANG'A**

**A THESIS SUBMITTED IN PARTIAL FULFILMENT FOR THE
REQUIREMENTS FOR THE AWARD OF THE DEGREE OF
MASTER OF PUBLIC HEALTH
EPIDEMIOLOGY & POPULATION HEALTH**

DEPARTMENT OF PUBLIC HEALTH

MASENO UNIVERSITY

©2020

DECLARATION

STUDENT

I declare that this thesis is my original work, and it has not been presented to any other university or college for award of a degree or diploma.

Signature.....Date.....

HABEL ANG'ANI ALWANG'A

REG. NO. EL/ESM/00389/2013

SUPERVISOR' S APPROVAL

We confirm that this thesis has been submitted for examination with our approval as
University Supervisors

Signature Date

DR. WILSON OKUMU

DEPARTMENT OF MEDICAL BIOCHEMISTRY

MASENO UNIVERSITY

Signature Date

DR. PAUL O. ANG'IENDA

DEPARTMENT OF ZOOLOGY

MASENO UNIVERSITY

ACKNOWLEDGEMENT

I wish to thank my Supervisors Dr. Wilson Okumu and Dr. Paul Ang'ienda as well as the contribution of the academic supervisor, Dr. Collins Asweto who were more than generous with their expertise and precious time and spending countless hours of reflecting, reading, revising, encouraging, and most of all patience throughout the entire process.

I am also very grateful to Maseno University School of Public Health and Community Development for giving me an opportunity to undertake the course.

I would like to acknowledge and thank staff members of Kakamega County Health Department as well as the Kakamega Referral Hospital's MCH clinic for allowing me to conduct my research in the county and aiding whenever requested. Special thanks goes to Dr. Ayub Misiani, who served as the county director when I did the study, and Jedidah Ambale, the nursing officer of the clinic, and all health workers for providing information whenever needed.

To all the respondents who participated in the interviews, I am tremendously appreciative of the support you gave me on a journey of exploration that we knew could be immensely challenging and demanding in parts.

ABSTRACT

Poor attendance in scheduled clinical appointments in HIV care affects transmission of HIV from an infected mother to the infant (MTCT), clinical processes, and treatment outcomes. Whereas the increased morbidity and mortality associated with HIV care discontinuation is well established, few studies have reported appointment adherence among caregivers of infants in HIV care. Predictors of adherence to appointment in caregivers of infants on HIV care remain unexplored, while the MTCT rate in Kakamega is higher than surrounding Counties despite > 80% of the pregnant women receiving a HIV test. This study sought to determine predictors of clinical appointment adherence among caregivers of children ≤ 18 months on HIV care at Kakamega Referral Hospital. Specific objectives were; to assess socio-demographic factors, clinical factors and develop a prediction model for clinical appointment adherence among caregivers of infants in HIV care. Using a descriptive cross-sectional study design and through systematic random sampling technique, total of 156 caregiver-infant pairs were selected. Caregivers were interviewed using structured questionnaire, and their appointment records used to deduce adherence to appointment. Socio-demographic and clinical factors influencing adherence to appointment were analyzed using descriptive statistics, odds ratios, and univariate binary logistic regressions. An appointment adherence predictive model was developed using multivariate logistic regression and further validated using Nagelkerke's R² and the Receiver Operating Characteristic (ROC) curve. Overall, 43.6% of the participants reported $\geq 90\%$ status of appointment adherence. Socio-demographic variables that showed significant association with adherence to clinical appointment were number of people staying with caregivers ($p=0.025$); age of 15-24 years ($p=0.016$); staying with someone ($p=0.040$); staying with ≥ 2 people ($p=0.025$); ≥ 2 forms of reminders ($p < 0.001$); husband as a reminder ($p=0.011$); those with a child aged of 2 – 5 months ($p=0.002$); and those with HIV exposed or infected infants ($p < 0.001$). Clinical variables that showed significant association with adherence to clinical appointment were: early ANC starters ($p < 0.001$); optimal attendance of ANC visits ($p=0.036$); less than 10 clinical appointments ($p=0.047$); self-reporting $> 80\%$ adherence ($p=0.035$); and with child birthweight of 2,500-3,500 grams ($p=0.019$). There were five variables that significantly predicted adherence to clinical appointment. These were: caregivers who stayed with ≥ 2 people were six times likely to be adherent (AOR 6.09, 95%CI=1.248-29.685, $p=0.026$); those with ≥ 2 forms of reminders three times adherent (AOR 3.31, 95%CI=1.106-9.881, $p=0.032$); early ANC starters four times adherent (AOR 4.14, 95%CI=1.526-11.242, $p=0.005$); with a self-reporting rate $\geq 81\%$ fourteen time more adherent (14.39, 95%CI=1.322-156.647, $p=0.029$); whose infants had a normal birthweight four times more adherent (4.76, 95%CI=1.283-17.632, $p=0.020$). In conclusion, there is a challenge in the clinical appointment adherence among caregivers of infants in HIV care at the Referral Hospital. Seven socio-demographic and five clinical predictors of appointment adherence among caregiver-infant pair are identifiable of which five are of highest prediction for adherence to appointments. It is recommended that caregiver social support systems and early and serial interaction with the health system to improve clinical appointment adherence be strengthened. Results will be used to plan intervention strategies to optimize appointment management of caregivers at the hospital. The results will inform the health policy makers and further enhance new areas of research.

TABLE OF CONTENT

| | |
|--|-------------|
| DECLARATION | ii |
| ACKNOWLEDGEMENT | iii |
| List of Figures | vii |
| List of Tables | viii |
| List of abbreviations and Acronyms | ix |
| DEFINITION OF OPERATION TERMS | x |
| CHAPTER ONE: INTRODUCTION | 1 |
| 1.1 Background of the Study | 1 |
| 1.2 Statement of the Problem | 3 |
| 1.3 Main objectives | 4 |
| 1.3.1 Specific Objectives | 4 |
| 1.3.2 Research Questions | 5 |
| 1.4 Significance of the study | 5 |
| 1.5. Scope of Study | 6 |
| CHAPTER TWO: LITERATURE REVIEW: | 7 |
| 2.1 Missed Scheduled Clinical Appointment in HIV care | 7 |
| 2.2 Socio-Demographic Factors Affecting Clinical Appointment Adherence in HIV care | 8 |
| 2.3 Clinical Factors Influencing Clinical Appointment Adherence in HIV Care | 10 |
| 2.4 Predictor Model of Clinical Appointment Adherence in HIV Care | 11 |
| 2.9 Conceptual framework | 15 |
| CHAPTER THREE: METHODOLOGY | 17 |
| 3.1: Study Site | 17 |
| 3.2 Study Design | 18 |
| 3.3 Study population | 19 |
| 3.3.1 Inclusion Criteria | 19 |
| 3.4 Sampling Size Determination | 19 |
| 3.4.1 Sample Size | 19 |
| 3.4.2 Sampling Caregiver-Infant Pairs in HIV Care | 20 |
| 3.5 Data Collection Instruments | 20 |

| | |
|---|-----------|
| 3.5.1. Pre-testing of Questionnaire | 21 |
| 3.5.2. Data Collection Procedure | 22 |
| 3.6 Data Analysis and Presentation | 22 |
| 3.9 Ethical Consideration..... | 24 |
| 3. 8 Study Assumptions | 24 |
| 3.9 Study Limitations | 24 |
| CHAPTER FOUR: RESULTS..... | 26 |
| 4.1 Introduction | 26 |
| 4.2: Socio-Demographic Characteristics of The Study Participants..... | 26 |
| 4.3 Clinical Characteristics of Caregivers and Their Children | 28 |
| 4.4 Adherence Scheduled Appointment..... | 30 |
| 4.5 Reasons for Missed Appointment..... | 33 |
| 4.6 Caregiver Socio-Demographic Determinants of Adherence to Appointment | 34 |
| 4.7 Infants Socio-Demographic Determinants of Adherence to Appointment | 39 |
| 4.8 Caregiver and Child Clinical Determinants of Adherence to Appointment..... | 40 |
| 4.9 Prediction Model Development for Adherence to Scheduled Appointment | 43 |
| CHAPTER FIVE: DISCUSSION | 49 |
| 5.1 Socio-demographic characteristics and adherence to schedule appointment | 49 |
| 5.2 Clinical characteristics and adherence to schedule appointment | 50 |
| 5.3 Status of adherence to schedule appointment | 52 |
| 5.4 Prediction model for clinical appointment adherence..... | 53 |
| CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS | 54 |
| 6.1 Summary of the findings | 54 |
| 6.2 Conclusions | 54 |
| 6.3 Recommendations | 55 |
| REFERENCES | 57 |
| Appendix I: Consent form..... | 68 |
| Appendix II: Informed Consent Form for minors (Under 18 years of age)..... | 74 |
| Appendix III: Interviewer administered questionnaire..... | 76 |
| Appendix IV: Appointment Records Data Collection Tool | 90 |
| Appendix V: School of Graduate Studies Proposal Approval..... | 91 |
| Appendix VI: Ethical Clearance | 92 |
| Appendix VII: Kakamega County Research Authorization | 93 |

LIST OF FIGURES

| | |
|--|----|
| Figure 2.1. Conceptual framework for predictors of appointment adherence among caregivers of infants in HIV care. | 16 |
| Figure 4.1. Caregivers appointment adherence..... | 31 |
| Figure 4.2. Caregiver scheduled appointments | 33 |

LIST OF TABLES

| | |
|---|----|
| Table 4.1. Caregivers socio-demographic characteristics | 27 |
| Table 4.2. Infants socio-demographic characteristics | 28 |
| Table 4.3. Caregivers clinical characteristics | 27 |
| Table 4.4. Infants clinical characteristics | 30 |
| Table 4.5. Socio-demographic and clinical characteristics of adherent study participants | 32 |
| Table 4.6. Participants' response reasons for missed appointments | 34 |
| Table 4.7. Socio-demographic factors associated with appointment adherence of caregivers | 36 |
| Table 4.8. Socio-demographic factors associated with appointment adherence of infants | 39 |
| Table 4.9. Caregiver clinical factors associated with appointment adherence | 42 |
| Table 4.10. Infant clinical factors associated with appointment adherence | 43 |
| Table 4.11a. Caregivers demographic data associated adherent to appointments | 44 |
| Table 4.11b. Clinical characteristics associated adherent to appointments..... | 45 |
| Table 4.12. Model to predict adherence to scheduled appointments..... | 46 |

LIST OF ABBREVIATIONS AND ACRONYMS

AMPATH – Academic Model for the Prevention and Treatment of HIV

AIDS – Acquired Immune Deficiency Syndrome

ART – Anti-Retroviral Therapy

ARV – Antiretroviral (drugs)

CTX – Cotrimoxazole

DOB – Date of Birth

EMTCT – Elimination of Mother to Child Transmission (of HIV)

GPC – Global Priority Countries

HIV – Human Immunodeficiency Virus

KASF – Kenya AIDS Strategic Framework

MUERC – Maseno University Ethics and Review Committee

MTCT – Mother to Child Transmission (of HIV)

PLWHIV – People Living With HIV

PMTCT – Prevention of Mother to Child Transmission (of HIV)

SCT – Social Cognitive Theory

SPSS- Statistical Package for the Social Sciences

SSA – Sub-Saharan Africa

UNAIDS – United Nations AIDS

UNICEF – United Nations Children Education Fund

USA – United States of America

WHO – World Health Organization

DEFINITION OF OPERATIONAL TERMS

Appointment reminder

When the caregiver is made to remember the date for clinical visit. This may be through the health care worker, family members, or friends.

Clinical appointment

A scheduled review of a client that may not necessarily be for an illness but as part of a follow-up for a chronic illness.

Honoured appointment

When a client comes in earlier or on the date of appointment.

Missed appointment

When a client fails to appear for their scheduled clinic appointment or fails to come in early than the appointment date.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Adherence to clinical appointments in HIV care affects transmission of HIV from an infected mother to the infant (MTCT), clinical processes, and HIV treatment outcomes (Kop *et al.*, 2018). Regular clinic appointment adherence plays a key role in securing favourable clinical outcomes (Lima *et al.*, 2009; Bastard *et al.*, 2012). Adherence to clinical appointments to treat HIV is important, as it is an independent predictor for long-term clinical progress in HIV patients (Anoje *et al.*, 2017). It is reported that the failure to keep clinical appointments affects health systems including an increase in the cost of health care; emergence of scheduling conflicts; deterring therapeutic care and outcomes; inefficiencies in the clinic operation; and reducing the health providers satisfaction (Chandio *et al.*, 2017). Certainly, the access to health care is put in jeopardy when clients miss their clinical appointments causing strains to the ever dwindling health resources (Kheirkhah *et al.*, 2016).

Globally, there are variations that exist in the rates of attendance to clinical appointments among caregivers of infants in HIV care depending on the patient types, geographical location, specialty in the medical field, with a global range of 10% to 50% and an average of 27% in North America (Turkcan *et al.*, 2013). It is reported that the attendance to clinical appointments in adult clinics vary from 16.3% to 24.6% (Parsons *et al.*, 2021). Among adolescents, 21.2% failed to keep their appointments in an adolescent and young adults clinic in the USA (Triemstra *et al.*, 2018); while in Nigeria a 54.8% non-adherence was reported in a longitudinal study in a HIV clinic (Ekop, 2019). In the pediatric population, one study has reported a range of 20.4% to 66.7% (Samuels *et al.*, 2015). Factors related to socio-demographic characteristics; clinical; and patient-provider interactions; among others have been found to be significantly but inconsistently associated with clinic attendance (Abdulrahman *et al.*, 2017). It is reported that age, race, and income are associated with higher clinic attendance in the USA (Bofill *et al.*, 2011) and Brazil (Nagata

and Gutierrez, 2015). In China, older age and female gender predispose one to higher likelihood of missed appointments (Zhang *et al.*, 2012). Within the sub-Saharan Africa, recent studies have reported clinical appointment attendance rates of 83.4% in Ethiopia (Eticha, *et al.*, 2014) to as low as 50% in Mozambique (Blanco, *et al.*, 2015) among the caregivers of infants on HIV care. In the Ethiopian study, caregivers who were unmarried, of young age (25-34 years) were more likely to be adherent than their counterparts. Some of the reasons for missing refills included child being sick. The Mozambican study highlighted the socio-economic plights of the caregivers as a contributing factor to the low attendance rates.

In Kenya the retention rate of children on regular HIV care is higher in the first 12 months about 82% and reduces to about 61% at month 60 (Braitstein *et al.*, 2011). Primary caregiver related factors and those of the children make the attendance of clinical appointments very challenging (Mugavero *et al.*, 2010) with a lot of emphasis put on strategies to increase early infant diagnosis, good linkage and early initiation of HIV treatment and less on retention. As well, in Kenya little is known on adherence to standard scheduled medical appointment among children in HIV care. According to (Kirimi *et al.*, 2020), social demographic factors associated with retention to scheduled medical appointment were: children with high CD4 count being more likely to miss scheduled clinic appointments, while those who had not missed HIV drugs because drug had finished having a lower risk of missing scheduled clinic appointments. More focus is needed to generate more data on children clinical outcome and predictors of the retention on regular medical appointment of care among children in HIV care before their completely lost to care.

Kakamega County is leading in HIV among the counties in the former Western province. The county's MTCT increased from 5.8% in 2015 to 6.8% in 2016, against the desirable WHO recommendation of less than 5%. This is despite more than 80% of the pregnant women in the county receiving HIV testing. The county has an otherwise very favourable immunization status with 98.9% coverage of Penta-1 vaccine, which is administered at about the same time as the onset of infant HIV services (6-8 weeks of birth) and with the full-immunized status (assessed at the age of 12 months after birth) reported as 64.8% (Makokha, *et al.*, 2015). Similarly, according to data from the sites that provide HIV

services to mothers and infants in Kakamega County, the overall 12-month retention of the HIV care clients is 90% (KHIS records, 2020). Among the HIV positive pregnant women and those breastfeeding and on HIV care with infants, the retention rate is 73% (KHIS records, 2020). Therefore, it is possible that caregivers of the infants seek services including immunization but fail to receive other allied services such as HIV care.

Most of the studies related to HIV including those on adherence to treatment have concentrated in the neighboring counties of Kisumu (Fayorsey, *et.al.* 2016; Kimeu, *et al.*, 2016; Ojwang, *et al.*, 2015), Homa Bay (Hickey, *et al.*, 2015; Hickey, *et al.*, 2016), Siaya (Fayorsey, *et.al.* 2016; Adino, 2016), Uasin Gishu (Talam *et al.*, 2008) and Busia which bear the highest burden of HIV in the region, while very few have focused on Kakamega County which as indicated, has an equally high HIV burden with gaps in provision of HIV services to the infants who are exposed or infected with HIV (NASCOP, 2018). Studies (Kirimi *et al.*, 2020; Kimeu, *et al.*, 2016; Adino, 2016) have identified both biomedical, such as virological failure, and non-biomedical factors affecting adherence, which were considerations in the current study's elucidation of socio-demographic (non-biomedical) and clinical (biomedical) factors predicting adherence to clinical appointments.

This study sought to determine predictors of clinical appointment adherence among caregivers of children aged 18 months and below on HIV care at Kakamega Referral Hospital by assessing socio-demographic factors, clinical factors and develop a prediction model for clinical appointment adherence among caregivers of infants in HIV care at Kakamega Referral Hospital.

1.2 Statement of the Problem

Adherence to clinical appointments among caregivers of infants on HIV care affects transmission of HIV clinical processes, and HIV treatment outcomes. In Kenya, attendance to clinical appointments among caregivers was at an average low of 50.4%.

However, assessment by NASCOP of 32 sites across Kenya found the sites had good prescribing practice (98%) but moderate to poor patient retention in care (69% of patients retained at 12 months), retention on first line therapy (50%), and appointment keeping (29% kept > 80% of appointments). Data from the appointment diary records in the Kakamega Referral Hospital indicates a disparity in appointment adherence between the comprehensive care clinic that serves older children, adolescents and adults, and the maternal child health/PMTCT clinic that serves the infants and young children. Missed clinical appointments adherence among the HIV clients range between 25% and 35% in keeping with the no-show rates for the general medicine clinics of 15% to 30%. Globally, attendance to clinical appointments among caregivers of infants on HIV varies between countries, healthcare system and clinic settings but on an average 5-55 % of scheduled clinical appointments is missed. WHO report showed that on-time clinical appointment was 49.8% in the African region compared to 86.0% in all other regions combined. This variability depicts the gravity of the problem more so when compared with the WHO target of a less than 10% for missed appointments. This study sought to determine predictors of clinical appointment adherence among caregivers of children and develop a prediction model for clinical appointment adherence among caregivers of infants in HIV care at Kakamega Referral Hospital.

1.3 Main objectives

To determine predictors of adherence to clinical appointments among caregivers of infants on HIV care at Kakamega Referral Hospital, Kakamega County, Kenya.

1.3.1 Specific Objectives

The specific objectives of this study were:

1. To assess the socio-demographic factors influencing adherence to clinical appointments among caregivers of infants in HIV care at the Kakamega County Referral Hospital, Kenya.
2. To assess clinical factors influencing adherence to clinical appointments among caregivers of infants in HIV care at the Kakamega County Referral Hospital, Kenya.

3. To develop prediction model for clinical appointments adherence among caregivers of infants in HIV care at the Kakamega County Referral Hospital, Kenya.

1.3.2 Research Questions

The research questions that the researcher wishes to address are:

1. What are the socio-demographic factors influencing adherence to clinical appointments among caregivers of infants in HIV care at the Kakamega County Referral Hospital, Kenya?
2. What are the clinical factors influencing adherence to clinical appointments among caregivers of infants in HIV care at the Kakamega County Referral Hospital, Kenya?
3. What are the predictors of appointment adherence among the socio-demographic and the clinical factors, for the caregivers of infants in HIV care at the Kakamega County Referral Hospital, Kenya?

1.4 Significance of The Study

This study was conducted to assess the predictors, among socio-demographic and clinical factors, on the adherence of appointments among caregivers of infants in HIV care. The study findings will add to the existing knowledge on socio-demographic factors given that the social and economic support systems play an important role in adherence to appointments among caregivers of infants in HIV care. These findings such as the young age of the caregivers, reminders for attendance, and the role of a social capital for the caregivers, are highly significant and beneficial to the department of health and specifically the hospital's management and clinic staff, who would put in place measures that would improve the provision of services to the infants and their caregivers.

Findings of significant clinical factors including the early and serial interaction with the health system by caregivers from the antenatal period, favourable birth outcomes of the infant, number of appointments given, among others, serve as a basis for the development of adherence promotion programmes in resource-limited locations and so provide a model for programmes in similar areas across Kenya where appointment adherence continues to

be a challenge to health care providers, caregivers and other relatives of children in HIV care.

That the five very significant predictors of appointment adherence are identifiable and modifiable portends a finding of this study may be used as reference data in conducting new research or testing the validity of other related findings. These findings also serve as their cross-reference that will give other researchers a background or an overview of the predictors of appointment keeping among caregivers of infants in HIV care. Put into context, the results of this study will make a major contribution to one of the pillars of the Kenya AIDS strategic framework (KASF) of 2014/15 to 2018/19 that seeks to improve health outcomes and wellness of persons living with HIV by focusing on reducing the loss in the cascade of care, a leakage that often begins with a missed appointment.

1.5. Scope of Study

This study was carried out at a large referral Hospital in Kakamega County, Kenya focusing on caregivers of the infants aged 0-18 months on HIV care born of mothers who are HIV-infected residing in Kakamega County in the last one year. The study involved participants, each with a monthly interval of the clinic appointments. The study gathered data on the socio-demographic and clinical factors that influence attendance to clinical appointments in this population. The study determined the adherent caregivers as those who kept $\geq 90\%$ of their scheduled appointments.

CHAPTER TWO

LITERATURE REVIEW

2.1 Missed Scheduled Clinical Appointment in HIV care

There are 38.0 million people living with HIV (PLHIV) globally with 19.6 million living in Sub-Saharan Africa (UNAIDS, 2021). It is estimated that 390 000 new paediatric infections were recorded in 2010, 15% less than reported in 2001 (UNAIDS, 2011). These reductions however are concentrated in the developed world due to greater coverage of prevention of mother-to-child transmission of HIV (PMTCT) services and antiretroviral therapy (ART) (UNAIDS, 2017). ART has transformed HIV infection into a manageable, chronic condition. There is a need for sustained patient adherence to ART for successful HIV treatment.

HIV infection requires long-term and continuous engagement with health-care providers (Mugavero *et al.*, 2011). Patient retention in HIV care is key to achieving the United Nations Programme on HIV/AIDS (UNAIDS) and the national targets on HIV (Geng *et al.*, 2010). Default rates vary from 32.7% in America, 12.1% in Europe to 39.4 to 79.4% in Africa (Kranzer *et al.*, 2010). Repeatedly missing appointments have been shown to lead to non-adherence to medication, faster disease progression, and treatment failure (Kimeu, *et al.*, 2016). With set targets of $\geq 80\%$, on-time appointment keeping is critical for early warning indicators with which World Health Organization (WHO) monitors HIV drug resistance among patients attending ART clinics around the world (Bennet *et al.*, 2012). Previous studies reported that missed clinic appointments are significantly associated with virologic failure, drug resistance, and occurrence of AIDS-defining illness or death (Bastard *et al.*, 2012; Brennan *et al.*, 2010).

Appointment management is part of the patient care continuum. In this, missed appointment is an aspect that is conceptualized, measured and studied in three different ways; appointments missed, missed visit rates, and the percentage of patients who miss appointments over a defined period (Catz *et al.*, 1999; Lucas *et al.*, 1999; Israelski *et al.*,

2001). Mugavero group defines missed visit as proportion to which studies have apportioned a threshold of 25% (Mugavero *et al.*, 2009). In Kenya, appointments at HIV Comprehensive Care Clinics coincide with prescription refills, adherence support, and timely delivery of required interventions (Geng *et al.*, 2010). An adherent clinical appointment is a critical component for the therapeutic success of ART in HIV infection (Kunutsor *et al.* 2010b). In the USA, the rate of failure of patients in HIV care to keep appointments is established to be between 20% and 40% (Gardner *et al.*, 2005). In Cameroon it was reported that 51% of the children in HIV programs attended their scheduled clinical appointments (Bigna *et al.*, 2014a). In South Africa, the greatest losses among infants occurred in the first week of life, translating to an incidence rate of 14.5% with 59.6% remaining adherent beyond 28 weeks of follow-up (Chetty *et al.*, 2012). In another study in South Africa, a 24-month follow-up of a mother-baby pair at a clinic that provided all components of PMTCT including counseling, free formula milk and testing of infants, showed very high loss to follow-up rates (Sherman *et al.*, 2004). A study that aimed to assess the patterns and dynamics of mobile phone usage amongst ART cohort in rural Uganda and ascertain its feasibility for improving clinic attendance, reported 11% scheduled clinic appointments (Kunutsor *et al.*, 2010a).

In Busia Kenya, an evaluation of a huge PMTCT programme study sought to assess its effectiveness in western Kenya reported that 309 of the 767 newborn infants completed the set protocol, thus translating to an adherence of 40.2% (Azcoaga-Lorenzo *et al.*, 2011). In Mumias sub-County in Kakamega reported that 81(21.1%) missed at least one appointment (Musenjeri *et al.*, 2015). Therefore, assessing the predictors of adherence to clinical appointments among caregivers of infants in HIV care is critical to help identify effective health system interventions that could be used to support individuals taking ART for improved treatment.

2.2 Socio-Demographic Factors Affecting Clinical Appointment Adherence in HIV care

Adherence is one of the two key components for the therapeutic success of ART in HIV infection (WHO, 2003). The opportunity to quickly identify and address treatment failure

is also lost when patients default scheduled outpatient clinic appointment. As such, identifying the socio-demographic reasons for poor follow-up of children in HIV care is an important component that aims at improving the service provision. A study done in Kilifi Kenya found that infant drop out was associated with a high proportion of mothers who were also “loss to follow-up” and of younger mothers (Hassan *et al.*, (2012). Previously, maternal age was associated with adherence. Mothers who were below 35 years of age were more likely to miss an appointment compared to older ones (Musenjeri *et al.*, 2015). Furthermore, a study done in Kilifi reported a weak association between infant drop and mother’s level of education (Hassan *et al.*, 2012). A recent report showed that parents who had a primary level of education were 13.1% more likely to adhere to clinic appointments compared to those without, while knowledge on HIV care for their children such as virological tests promoted clinic appointment adherence (Musenjeri *et al.*, 2015). In Malawi, it was reported that mothers who were less educated, and those from farming communities were less likely to attend their clinical appointments (Ioannidis *et al.*, 1999).

Children of married mothers were 6% more likely to adhere to clinic appointments compared to their unmarried counterparts (Musenjeri *et al.* (2015). In contrary, a study in Zimbabwe found that women who lived with male partners were 60% less likely to seek care and treatment services (Mucedzi *et al.*, 2010). A study in Brazil found that a mother-baby pair from rural and remote areas were more likely to be loss to follow-up than those from a metropolitan area or the capital (Gouveia *et al.*, 2014). In South Africa analysis of the PMTCT program suggested that reasons such as poor mobility, long distances and cost of travel were a hindrance to the access of HIV services for the mothers and their infants (McCoy *et al.*, 2002).

One of the major challenges that affect the attendance to clinic appointments of children in HIV care is the financial constraint faced by primary caregivers. Access to transportation was a factor affecting patients’ ability to seek health services in a timely manner (Varga, 1998). While incentives such as transport reimbursement contributed to high follow-up rates thus increasing adherence to clinical appointments (Lee *et al.*, 2020). In Kericho county, it was reported that transport cost was a significant contributor to the

54.3% missed appointments that were reported among caregivers of HIV in HIV care (Langat *et al.*, 2012).

Socio-demographic factors are part and parcel of the day-to-day undertakings of clients including the caregivers of infants in HIV care. If we can elucidate the factors that influence adherence of caregivers of infants in HIV care, it would be in the best interest of the health care system to invest in interventions to address these. If these factors are deduced to be modifiable, they can decrease the amount of missed appointments and give better patient outcomes at the global, regional, national, and in Kakamega county (Phillips, 2008).

2.3 Clinical Factors Influencing Clinical Appointment Adherence in HIV Care

The number of antenatal clinic appointments attended has an effect on the likelihood of attending the postnatal clinics (Jacobs *et al.*, 2017). A study in Ethiopia found that women who attended postnatal visits were more likely to have had ≥ 4 antenatal visits (Alemayehu *et al.*, 2020). Similarly, in India a woman who was registered into antenatal care after 20 weeks of pregnancy was 1.75 times more likely to be a loss to follow-up than a woman who was registered earlier in the pregnancy (Panditrao *et al.*, 2011). A study in South Africa reported that late attendance, greater than 28 weeks of gestation, of the pregnant women for their antenatal clinics when compared to early trimester attendance was a predictor for loss to follow-up of their children that eventually enter HIV care (Chetty *et al.*, 2012).

A fairly large longitudinal study showed that retention among the women who were newly tested as HIV positive in their pregnancy had a lower retention post-delivery (40%) compared to those previously diagnosed as HIV positive (60%) (Fayorsey *et al.*, 2016). This puts into jeopardy the acclamation that the initial clinic visits are key in predicting favourable outcomes for the HIV patients (Park, *et al.*, 2007). A study done in Malawi showed that the loss to follow-up of infants increased when the birthweight was lower than 2,000 grams (Ioannidis *et al.*, 1999). Not receiving ART was a factor that was associated with overall attrition to care among children in a large community-based study in Uganda (Massavon *et al.*, 2013). This therefore means that children who are on ARVs, and therefore have had their HIV status determined, will most likely keep their clinic

appointments compared to those not on ARVs. Early initiation to HIV treatment was one protective factors for attendance of clinical appointments among children in HIV care (Janssen *et al.*, 2015)..

Giving different appointments will result in one being honoured while the other is skipped. A study showed that HIV-infected women who did not attend clinics after delivery and continued to attend their regular pediatric appointments with their infants during the 24-month follow-up period were 47% (Lemly *et al.*, 2007). In a study that included Kakamega County, examined two models of provision of HIV care to the mother-baby infant and concluded that in the model that allowed both mother and child to be seen under the same roof, the infants were 2.24 times more likely to attend all visits compared to their counterparts in the other arm (Ong'ech *et al.*, 2012). The number of clinical appointments that a child's caregiver is given influences their adherence. This is evidenced in a study in which the 2-, 4-, and 6-month pediatric visits were attended at 63% to 90%, whereas the 15- and 18-month visits were lower, between 41% to 75% (Wolf *et al.*, 2018). Clinical factors are a preserve of the health care system in which a country or health system operates. Most of the factors are modifiable by for instance advocating for increased interaction of the caregivers with the health system through use of community and facility mechanisms. When these are not addressed, the result will be increased mortality among the infants (Nyandiko *et al.*, 2013).

2.4 Predictor Model of Clinical Appointment Adherence in HIV Care

A lot of progress has been made in the treatment of HIV infection; however, many HIV positive individuals do not adhere to routine clinical care and therefore cannot benefit from available treatment (Mugavero *et al.*, 2012). Identification of predictors of poor HIV clinical appointment adherence could help in the development of interventions and minimize viral transmission (Cohen *et al.*, 2011). Even though the factors that affect appointment keeping are complex (Wachira *et al.*, 2012), various appointment adherence indicators and benchmarks have been established (DHHS, 2021). Some of the factors strongly correlate with appointment keeping in one study were low predictors in another.

A study to identify predictors of appointment developed a logistic model to predict the likelihood of clients missing the appointment (Torres *et al.*, 2015). Here, it was reported that the percentage of previously missed appointment, lag time between booking and appointment, day of the week, and demographic factors influenced missed the appointment. Using both the bivariate and multivariate analysis, it was found that children with a higher quality of care and 24 months or younger had lower loss to follow-up while gender was not (Bisola *et al.* 2014). Furthermore, use of logistic regression to determine the factors associated to retention among the clients on HIV care showed that demographic and clinical variables were interacting in a complex manner (Ugoji *et al.* 2015). A study in Uganda found that in examining retention among a cohort using a multivariate logistic regression analysis, age category 35 years and below were less likely to achieve regular attendance (Kunutsor *et al.* 2010b).

Models for predicting appointment adherence are an integral part of the health care system, globally, nationally and in Kakamega County. These developed model not only show the ability of the models to predict no-show with high accuracy, but define minimalist risk factors that can shed some light to know the reasons behind missing the appointments by the patient (Alshammari *et al.* 2010b). When employed, they help in focusing the health care providers on those clients that need the highest attention for adherence and thus improve the adherence of the caregivers to the tenets of the elimination of mother to child transmission of HIV. In one such study, the predictive model accurately identified patients who were more likely to miss their appointments and its application led to a reduction in missed appointments from 35% to 12.16% among the high-risk clients (Goffman *et al.*, 2017).

2.5 Prevalence of Clinical Appointment Adherence To ART Among Children

Poor adherence to clinic appointments, which occurs across all stages of the continuum of HIV care, has been recognized as a major challenge to attaining universal uptake of ART (WHO, 2011). Its prevalence is highest among children in Sub-Saharan Africa (SSA) being the region that bears >85% of the global burden of the disease (WHO, 2011; WHO, 2015) done. In South Africa, one third of the children missed a clinic visit (Chandiwana *et al.*,

2018). In Tanzania, it was established about 31% of the caregivers missed clinic appointments at least once in the during three-month period before the survey (Urassa *et al.*, 2018). The retention rate of children on regular HIV care, in Kenya, is higher in the first 12 months about 82% and reduces to about 61% at month 60 (Braitstein *et al.*, 2011). This progressive decrease is also confirmed by a study in Homa Bay County where keeping clinic appointments among children on ARVs decreased from 83.1% at 3 months, to 76.6%, at 6 months and to 52.9% at 12 months (Tanyi *et al.*, 2021). In Kericho, the prevalence of appointments was 45.7% among the children on care (Talam *et al.*, 2015).

2.6 Caregiver Characteristics Associated With Clinical Appointment Adherence on HIV Care

Studies on the caregiver characteristics associated with clinical appointment adherence are fairly consistent. They tend to detail socio-demographic, clinical and economic factors as the influencers (Wachira *et al.*, 2012). A study in Cameroon deduced that a caregiver with no formal education were likely not to keep appointments (Bigna *et al.*, 2014a). In Tanzania, caregivers cited factors such as lack of transport fare and distance to the health facility as barriers to attend the planned clinics (Urassa *et al.*, 2018). In a study done in Malawi, caregivers of less adherent infants tended to be less educated, with farming occupations (Ioannidis *et al.*, 1999). In Uganda, non-retention was about 60% lower among pairs where the mothers understood and appreciated the importance of adhering to all clinic appointments together with the baby, denoting the importance of caregiver's cognitive factors (Obai *et al.*, 2017). In Kericho, it was indicated that decreased probability of keeping clinic appointments occurred when a caregiver was away from home, when there was no disclosure to the child, when the child experienced side effects of the drugs, when they had stigma and high transport cost (Talam *et al.*, 2015). Additionally, caregivers awareness of the availability of HIV care services for their infants is a contributor to adherence (Cohen *et al.*, 2010).

2.7 Infant Characteristics Associated With Clinical Appointment Adherence on HIV Care

The profile of children who would not attend follow-up medical appointments in an HIV program in Cameroon was a female, and with a longer follow-up appointment interval (Bigna *et al.*, 2014a). From this study, there is a possibility that female caregivers favor female children and that male caregivers favor male children when they come to medical care. In Malawi, it was noted that infants with lower birthweight and those that were singletons had a higher propensity of not returning for follow-up (Ioannidis *et al.*, 1999). In a large study in Kenya, low adherence was witnessed among untreated, HIV-exposed infants who had low weight for height, were orphaned, and had clinically advanced disease, while older, exposed infants were also more likely to be retained, as were those receiving food supplementation (Braitstein *et al.*, 2010). Ascribed to the low immunity and mortality, younger, sicker, infected or exposed infants have a lower adherence to appointments (Sengayi *et al.*, 2013).

2.8 Clinical Appointment Adherence measurement in HIV Care

The guidelines for antiretroviral therapy in Kenya outline that appointments for clients on ART should be monthly in the first 6 months, 2 monthly in the subsequent 6 months and thereafter on a 3 monthly (NASCO, 2011). Appointment management is part of the patient care continuum within which missed appointment is an aspect that is conceptualized, measured and frequently studied in three different ways: appointments missed, missed visit rates, and the percentage of patients who miss appointments over a defined period (Catz *et al.*, 1999; Lucas *et al.*, 1999; Israelski *et al.*, 2001). The term missed appointments is used in reference to visits that are not cancelled or are rescheduled by the person seeking the health services; missed appointment rates are the proportion of the total appointments that are missed, also referred to as missed visit proportion to which studies have apportioned a threshold of 25% (Mugavero *et al.*, 2009). For those that miss appointments over a defined period, the construct follows as defined for the first two aspects save for the definition of the time period that is used in reference. The most studied aspects of the HIV care continuum are retention and loss to follow-up. However, although measuring patient retention helps to address keeping people in care, it is more challenging

to measure, but when measured it addresses the “ongoing health and engagement of a patient within the care system (Horstmann *et al.*, 2010). In this section of the literature, the researcher refers to both aspects of missed appointment and loss to follow-up among the children on HIV care. This is because the researcher strongly believes that the two are part of a continuum, with a missed appointment being a precursor for an eventual loss-to follow-up. In this study, the researcher concentrated on missed appointments in its three constructs as detailed earlier in this section.

WHO has defined on-time pick-up of drug refills as a tenet of clinical appointment keeping placing a desired ≥ 90 target a score (WHO, 2012a). The other model used in calculation of clinic adherence is that known as the ‘cumulative clinic adherence (CCA) which is defined as the proportion of days adherent to clinic visits after enrollment (Nyandiko *et al.*, 2013).

2.9 Conceptual Framework

The conceptual framework identifies a number of independent or predictor variables for this study. These include the socio-demographic factors of the caregivers such as age, gender, marital status, level of education and occupation as well as those for the infant such as age and gender and the attitude of the caregiver to the HIV health care provider (positive or negative); the clinical factors at both caregiver (antenatal clinic attendance, HIV-infected) and infant (mode of delivery, confirmed HIV infection) levels. This study investigated the three mentioned variables in order to identify factors that are associated with missing of appointments in the context of the Kakamega county referral hospital. Figure 2.1 illustrates the relationship among these variables.

Independent variables

Dependent variable

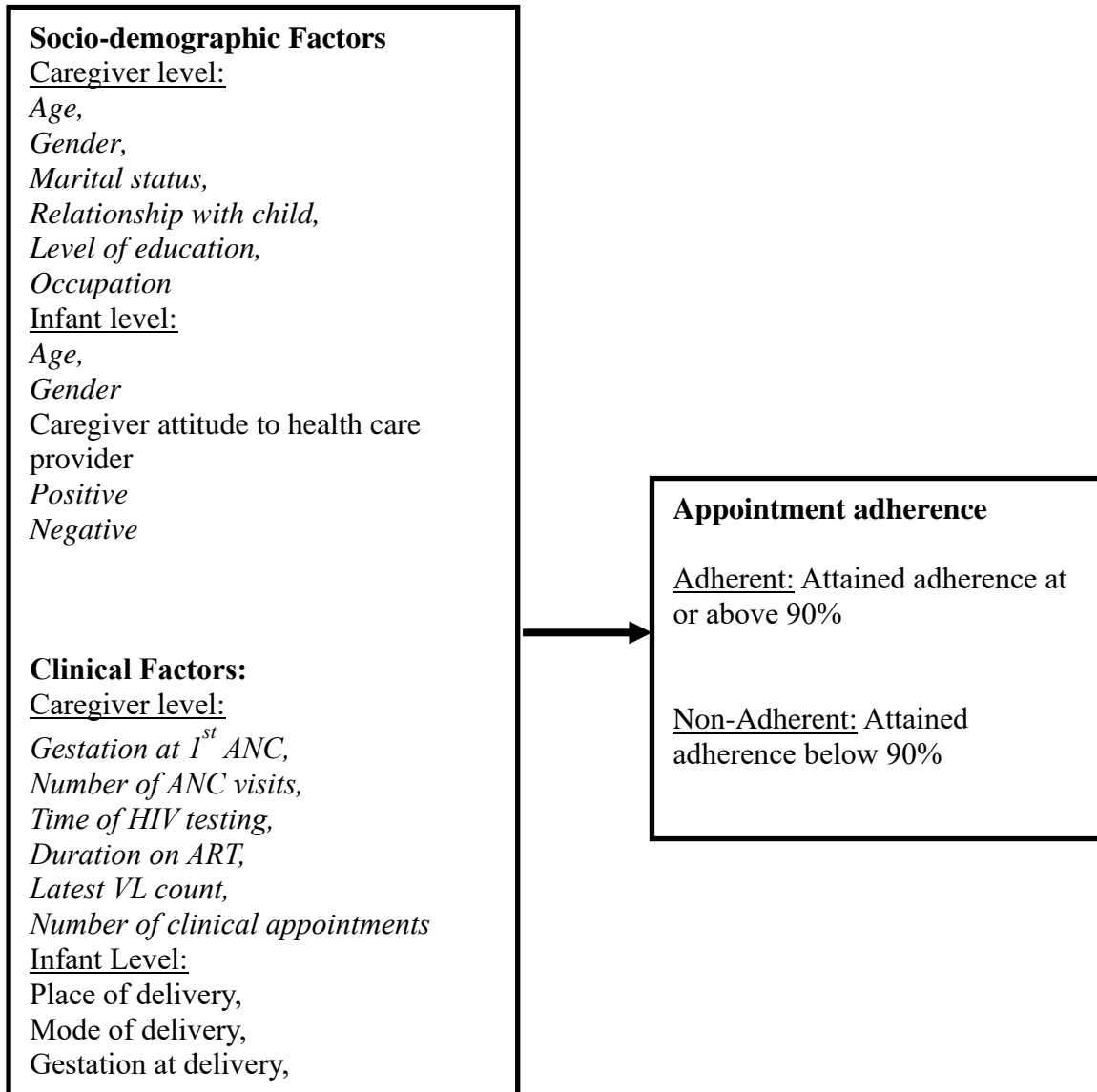


Figure 2.1. Conceptual framework for predictors of appointment adherence among caregivers of infants in HIV care.

CHAPTER THREE

METHODOLOGY

3.1: Study Site

The study was conducted at the Kakamega County Referral Hospital. This is a level 5 hospital in Kakamega County. Kakamega County is located in western Kenya with latitude of 0.2827⁰N and longitude of 34.7519⁰E, as shown in Figure 2.1. The hospital was established in 1926 and has a catchment population of 79,316 in an area of 77.4.

According to the 2019 Kenya Population and Housing Census, Kakamega County's 12 constituencies and 60 administrative wards hold a population of 1,867,579 (48.0% male; 51.9% female; <1% intersex) with a population density of 618 people km². The County has a total of 433,207 households. About 15.2 percent of the population (283,872) lives in urban areas compared to an average of 27.8% in Kenya. According to (NAS COP, 2020), Kakamega has an estimated 46,374 persons living with HIV of whom 2,240 are children below 5 years. The MTCT rate is 9.7% with an estimated 2,415 pregnant and breastfeeding women in need of ART. The county referral hospital's catchment of 79,316 comprises of 41,244 males (52%); 2,855 infants under one year and 15,863 households.

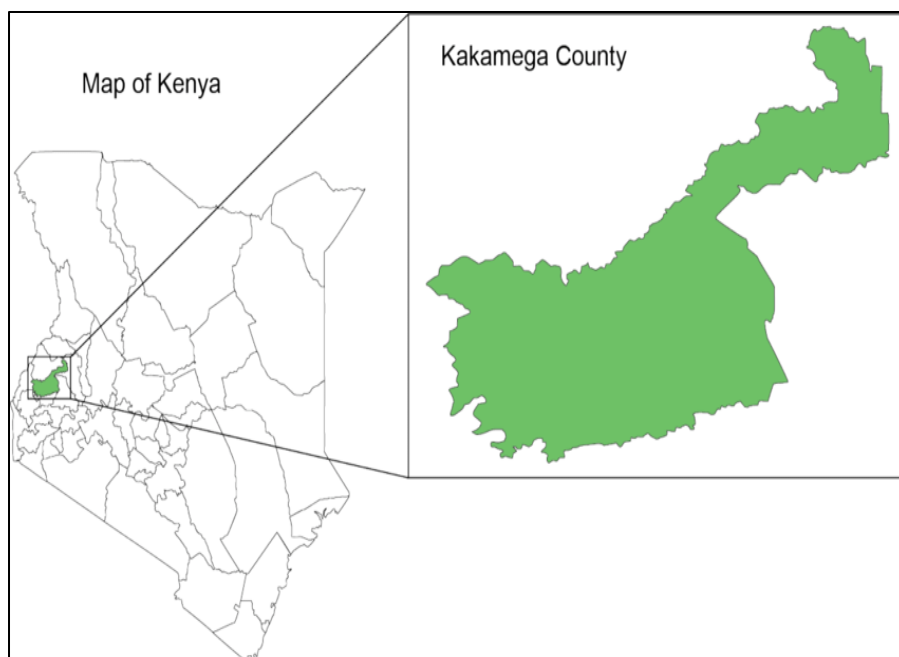


Figure 3.1. Administrative map of Kakamega County showing sub-county boundaries and County hospitals

3.2 Study Design

This was a cross-sectional, facility-based descriptive study in which information on socio-demographic and clinical factors affecting adherence to clinical appointments among caregivers of children in HIV care was sought by interviewing caregivers of children aged 18 months and below, who were born to HIV positive mothers or had their mothers tested for HIV during breastfeeding who had been residents of Kakamega County in the past one year. The use of a cross-sectional study was based on studying health burden in the population, that of adherence of clinical appointments, to inform future interventions. Descriptive is a method in which the study population is divided into two parts, that adherent versus non-adherent, and then studied as well as the exposure variables (the independent variables) and the outcomes (or the dependent variables) were studied at the same time. This was the most appropriate design for this study.

3.3 Study Population

This study targeted caregivers of children aged 18 months and below, who were born to HIV positive mothers, or had their mothers tested positive for HIV during breastfeeding; were a parent, a grandparent or a foster guardian to the child. The targeted caregivers were taking their children for HIV services at the Kakamega County referral hospital.

3.3.1 Inclusion Criteria

All caregivers with infants aged 0 to 18 months who consented, caregivers with infants whose HIV exposure status is known i.e., only those born to HIV positive mothers were included, caregivers with infants who enrolled into HIV care at the county referral hospital, caregivers with infants who are transferred in from another facility within previous one month, and caregivers with infants who were given clinic appointment within the study period. Caregivers who honoured their clinic appointment and those who had come early before the appointment date were included in the study. Missed visits were considered of clients who did not call the facility to indicate that they will not show up.

3.3.2 Exclusion Criteria

All caregivers with infants transferred out of the facility with no recorded follow-up appointment scheduled, caregivers with infants who had no further follow-up beyond the enrolment visit.

3.4 Sampling Size Determination

3.4.1 Sample Size

The number of the caregiver-infant pairs was sampled using the Yamane's formula (1967):

$$n = N / (1 + Ne^2)$$

In this formula;

n = desired sample size (number of caregiver-infant pairs in HIV care);

N = size of the population;

E = the margin error to be tolerated (5%).

The Yamane formula presumes a normal distribution. The caregiver-infant pairs in HIV care are assumed to be normally distributed in terms of the parameters that are to be investigated. The study used the Yamane's formula with an error of 5% and a confidence coefficient of 95% (Yamane, 1967), with the size of the population being 220 (based on the number of infants born of HIV positive mothers in Kakamega county in 2017 according to the data available in the Kenya County HIV Estimates (NASCO, 2018). Yamane's formula was used because the study population is known but we do not have the mean or standard deviation for the application of other formulae.

Substituting in the formula:

$$N=220; e=0.05 \quad n = 220 / ((1+220 * (0.05*0.05))$$

$$n = 220 / ((1+220 * (0.0025))$$

$$n = 220 / (1+0.65)$$

$$n = 220 / (1.65)$$

Thus n = 142 caregiver-infant pairs in HIV care

To account for possible attrition, such as declines by the participants to be included in this study, this was increased by 10%, giving a sample size of 156 caregiver-infant pairs in HIV care.

3.4.2 Sampling Caregiver-Infant Pairs in HIV Care

Systematic random sampling technique was used to select the individuals to be interviewed. This was done to arrive at the primary sample of the caregivers and their children. From the 220 caregiver-infant pairs on the sampling frame, against an expected 156-sample size, every 2nd was selected for inclusion. This method of sampling was employed because the population is defined and can be ordered from which a good a representation of the population as possible can be derived, given the limited resources.

3.5 Data Collection Instruments

Data were obtained from two main sources, namely the caregivers to the infants and the appointment records of the sampled caregivers. An interviewer-administered questionnaire

bearing both open- and close-ended questions serialized and without the client's name or unique facility code, was used to obtain data from the caregivers (appendix III). The questionnaire administered to the caregiver was prepared in English and Swahili languages. The content of the questionnaire included the socio-demographic, and clinical factors affecting appointment keeping. The socio-demographic and clinical factors to be examined were elicited for both the caregivers and the infants given that these influence the appointment adherence as detailed in the literature reviewed (Bigna *et al.*, 2014b; Ong'ech *et al.*, 2012). A checklist was used to abstract data on the number of appointments made and those honoured, from the caregiver's appointment records (appendix IV). The was used to derive the number of expected clinical visits versus those honoured and hence deducing the percentage clinic attendance, a factor that was used in obtaining the status of appointment adherence. A clinic attendance of $\geq 90\%$ was termed adherent.

3.5.1. Pre-testing of Questionnaire

Before rolling out data collection, pretesting of the tools at the Vihiga County Referral Hospital, a facility of a similar level as the study site, was done. The pretesting targeted 16 caregivers of children who are 18 months and below on HIV care, this constituting 10% of the desired sample as recommended by Yamane (Yamane, 1967). The researcher and the assistants accessed a sampling frame of 81 caregivers at the hospital and selected every 6th participant for a total of 16 for inclusion in the pre-testing. Of these, 6 (38%) were adherent. Prior to pre-testing the tool, it was given to three nursing officers in charge of MCH clinics who oversee HIV services, to assess it for content validity. Maseno University Ethics Review Committee (MUERC) also gave their experts input (Appendix VI). The tool was then pre-tested to check on the ability of the study participants to comprehend the questions in a similar way and respond, the duration of the interview, language comprehension and structuring of the questions. The questionnaire was then revised in line with the inputs from the expert opinions and the pretest results.

To assess for reliability of the questionnaire: the extent to which a measure appears to measure the characteristic it is supposed to measure (Diamantopoulos and Schlegelmilch, 2000), the researcher employed the split half technique which also gives information on

the consistency of the tool. In this method, the 16 administered questionnaires were split into two halves, with the data for each of the halves analyzed in Statistical Package for the Social Sciences (SPSS) version 22, and results correlated to give the Cronbach Alpha reliability coefficient. A coefficient of 0.81 was obtained which was above the acceptable cut off of 0.7. Data was collected daily for the entire study period.

3.5.2. Data Collection Procedure

Permission to collect data from the study hospital was obtained from the county director of health, Kakamega County to allow for the collection of data on the sampled caregivers. Four data collectors were recruited to assist in the collection of the data. The reason for their engagement was the varied appointments dates given to the caregivers over the two months of the study and researcher did not want to have any lost opportunities due to his unavailability to interview the participants. The four were trained in health-related field that is three were health records information graduates while one was a nurse. They were well versed in the local languages, Swahili, and Luhya. The four data collectors were hired and trained over two days with each of the training sessions lasting five hours, on the data collection instruments. Additional knowledge was provided through practical sessions on the tools in the training as well as field testing of the tool. The data collectors undertook interviews with the sampled caregivers and entered the data in the respective questionnaire tool as well as abstracting data from their appointment files.

3.6 Data Analysis and Presentation

The information from the questionnaires was cleaned, checked for completeness, accuracy, and consistency, and then entered in MS Excel and then analyzed Statistical Package for the Social Sciences (SPSS) version 22 (SPSS Inc, Chicago IL, USA). Continuous variables such as age were grouped, and the group frequencies and percentages deduced. To establish the significant socio-demographic factors in appointment adherence, the odd ratio and binary logistic regressions, measures of association with 95% confidence intervals, were used. Factors with a p value less than 0.05 were considered significant. For the clinical factors influencing adherence to appointments, descriptive analysis comprising of

frequencies and percentages with grouping of the continuous variables such as viral load count and birth weight of the child, was done. For the inferential statistical analyses, the odds ratio and binary logistic regression were used to determine association between the clinical factors, and appointment keeping with a p value less than 0.05 considered significant.

To determine the predictors of appointment attendance, the variables with a p value less than 0.05 in bivariate analysis were included in a multivariate logistic regression model. The Logistic model is specified as follows (Weisstein, 2003).

$$\ln\left(\frac{\pi}{1-\pi}\right) = \beta_0 + \beta_1x_1 + \beta_2x_2$$

$\ln\left(\frac{\pi}{1-\pi}\right)$ is the logit term (of the outcome y)

β_0 is the y-intercept (1)

The β s ($\beta_1, \beta_2, \beta_i$) are the regression coefficients taken from the logistic regression model output, and the X s are a set of significant predictors

The significance of the relationship between the dependent and the independent variables was tested at a confidence interval of 95%. The findings of the study were presented using tables and graphs.

To validate the model, overall performance and discriminative ability of the logistic regression model was assessed. The Nagelkerke's R^2 was 0.914 indicating the model explains more 91.4% of variation observed. Moreover, a Hosmer and Lemeshow test was done to assess the goodness-of-fit of this model. Receiver operating characteristic (ROC) curve analysis was done using 5 combined factors to define a cut point for prediction of adherence to clinical appointment. Higher values were considered to demonstrate better

discrimination abilities as follows: excellent ($AUC \leq 0.90$), good ($0.80 AUC < 0.90$), fair ($0.70 AUC < 0.80$), and poor ($AUC < 0.70$) (Fan et al., 2006).

3.9 Ethical Consideration

The researcher was cognizant of the vulnerability of the population under study due to their HIV status a factor that exposes them at risk of physical and psychological harm. In view of that, the proposal was submitted to Maseno University Ethics Review Committee (MUERC) for ethical review (Appendix VI). Additionally, a letter from the Department of Health in the County Government was sought for permission to conduct the research in the county's referral hospital (Appendix VII). In this research, the researcher informed the participants of the study and its benefits. They were informed that participation in the study was voluntary, and they were at liberty to opt out without fear of victimization. This information was contained in detailed consent forms for the caregivers as well as for the minors that were developed and administered to the respondents (Appendices I & II). The researcher administered verbal and written consents prior to undertaking the interview and those who declined were not coerced into getting interviewed. To ensure confidentiality of the research participants, the researcher employed several methods including a code for the identification of the subjects that was only known to the researcher. In addition, any identifying individual-level information was kept out of the report for findings and only aggregate findings were reported. Any infants or caregivers that were determined to be sick were referred to the clinician within the health facility for follow up.

3. 8 Study Assumptions

The researcher assumed that the study site, Kakamega referral hospital, is representative of the entire county and that the interviewees provided honest answers to the interview questions. To assure that this is undertaken, the interviewees were provided with the requisite anonymity and ensured that their confidentiality was preserved and that their participation in the study was voluntary.

3.9 Study Limitations

The researcher exercised the necessary procedures in ensuring that the study was carried out to meet the expectations of a sound research. The research study was conducted at only

one facility, the Kakamega referral hospital reaching 156 caregivers of children in HIV care and focusing on socio-demographic and clinical factors of appointment adherence. The findings of the study may not be generalized to the entire population and thus confined these to the population accessing services to the referral hospital. However, the study site was a high-volume teaching and referral facility for not only Kakamega county, but the larger Western region, with a catchment wider than its prescribed bounds. The study population was limited to the caregivers of children below 18 months. Thus, this may have locked out caregivers of older children and teenagers seeking HIV services in this facility, and it may be inferred that the findings may not be applied to children above this age group who are in HIV care.

The stigmatized nature of HIV/AIDS disease may mean that some of the caregivers of the infants in HIV care may not have been comfortable to participate in this study and some may have declined to be enrolled or dropped out as the interview progresses. To discount this, the researcher ensured that the study was conducted at the participant's convenience to minimize dropout and the resultant effect on the study's findings. Another limitation is that all but one of the caregivers interviewed were mothers to the children on care, which may have prevented ascertaining of the role of the fathers and any other types of caregivers. Lastly, the cross-sectional nature of the study emanating from the time frame accorded to the researcher in conducting the study provided a longitudinal limitation effect that would have been best addressed by conducting a prospective study.

CHAPTER FOUR

RESULTS

4.1 Introduction

This study sought to find out the clinical and socio-demographic factors influencing adherence as well as development of a prediction model for adherence among the caregivers of infants in HIV care at the Kakamega Referral Hospital. The study was conducted between November and December 2018. A total of 156 participants were sampled, each with monthly intervals of the clinic appointments. All the 156 responded giving a response rate of 100%. We analyzed all the 156 to determine the status of appointment adherence rate, defined as those that honoured $\geq 90\%$ of their scheduled appointments; assessed the influence of socio-demographic and clinical factors on appointment adherence; and developed a prediction model for appointment adherence; among the participants at Kakamega Referral Hospital. The results of all the 156 descriptive and logistic regression analyses are presented in narrative, tables, and figures where appropriate.

4.2: Socio-Demographic Characteristics of The Study Participants

Table 4.1 shows the caregiver socio-demographic characteristics. Less than half of the participants (43.6%, n=68) attended the recommended $\geq 90\%$ of their scheduled appointments. There were a total of 156 caregivers, all of whom were females. Nearly all (99.4%, n=155) were mothers to the infants in HIV care. Most of the caregivers were in a monogamous marriage (70.5%, n=110). Slightly over half of the respondents (51.3%, n=80) attained primary level of education. Small proportion of the participants was housewives (21.8%, n=34), businesswomen (19.9%, n=31), and was engaged in formal employment (19.2%, n=30). Most of the respondents were residing in the rural areas (41.0%, n =64) with a higher proportion (70.5%, n=110) located in the Lurambi Sub-County of Kakamega. More than half (57.7% n=90) of respondents were aged between 25 and 34 years old with a mean age of 31.5 ± 6.5 (mean \pm SD). As depicted in Table 4.2, a greater part of the children were females (56.4% n=88); most were aged between 14 and 18 months (29.4%, n=46), with a mean age of 9.9 ± 5.0 months (mean \pm SD). The mean

for the number of living children was 3.0 ± 1.7 (mean \pm SD) while that for the number of HIV exposed or infected children were 3.0 ± 0.6 (mean \pm SD). The most frequently used means of transport to the health facility was a motorbike (72.4%, n=113) with more than half paying a return fare of more than 100 shillings (57.1%, n=89).

Table 4.1. Caregivers socio-demographic characteristics

| Characteristic | N (%) |
|---|--------------|
| Marital status | |
| Single | 18 (11.5) |
| Married Monogamous | 110 (70.5) |
| Married Polygamous | 15 (9.6) |
| Divorced | 11 (7.1) |
| Widowed | 2 (1.3) |
| Education Level | |
| None | 5 (3.2) |
| Primary | 80 (51.3) |
| Secondary | 43 (27.6) |
| College | 17 (10.9) |
| University | 11 (7.1) |
| Occupation | |
| Formal employment | 30 (19.2) |
| Manual work | 22 (14.1) |
| Business | 31 (19.9) |
| Farmer | 27 (17.3) |
| Housewife | 34 (21.8) |
| None | 12 (7.7) |
| Residence | |
| Urban | 45 (28.9) |
| Rural | 64 (41.0) |
| Peri-urban | 47 (30.1) |
| Residence location | |
| Within Lurambi sub-county | 110 (70.5) |
| Outside Lurambi sub-county | 46 (29.5) |
| Caregiver Age in years | |
| 16-24 | 20 (12.8) |
| 25-34 | 90 (57.7) |
| 35+ | 46 (29.5) |
| Relationship of primary caregiver with child | |
| Mother | 155 (99.4) |
| Grandmother | 1 (0.6) |

Table 4.2. Infants socio-demographic characteristics

| Characteristic | N (%) |
|---|--------------|
| Gender | |
| Male | 68 (43.6) |
| Female | 88 (56.4) |
| Age (months) | |
| 2-5 | 38(24.3) |
| 6-9 | 39(25.1) |
| 10-13 | 33(21.2) |
| 14-18 | 46(29.4) |
| Total number of living children | |
| 1-4 | 139 (89.1) |
| 5 and above | 17 (10.9) |
| Treatment for childhood illnesses | |
| Yes | 65 (41.7) |
| No | 91 (58.3) |
| Total number of HIV exposed/ infected children | |
| 1 exposed/ infected child | 121 (78.1) |
| 2 and more exposed/ infected children | 34 (21.9) |
| Means of transport to health facility | |
| Motorbike | 113 (72.4) |
| Bicycle | 1 (0.6) |
| Matatu | 29 (18.6) |
| Tuktuk | 3 (1.9) |
| Own car | 1 (0.6) |
| Walking | 9 (5.8) |
| <= 50 | 10 (6.4) |
| 60 – 100 | 47 (30.1) |
| >100 | 89 (57.1) |
| Not applicable | 10 (6.4) |

4.3 Clinical Characteristics of Caregivers and Their Children

In this study, a total of 156 caregivers and an equal number of children were consented for their clinical characteristic to be taken (Table 4.3 and 4.4). All the caregivers were mothers to the children and attended ANC clinic (99.4%, n=155) except one who was the child's grandmother. A higher proportion (64.5%, n=100) of the caregivers attended ANC in their second trimester. The mean gestational age for those that attended ANC was 18.8 ± 6.7 (mean \pm SD) weeks. All the caregivers (100%, n=156) reported knowing their HIV status with a high proportion (76.9%, n=113) having tested before the pregnancy of the index

child and majority (73.1%, n=114) starting treatment on the same day of diagnosis. The grandmother availed the clinic notes of the child’s mother, which was used in deducing data for these indicators of the child. A majority of the caregivers (83.3%, n=130) had a viral load of less than 1,000 copies/ml. Nearly all the children were born in a health facility and by a qualified midwife (94.2%, n=147) for each); at 9 months of gestation (91.0%, n=142); majority were of normal weight (73.7%, n=115); and all (100%, n=156) had been tested for HIV. Two were HIV positive (1.3%) while the rest were HIV-exposed, and all received ARV treatment and prophylaxis accordingly.

Table 4.3. Caregivers’ clinical characteristics

| Variables | N (%) |
|---|--------------|
| Attended ANC | |
| Yes | 155(99.4) |
| No | 1(0.6) |
| Gestation of ANC attendance | |
| 1 st trimester | 48(31.0) |
| 2 nd trimester | 100(64.5) |
| 3 rd trimester | 7 (4.5) |
| Number of ANC visits attended | |
| Less than 4 (non-optimal) | 36(23.1) |
| 4 and more (optimal) | 119(76.3) |
| Testing period for HIV | |
| Before bearing this child | 113(76.9) |
| During the pregnancy of this child | 34(23.1) |
| Started ART on testing positive? | |
| Yes | 156(100) |
| No | 0(0) |
| Duration to start of ART | |
| Same day | 114(73.1) |
| 1 to 14 days | 13(8.3) |
| After 14 days | 27(17.3) |
| Information missing | 2(1.3) |
| Latest viral load count | |
| Less than 1,000 copies/ml | 130(83.3) |
| More than 1,000 copies/ml | 19(12.2) |
| Information missing | 7(4.5) |

Table 4.4. Infants' clinical characteristics

| Variables | N (%) |
|--|--------------|
| Delivery place | |
| In a Health facility | 147 (94.2) |
| At my home | 7(4.5) |
| On the way to health facility | 1(0.6) |
| Delivery assistance | |
| Midwife | 147(94.2) |
| Traditional Birth Attendant | 1(0.6) |
| Family member | 4(2.6) |
| Neighbour | 3(1.9) |
| Delivery gestation | |
| At 9 months of pregnancy | 142(91.0) |
| Between 7 and 9 months | 13(8.3) |
| Birth weight of child | |
| Underweight (<2500grams) | 23(14.7) |
| Normal weight (2500-3500grams) | 115(73.7) |
| Overweight (>3500grams) | 12(7.7) |
| Confirmed HIV positive | |
| HIV positive | 2(1.3) |
| HIV exposed | 154(98.7) |
| Received ARV for treatment/ prophylaxis | |
| Yes | 156(100) |
| No | 0(0) |

4.4 Adherence Scheduled Appointment

Among the 156 caregiver-infant pairs that were assessed in this study, a total of 1,106 appointments were scheduled as at the time of conducting the study. Of these, 902 (81.6%) were realized. Figure 4.1 presents the status of adherence rate to monthly appointments of the caregivers that were enrolled in the clinic who are given monthly appointments for themselves and the infants. To determine the appointment adherence rate per participant, the number of scheduled appointments was determined from the appointment records, and this was considered against the number of visits honoured upon which the adherence rate was deduced. Adherence is a target that a client should attain at $\geq 90\%$ (WHO, 2012a). Among the 156 caregivers, only 68 (43.6%) attained the desired $\geq 90\%$ appointment adherence. The average status of adherence was 43.6% (n=68) (Figure 4.1).

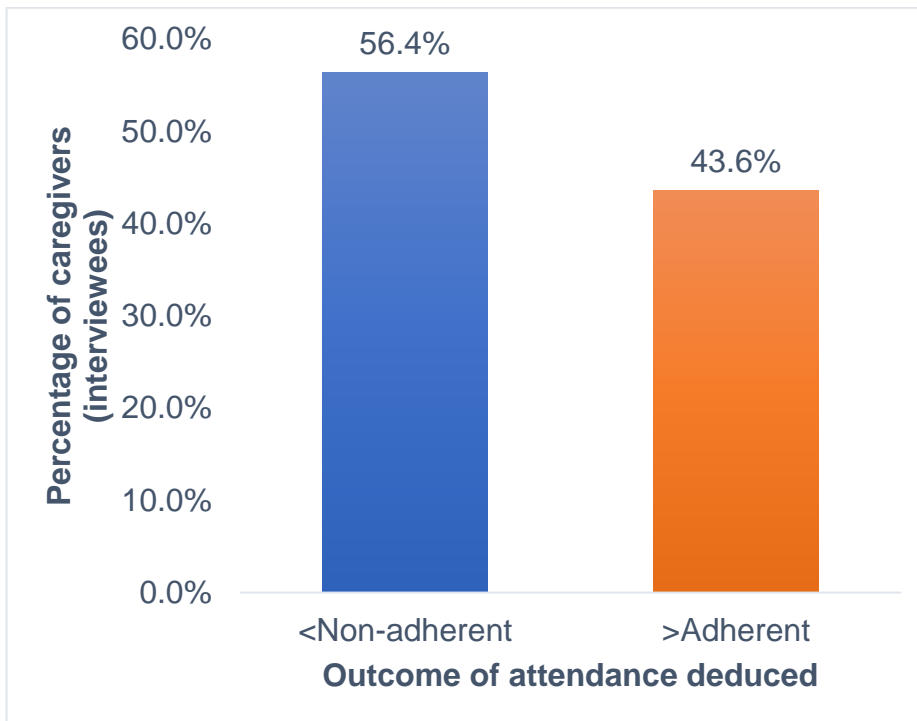


Figure 4.1. Caregivers appointment adherence

This study also assessed the socio-demographic and clinical characteristics of the adherent study participants (Table 4.5). A majority of the adherent caregivers were aged 25-34 years (54.4%, n=37); in a monogamous relationship (69.1%, n=47); of primary and lower level of education (50.0%, n= 34); with children aged 2-5 months (36.8%, n=25). Nearly all had attended ANC clinic (98.5%, n=67); had made >4 ANC clinics visits (85.1%, n=57); and had <10 appointments (89.7%, n=61).

Table 4.5. Socio-demographic and clinical characteristics of adherent study participants

| Variables | N (%) |
|--|--------------|
| Age of caregiver | |
| 15-24 years | 14 (20.6) |
| 25-34 years | 37 (54.4) |
| 25+ years | 17 (25.0) |
| Marital status of caregiver | |
| Single | 13(19.1) |
| Monogamous | 47(69.1) |
| Polygamous | 8(11.8) |
| Education Level of caregiver | |
| Primary & below | 34(50.0) |
| Secondary | 19(27.9) |
| Tertiary | 15(22.1) |
| Occupation of caregiver | |
| Formal employment | 14(20.6) |
| Manual work | 5(7.4) |
| Business | 15(22.1) |
| Farmer | 16(23.5) |
| Housewife | 12(17.6) |
| None | 6(8.8) |
| Residence of caregiver | |
| Urban | 24(35.3) |
| Rural | 25(36.8) |
| Peri-urban | 19(27.9) |
| ANC clinic attendance | |
| Yes | 67(98.5) |
| No | 1(1.5) |
| Gestation of 1st ANC | |
| Early starters (<=14 weeks) | 32(47.8) |
| Late starters (>14 weeks) | 35(52.2) |
| Number of ANC visits made | |
| Less than 4 visits (non-optimal) | 10(14.9) |
| Four (4) or more visits (optimal) | 57(85.1) |
| Number of clinical appointments | |
| Less than 10 | 61(89.7) |
| 10 or more | 7(10.3) |
| Age of child | |
| 2-5 | 25(36.8) |
| 6-9 | 19(27.9) |
| 10-13 | 10(14.7) |
| 14-18 | 14(20.6) |
| Gender of child | |
| Male | 30(44.1) |

| | |
|--------|----------|
| Female | 38(55.9) |
|--------|----------|

Further investigation of those who adhered to scheduled appointments showed that a majority of the caregivers (44.2%, n=69) were given between 6 and 10 appointments Figure 4.2. The mean appointments given were 7.1 ± 4.1 (mean \pm SD). This was obtained by running a frequency table in SPSS on the outcome of the caregiver, either as adherent ($\geq 90\%$ of appointments attended) or non-adherent. On grouping the number of appointments given to the caregivers, majority of the caregivers (44.2%) were given 6 to 10 appointments while only 2.6% had 16 to 20 appointments.

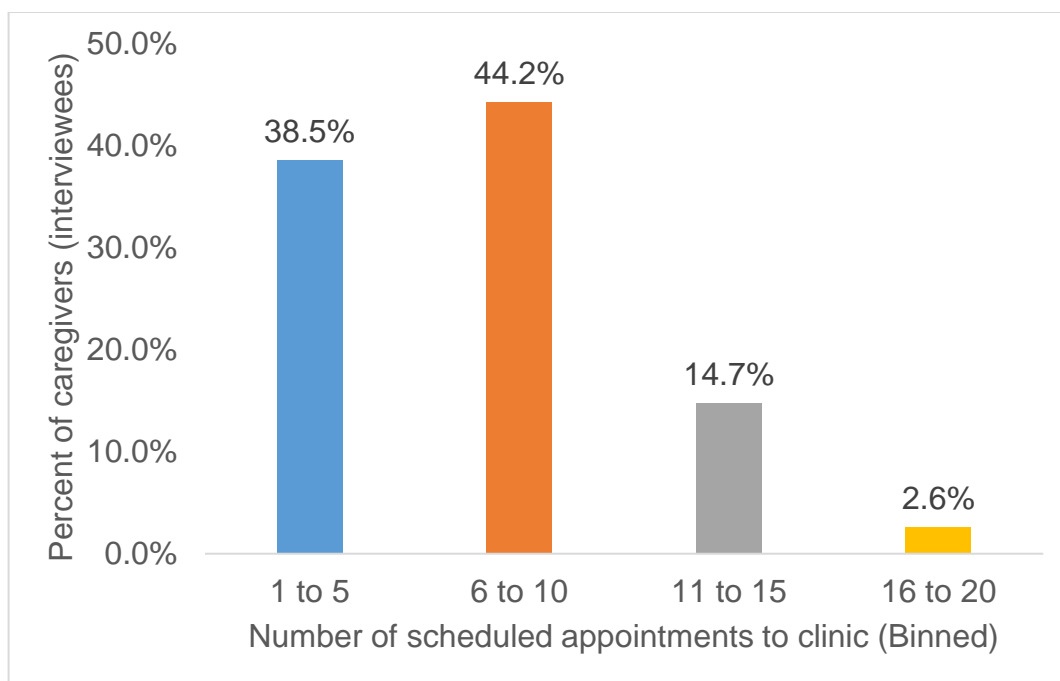


Figure 4.2. Caregiver scheduled appointments

4.5 Reasons for Missed Appointment

This study further sought to determine the reasons for missed appointments. Of the 156 participants investigated, the results showed four reasons for missed appointments for participants who self-reported an appointment adherence of $<90\%$ (23.0%, n=36) (Table 4.6). Different appointment dates for the baby and caregiver was not considered by nearly all of the participants as a factor in low adherence (91.7%, n=33). Majority of the participants reported long distance to health facility as a contributing factor (75.0%, n=27)

while over half lacked means of transport to the health facility as a factor (58.3%, n=21). None of the participants cited lack of reminder on clinic appointment date as a factor (0.0%).

Table 4.6. Participants’ response reasons for missed appointments

| Variables | N (%) |
|--|--------------|
| Different appointment dates for the clinics of baby and caregiver | |
| Yes | 3(8.3) |
| No | 33(91.7) |
| Long distance to health facility | |
| Yes | 9(25.0) |
| No | 27(75.0) |
| Lack of means of transport to health facility | |
| Yes | 21(58.3) |
| No | 15(9.6) |
| Lack of reminder on clinic appointment date | |
| Yes | 0(0.0) |
| No | 36(100.0) |

4.6 Caregiver Socio-Demographic Determinants of Adherence to Appointment

Information on the socio-demographic determinants was sought was sought from a total of 68. Furthermore, logistic regression analysis of each of the caregiver socio-demographic factors was performed against the appointment adherence. The result of logistic regression analysis found that caregivers aged between 16 and 24 years were 4 times more likely to keep appointments than those more than 35 years or older (OR =3.98; 95% CI = 1.288 – 12.301; $p=0.016$) (Table 4.7). The caregivers that were not staying alone were three times more likely to adhere to their appointments (OR =3.02; 95% CI = 1.052 – 8.649; $p=0.040$) than those staying alone. Moreover, a caregiver staying with two or more persons had better chances of adherence (OR =3.23; 95% CI = 1.158 – 9.011; $p=0.025$) than the one staying alone or with one person. The number of forms of reminders for clinic appointments was a significant factor in adherence with those that had two or more forms of reminders showing a higher likelihood of adhering than those with one or no reminder (OR =3.00; 95% CI = 2.993 – 16.042; $p<0.001$). Higher chances of adhering were witnessed among the caregivers who were reminded by their husband (OR =2.33; 95% CI = 1.218 – 4.454; $p=0.011$).

The analysis showed that the following caregiver characteristics were not statistically significant. They include marital status; education level; occupation; residence; staying with mother, mother in law, father, father in law, husband, or others; being a primary or secondary decision maker; decision maker sum; responsibility of taking child to clinic; who else takes child to clinic; summation of taking child to clinic; encouragement to take child to clinic; relative support type; family challenges in taking child to hospital; mother, father and father in law as reminders; satisfaction with family & friends support; distance to the nearest facility; and nearest HF is KCTRH (the study facility).

Table 4.7. Socio-demographic factors associated with appointment adherence of caregiver

| Characteristic | Adherent to appointments | OR (95% CI) | p-value |
|--|---------------------------------|-----------------------|----------------|
| Variable | (N, %) | | |
| Age | | | |
| 16-24 years | 14 (70.0) | 3.98 (1.288 – 12.301) | 0.016* |
| 25-34 years | 37 (41.1) | 1.20 (0.573 – 2.474) | 0.640 |
| 35+ years | 17 (37.0) | 1.00 | |
| Marital status | | | |
| Single | 13(41.9) | 1.00 | |
| Monogamous | 47(42.7) | 1.03 (0.461 – 2.316) | 0.937 |
| Polygamous | 8(53.3) | 1.58 (0.458 – 5.469) | 0.468 |
| Education Level | | | |
| Primary & below | 34(40.0) | 1.00 | |
| Secondary | 19(44.2) | 1.19 (0.565 – 2.494) | 0.650 |
| Tertiary | 15(53.6) | 1.73 (0.732 – 4.091) | 0.211 |
| Occupation | | | |
| Formal employment | 14(46.7) | 0.88 (0.229 – 3.341) | 0.845 |
| Manual work | 5(22.7) | 0.29 (0.065 – 1.329) | 0.112 |
| Business | 15(48.4) | 0.94 (0.247 – 3.555) | 0.924 |
| Farmer | 16(59.3) | 1.46 (0.371 – 5.709) | 0.591 |
| Housewife | 12(35.3) | 0.55 (0.144 – 2.067) | 0.373 |
| None | 6(50.0) | 1.00 | |
| Residence | | | |
| Urban | 24(53.3) | 1.68 (0.737 – 3.847) | 0.216 |
| Rural | 25(39.1) | 0.95 (0.438 – 2.038) | 0.885 |
| Peri-urban | 19(40.4) | 1.00 | |
| Residence location | | | |
| Within Lurambi sub-county | 47(42.7) | 1.00 | |
| Outside Lurambi sub-county | 21(45.7) | 1.13 (0.563 – 2.250) | 0.737 |
| Stay alone | | | |
| No | 63(47.0) | 3.02 (1.052 – 8.649) | 0.040* |
| Yes | 5(22.7) | 1.00 | |
| Number of people staying with caregiver | | | |
| One or None | 55(40.1) | 1.00 | |
| Two or more | 13(68.4) | 3.23(1.158 – 9.011) | 0.025* |
| Stay with mother | | | |
| No | 57(41.0) | 1.00 | |
| Yes | 11(64.7) | 2.64 (0.922 – 7.541) | 0.070 |

Table legend: Test performed using univariate binary logistic regression analysis

Table 4.7. (Continued) Socio-demographic factors associated with appointment adherence caregiver

| Characteristic | Adherent to appointments | OR (95% CI) | p-value |
|---|---------------------------------|-----------------------|----------------|
| Variable | (N, %) | | |
| Stay with others | | | |
| No | 65(42.8) | 1.00 | |
| Yes | 3(75.0) | 4.02 (0.408 – 39.488) | 0.233 |
| Stay with mother in law | | | |
| No | 58(41.7) | 1.00 | |
| Yes | 10(58.8) | 2.00 (0.717 – 5.549) | 0.186 |
| Stay with husband | | | |
| No | 20(40.0) | 1.00 | |
| Yes | 48(45.3) | 1.24(0.627 – 2.458) | 0.535 |
| Stay with father | | | |
| No | 65(43.3) | 1.00 | |
| Yes | 3(50.0) | 1.31 (0.256 – 6.691) | 0.747 |
| Stay with father-in-law | | | |
| No | 62(42.5) | 1.00 | |
| Yes | 6(60.0) | 2.03 (0.550 – 7.509) | 0.288 |
| Primary decision-maker | | | |
| Husband | 45(46.4) | 1.34 (0.685 – 2.610) | 0.394 |
| Caregiver (CG) | 22(39.3) | 1.00 | |
| Secondary decision-maker | | | |
| Parents | 10(58.8) | 1.87 (0.647 – 5.378) | 0.249 |
| In-laws | 9(42.9) | 0.98 (0.372 – 2.576) | 0.966 |
| Others | 13(39.4) | 0.85 (0.373 – 1.931) | 0.696 |
| No one else | 36(43.4) | 1.00 | |
| Decision maker sum | | | |
| CG alone | 12(32.4) | 1.00 | |
| CG & 1 other | 35(50.0) | 2.08 (0.906 – 4.790) | 0.084 |
| CG & 2 others | 21(42.9) | 1.56 (0.641 – 3.809) | 0.326 |
| Responsibility of taking child to clinic | | | |
| CG alone | 44(40.0) | 1.00 | |
| CG and other | 22(53.7) | 1.74 (0.843 – 3.578) | 0.134 |
| Who else is taking child to clinic | | | |
| Husband | 13(46.4) | 1.00 | |
| Relative | 8(72.7) | 3.08 (0.673 – 14.077) | 0.147 |
| Summation of taking child to clinic | | | |
| Only CG | 47(40.2) | 1.00 | |
| CG and other | 21(53.8) | 1.74 (0.837 – 3.606) | 0.138 |

Table legend: Test performed using univariate binary logistic regression analysis

Table 4.7. (Continued) caregiver Socio-demographic factors associated with appointment adherence of caregivers

| Characteristic | Adherent to appointments | OR (95% CI) | p-value |
|---|---------------------------------|------------------------|----------------|
| Variable | (N, %) | | |
| Encouragement to take child to clinic | | | |
| Yes | 52(42.6) | 1.00 | |
| No | 16(53.3) | 1.54 (0.690 – 3.431) | 0.292 |
| Relative support type | | | |
| Financial | 39(48.8) | 1.00 | |
| Non-financial | 10(41.7) | 1.33 (0.529 – 3.350) | 0.543 |
| Family challenges in taking child to hospital | | | |
| Yes | 5(83.3) | 6.905 (0.787 – 60.557) | 0.081 |
| No | 63(42.0) | 1.00 | |
| Number of forms of reminders for clinic attendance | | | |
| None or 1 | 38(32.5) | 1.00 | |
| 2 or more | 30(76.9) | 3.00 (2.993 – 16.042) | <0.001* |
| Husband as reminder | | | |
| No | 30(34.5) | 1.00 | |
| Yes | 38(55.1) | 2.33 (1.218 – 4.454) | 0.011* |
| Health care worker as reminder | | | |
| No | 20(37.0) | 1.00 | |
| Yes | 48(47.1) | 1.51 (0.769 – 2.969) | 0.231 |
| Mother as reminder | | | |
| No | 60(41.4) | 1.00 | |
| Yes | 8(72.7) | 3.78 (0.962 – 14.829) | 0.057 |
| Father as reminder | | | |
| No | 67(43.5) | 1.00 | |
| Yes | 1(50.0) | 1.30 (0.080 – 21.142) | 0.854 |
| Mother in law as reminder | | | |
| No | 65(43.0) | 1.00 | |
| Yes | 3(60.0) | 2.00 (0.322 – 12.224) | 0.460 |
| Satisfaction with family & friends' support | | | |
| Never | 12(54.5) | 1.44 (0.556 – 3.729) | 0.453 |
| Sometimes | 3(28.7) | 0.277 (0.073 – 1.050) | 0.059 |
| Often | 17(42.5) | 0.887 (0.410 – 1.917) | 0.760 |
| Always | 35(45.5) | 1.00 | |
| Distance to nearest Health facility | | | |
| Less than 5 kms | 53 | 1.25 (0.594 – 2.633) | 0.557 |
| More than 5 kms | 15 | 1.00 | |
| Nearest HF is KCTRH | | | |
| No | 59(43.7) | 1.04 (0.409 – 2.620) | 0.942 |
| Yes | 9(42.9) | 1.00 | |

**Denotes significance at the $p < .05$ level; tests are one-tailed. Table legend:* Test performed using univariate binary logistic regression analysis

4.7 Infants Socio-Demographic Determinants of Adherence to Appointment

The present study sought to determine the association between infant's socio-demographic determinants and adherence to appointment. The age of the infants and age of the first HIV exposed/ infected infants were significant predictors of adherence to clinical appointment among the caregivers (Table 4.8). Caregivers with younger children (2-5 months) had a four times higher likelihood of being adherent (OR =4.40; 95% CI = 1.754 – 11.013; $p=0.002$). Younger age of the first HIV exposed or infected infant (OR =3.84; 95% CI = 1.845 – 8.000; $p<0.001$) was associated with a higher likelihood of adhering by the caregiver. Gender, birth order and number of children in the family were not significantly associated with adherence to clinical appointment.

Table 4.8. Socio-demographic factors associated with appointment adherence of infants

| Characteristic Variable | Adherent to appointments (N, %) | OR (95% CI) | p-value |
|--|---------------------------------|-----------------------|---------|
| Age (months) | | | |
| 2-5 | 25(65.8) | 4.4 (1.754 – 11.013) | 0.002* |
| 6-9 | 19(48.7) | 2.2 (0.893 – 5.278) | 0.087 |
| 10-13 | 10(30.3) | 0.99 (0.376 – 2.628) | 0.990 |
| 14-18 | 14(30.4) | 1.00 | |
| Gender | | | |
| Male | 30(44.1) | 1.04 (0.549 – 1.966) | 0.907 |
| Female | 38(43.2) | 1.00 | |
| Birth order | | | |
| 3 rd and below | 50(44.2) | 1.10 (0.542 – 2.243) | 0.788 |
| 4 th and above | 18(41.9) | 1.00 | |
| Number of Living children | | | |
| 1 to 4 | 61(43.9) | 1.12 (0.402 – 3.105) | 0.832 |
| 5 to 9 | 7(41.2) | 1.00 | |
| Age 1st living child (years) | | | |
| ≤1.75 | 8(42.1) | 1.00 | |
| 1.76 - 9.83 | 34(50.7) | 1.42 (0.506 – 3.964) | 0.507 |
| 9.84 – 17.92 | 20(37.0) | 0.81 (0.279 – 2.347) | 0.696 |
| 17.93+ | 6(37.5) | 0.825 (0.211 – 3.219) | 0.782 |

Table legend: Test performed using univariate binary logistic regression analysis

**Denotes significance at the $p < .05$ level; tests are one-tailed*

Table 4.8. (Continued) Socio-demographic factors associated with appointment adherence of infants

| Characteristic Variable | Adherent to appointments (N, %) | OR (95% CI) | p-value |
|---|--|-----------------------|----------------|
| Age 2nd living child (years) | | | |
| <3.0 | 27(54.0) | 1.47 (0.352 – 6.117) | 0.599 |
| 3.0-9.66 | 17(31.5) | 0.57 (0.137 – 2.411) | 0.449 |
| 9.67-16.32 | 12(50.0) | 1.25 (0.268 – 5.826) | 0.776 |
| 16.33+ | 4(44.4) | 1.00 | |
| Age 3rd living child (years) | | | |
| ≤ 6.33 | 25(36.8) | 1.00 | |
| 6.34+ | 9(42.9) | 1.29 (0.477 – 3.489) | 0.616 |
| Age 4th living child (years) | | | |
| < 2 | 10(38.5) | 1.00 | |
| 2 + | 6(42.9) | 1.20 (0.320-4.496) | 0.787 |
| Treated for childhood illnesses | | | |
| Yes | 23(35.4) | 1.00 | |
| No | 45(49.5) | 1.79 (0.929 – 3.435) | 0.082 |
| Number of HIV exposed/ infected children | | | |
| <2 | 54(44.3) | 1.13 (0.525 – 2.452) | 0.748 |
| 2+ | 14(41.2) | 1.00 | |
| Age of 1st HIV infected/exposed child | | | |
| ≤ 0.5 years | 30(66.7) | 3.84 (1.845 – 8.000) | <0.001* |
| >0.5 years | 38(34.2) | 1.00 | |
| Age of 2nd HIV infected/exposed child | | | |
| <1 year | 8(47.1) | 1.63 (0.411 – 6.459) | 0.487 |
| 1 Year + | 6(35.3) | 1.00 | |
| Means of transport to clinic | | | |
| Non-vehicle | 54(42.9) | 1.00 | |
| Vehicle | 14(46.7) | 1.167 (0.525 – 2.595) | 0.705 |
| Fare to and from clinic | | | |
| ≤ 100 | 31(54.4) | 1.84 (0.939 – 3.605) | 0.076 |
| >100 | 35(39.3) | 1.00 | |

Table legend: Test performed using univariate binary logistic regression analysis

*Denotes significance at the $p < .05$ level; tests are one-tailed

4.8 Caregiver and Child Clinical Determinants of Adherence to Appointment

This study sought to determine the association between the caregiver and child clinical determinants and adherence to appointment. Caregiver factors made up 64% (n=7) while child factors were 36% (n=4) of the clinical factors (Table 4.9). Caregivers who started their antenatal visit early (on or before 14 weeks gestation) had a higher adherence (OR

=4.11; 95% CI = 1.996 – 8.481; $p < 0.001$). The odds of attending increased with increasing number of antenatal clinic visits (OR =2.40; 95% CI = 1.060 – 5.390; $p = 0.036$). Having fewer than 10 allocated appointments increased the likelihood of adherence (OR =2.57; 95% CI = 1.014 – 6.480; $p = 0.047$). Self-reporting of a higher appointment adherence (>81%) increased the likelihood of being adherent (OR =5.35; 95% CI = 1.124 – 25.477; $p = 0.035$). Table 4.9 shows that the time of testing HIV positive; duration to the ART initiation; and latest viral load count were not significantly associated with caregiver clinical factors ($p > 0.05$). Delivery of a child with normal weight (2,500 -3,500g) significantly increased the chances of adhering by the caregiver (OR =3.54; 95% CI = 1.231 – 10.172; $p = 0.019$) (Table 5.0). The clinical factors at the child level that were not significantly associated with child factors were child delivery place, child delivery assistance, and gestation at delivery.

Table 4.9. Caregiver clinical factors associated with appointment adherence

| Characteristic | Adherent | OR (95% CI) | p-value |
|---|------------|----------------------|---------|
| Variable | Yes (N, %) | | |
| Caregiver Factors | | | |
| Gestation at 1st ANC | | | |
| Early starters (≤14 weeks) | 32(66.7) | 4.11 (1.996-8.481) | <0.001* |
| Late starters (>14 weeks) | 35(32.7) | 1.00 | |
| Number of ANC visits done | | | |
| Less than 4 visits (non-optimal) | 10(27.8) | 1.00 | 0.036* |
| Four (4) or more visits (optimal) | 57(47.9) | 2.39 (1.060-5.390) | |
| Time of HIV testing | | | |
| Before pregnancy | 53(46.9) | 1.62 (0.732-3.584) | 0.234 |
| During pregnancy | 12(35.3) | 1.00 | |
| Duration to ART initiation | | | |
| Same day initiation | 49(43.0) | 1.00 | 0.457 |
| 1-14 days | 7(53.8) | 1.55 (0.489 – 4.896) | |
| After 14 days | 12(44.4) | 1.06 (0.456 – 2.470) | |
| Latest Viral Load count (copies/ml) | | | |
| <1,000 | 58(44.6) | 1.11 (0.418 – 2.934) | 0.837 |
| >1,000 | 8(42.1) | 1.00 | |
| Number of clinical appointments | | | |
| Less than 10 | 61(47.3) | 2.56 (1.014 – 6.480) | 0.047* |
| 10 or more | 7(25.9) | 1,00 | |
| Self reported appointment adherence rate | | | |
| Less 60% | 5(16.7) | 1.00 | 0.009* |
| 61% to 80% | 7(20.0) | 5.4 (1.124 -25.477) | |
| 81% to 100% | 55(51.7) | 1.25 (0.205 – 7.615) | |

Table legend: Test performed using univariate binary logistic regression analysis

**Denotes significance at the $p < .05$ level; tests are one-tailed*

Table 4.10. Infant clinical factors associated with appointment adherence

| Characteristic Variable | Adherent Yes (N, %) | OR (95% CI) | p-value |
|----------------------------------|------------------------|-----------------------|---------|
| Child delivery place | | | |
| In a health facility | 66(44.9) | 5.70 (0.684 – 47.535) | 0.108 |
| Outside a health facility | 1(12.5) | 1.00 | |
| Child delivery assistance | | | |
| Qualified midwife | 66(44.9) | 5.70 (0.684 – 47.535) | 0.108 |
| Unqualified midwife | 1(12.5) | 1.00 | |
| Gestation at delivery | | | |
| At 9 months | 62(43.7) | 1.24 (0.387 – 3.977) | 0.718 |
| Between 7 & 9 months | 5(38.5) | 1.00 | |
| Child delivery weight | | | |
| Underweight (<2500g) | 5(21.7) | 1.00 | 0.019* |
| Normal weight (2500-3500g) | 57(49.6) | 3.54 (1.231 – 10.172) | |
| Overweight (>4000g) | 4(33.3) | 1.80 (0.380 – 8.535) | |

Table legend: Test performed using univariate binary logistic regression analysis

**Denotes significance at the $p < .05$ level; tests are one-tailed*

4.9 Prediction Model Development for Adherence to Scheduled Appointment

In this section, multivariate binary logistic regression models were used to assess whether demographic profile can predict adherence to clinical appointment to better understand appointment adherence in Kakamega Referral Hospital. We restricted our analyses to modeling techniques that provide probability estimates, such as logistic regression (Goffman *et al.*, 2017). The goal was to create a model that would actually be used in Kakamega Referral Hospital. Logistic regression was used as a modeling technique because its coefficients can easily be interpreted and because the model could be implemented in an Excel routine (Long & Freese, 2006).

The dependent binary variable was whether the appointment was completed or not (0 = completed appointments, 1 = incomplete appointment). We selected twelve potential independent variables describing participants' demographics to develop a predictive model for adherence to appointment. These variables were: age of the caregiver, stay alone, number of persons staying with the caregiver, number of forms of reminders for clinic attendance, husband as a reminder, age of child, age of first HIV infected/ exposed child, gestation at first ANC, number of ANC visits done, number of clinical appointments, self reported appointment adherence rate, and child birth weight. The variables extracted are

obtained from sections 4.4 and 4.5. Our selection was based on the previous studies of no-show outcome models developed by other researchers (Tomar & Agarwal, 2013).

Table 4.11 shows the 12 variables that were significant at the univariate analysis and thus subjected to multivariate analysis. Only five remained significant namely number of people staying with caregiver, number of reminders, early ANC attendance, high self-report of attendance and normal birthweight of the infant.

Table 4.11(a). Caregiver demographic data factors associated adherent to appointments

| Characteristic Variable | Adherent to appointments (N, %) | B | AOR (95% CI) | p-value |
|---|---------------------------------------|--------|-----------------------|---------|
| Caregiver socio-demographic Data | | | | |
| Age | | | | |
| 16-24 years | 14 (70.0) | 1.415 | 4.12 (0.807 – 21.010) | 0.089 |
| 25-34 years | 37 (41.1) | -0.220 | 0.80 (0.292 – 2.209) | 0.670 |
| 35+ years | 17 (37.0) | | 1 | |
| Stay alone | | | | |
| Yes | 5 (22.7) | | 1 | |
| No | 63 (47.0) | 0.182 | 1.20 (0.294 – 4.891) | 0.799 |
| Number of people staying with caregiver | | | | |
| One or None | 55 (40.1) | | 1 | |
| Two or more | 13 (68.4) | 1.806 | 6.09(1.248 – 29.685) | 0.026* |
| Number of forms of reminders for clinic attendance | | | | |
| None or 1 reminder | 38 (32.5) | | 1 | |
| 2 or more reminders | 30 (76.9) | 1.196 | 3.31(1.106 – 9.881) | 0.032* |
| Husband as reminder | | | | |
| No | 30 (34.5) | | 1 | |
| Yes | 38 (55.1) | 0.234 | 1.26(0.504 – 3.172) | 0.618 |

Table legend: Test performed using univariate binary logistic regression analysis

**Denotes significance at the $p < .05$ level; tests are one-tailed*

Table 4.11 (b). Clinical characteristics associated adherent to appointments

Child socio-demographic characteristics

| Age (months) | | | | |
|---|-----------|--------|-----------------------|-------|
| 2-5 | 25 (65.8) | 0.666 | 1.95 (0.240 – 15.824) | 0.533 |
| 6-9 | 19 (48.7) | 0.310 | 1.36 (0.328 – 5.666) | 0.670 |
| 10-13 | 10 (30.3) | -1.025 | 0.36 (0.082 – 1.576) | 0.175 |
| 14-18 | 14 (30.4) | | 1 | |
| Age of 1st HIV infected/exposed child | | | | |
| ≤ 0.5 years | 30 (66.7) | 1.300 | 3.67 (0.888 – 15.159) | 0.073 |
| >0.5 years | 38 (34.2) | | 1 | |

Caregiver clinical characteristics

| Gestation at 1st ANC | | | | |
|---|-----------|-------|-------------------------|--------|
| Early starters (≤ 14 weeks) | 32 (66.7) | 1.421 | 4.14 (1.526 – 11.242) | 0.005* |
| Late starters (>14 weeks) | 35 (32.7) | | 1 | |
| Number of ANC visits done | | | | |
| Less than 4 visits (non-optimal) | 10 (27.8) | | 1 | |
| Four (4) or more visits (optimal) | 57 (47.9) | 0.271 | 1.312 (0.436-3.950) | 0.629 |
| Number of clinical appointments | | | | |
| Less than 10 | 61 (47.3) | 0.112 | 1.119 (0.280 – 4.465) | 0.874 |
| 10 or more | 7 (25.9) | | 1 | |
| Self-reported appointment adherence rate | | | | |
| Less 60% | 5 (16.7) | | 1 | |
| 61% to 80% | 7 (20.0) | 1.082 | 2.95 (0.202 - 43.101) | 0.429 |
| 81% to 100% | 55 (51.7) | 2.666 | 14.39 (1.322 – 156.647) | 0.029* |

Child clinical characteristics

| Child delivery weight | | | | |
|------------------------------|----------|--------|------------------------|--------|
| Underweight (<2500g) | 5(21.7) | | 1 | |
| Normal weight (2500-3500g) | 57(49.6) | 1.599 | 4.76 (1.283-17.632) | 0.020* |
| Overweight (>4000g) | 4(33.3) | 0.961 | 2.614 (0.342 – 19.984) | 0.354 |
| Intercept | | -3.641 | | 0.176 |

Table legend: Test performed using univariate binary logistic regression analysis

*Denotes significance at the $p < .05$ level; tests are one-tailed; B = regression coefficient; AOR = Adjusted odds ratio in favour of adherence to clinical appointment; all variables were entered on step

Five variables; stay sum (≥ 2 persons), forms of reminders (≥ 2), early ANC starters (≤ 14 weeks), self-reported appointment adherence rate ($\geq 81\%$) and child birthweight (2,500-3,500 grams) were significant ($p < 0.05$) Table 4.12.

Table 4.12. Model to predict adherence to scheduled appointments

| Indicator | β estimate | Standard Error | p-value |
|--|------------------------------------|-----------------------|----------------|
| Intercept (β_0) | -3.641 | 2.692 | 0.176 |
| Stay sum: ≥ 2 persons ($\beta_1 X_1$) | 1.806 | 0.809 | 0.026 |
| Forms of reminder: ≥ 2 ($\beta_2 X_2$) | 1.196 | 0.559 | 0.032 |
| Early ANC starters: ≤ 14 weeks ($\beta_3 X_3$) | 1.421 | 0.509 | 0.005 |
| Self-reported appointment adherence rate: $> 81\%$ ($\beta_4 X_4$) | 2.666 | 0.507 | 0.029 |
| Child birthweight: (2500-3500g) ($\beta_5 X_5$) | 1.599 | 0.706 | 0.020 |

Table legend: Test performed using univariate binary logistic regression analysis

We calculated the odds ratio (*OR*) and *Nagelkerke's R²* statistic. We examined how the twelve variables contributed to clinical appointments using the *Nagelkerke's R²* statistic and estimated the effect of each variable using *ORs*. Table 4.11 showed that demographic and clinical data in the model accounted for 91.4% (*Nagelkerke's R² = 0.914*) of the variance in the dependent variable. Table 4.12 shows that the number of persons the caregiver stayed with; *OR* = 6.086(1.248 – 29.685), $p=0.026$), having more than one form clinic reminder; *OR* = 3.306(1.106-9.881), $p = 0.032$), early starters of first ANC; *OR* = 4.142 (1.526 – 11.242), $p = 0.005$), self-reporting of >80 appointment adherence; *OR* = 14.39 (1.322-156.647), $p = 0.029$, and normal child birthweight; *OR* = 4.76 (1.283-17.632), $p = 0.020$ significantly predicted clinical appointments. Five variables (Equation 2): the number of persons the caregiver stayed with, the number of forms of reminder for appointment the caregiver had, gestation at 1st ANC, self-reported adherence rate and the child's birth weight were used in the final model. The results showed STAYSUM1 (*AOR* = 6.086, *CI* = 1.248 – 29.685, $P=0.026$), REMINDERSUM1 (*AOR* = 3.306, *CI* = 1.106-9.881, $P = 0.032$), FIRSTANCGESTATION2 (*AOR* = 4.142, *CI* = 1.526 – 11.242, $P = 0.005$), REPORTDCLINICAPPT1 (*AOR* = 14.39, *CI* = 1.322-156.647, $P = 0.029$), AND CHILDWEIGHT1 (*AOR* = 4.76, *CI* = 1.283-17.632, $p = 0.020$) were independently associated with clinical appointments. The multiple logistic regression model as shown in equation 2 estimated the predicted probability of clinical appointment adherence.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon$$

Where

y= logit/logarithm of the odds

$$\beta_0 = -3.641$$

$$\beta_1 = 1.806$$

X₁ = STAYSUM1, 2 = (> 2 people), 1 = (1 person or none)

$$\beta_2 = 1.196$$

X₂ = REMINDERSUM1, 2 = (≥ 2 forms), 1 = (1 or none)

$$\beta_3 = 1.421$$

X₃ = FIRSTANCGESTATION2, 1 = (early starters (≤ 14 weeks)), 2 = (late starters (>14 weeks))

$$\beta_4 = 2.666$$

X₄ = REPORTEDCLINICAPPT1, 3 = (81%-100%), 2 = (61%-80%), 1 = (<60%)

$$\beta_5 = 1.599$$

X₅ = CHILDWEIGHT1, 1= underweight (<2,500grams), 2 = Normal weight (2,500-3,500 grams), 3 = overweight (>4,000 grams)

$$\varepsilon = 2.692$$

(2)

To evaluate model performance, we calculated area under the receiver-operating characteristic (AUROC) (Fan et al., 2006). The average of the areas under all receiver operating characteristic curves was to estimate the socio-demographic and clinical data capacity to discriminate between adherence and non-adherence. The best cut-offs in discriminating poor versus good adherence to clinical appointments for the five factors were: ≥1.50 for STAYSUM1 (AUROC = 0.561, 95% CI, 0.469 –0.654; p=0.188); ≥1.50 for REMINDERSUM1 (AUROC = 0.669, 95% CI, 0.581 –0.758; p=0.000); ≥1.50 for FIRSTANCGESTATION2 (AUROC = 0.352 95% CI, 0.263 –0.441; p=0.002); ≥2.50 for REPORTDCLINICAPPT1 (AUROC = 0.622 95% CI, 0.534 –0.709; p=0.009); and ≥1.50 for CHILDWEIGHT1 (AUROC = 0.549, 95% CI, 0.457 –0.641; p=0.303). The ROC analysis for the 5 combined factors gave a cut point for prediction of adherence to clinical appointment was defined as a value ≥ 0.27. The sensitivity of the equation was 90.8%, while the specificity was 63.9% for predicting the possibility of adhering to clinical

appointment [area under the curve = 0.861, 95%CI 0.802 – 0.920]. This combined analysis was better than for each of the five factors, individually, as described.

CHAPTER FIVE

DISCUSSION

5.1 Socio-demographic characteristics and adherence to schedule appointment

This study sought to determine the socio-demographic factors influencing adherence to scheduled appointments among caregivers of infants on HIV care at the Kakamega County Referral Hospital, Kenya. The study findings revealed that adherence to scheduled appointments was affected by the following factors; the young caregiver age of 15 – 24 years ($p=0.016$); the caregiver staying with other people ($p=0.040$); staying with two or more people ($p=0.025$); those receiving two or more forms of reminders ($p<0.001$); the husband as a reminder ($p=0.011$); caregivers with young infants (2-5 months) ($p=0.002$) and those with a young first exposed or HIV positive child (≤ 0.5 years) ($p<0.001$). Young caregiver age has been consistently deduced as a protective factor for appointment keeping (Karcher *et al.*, 2007). As well caregivers had a higher appointment adherence (up to 90%) in the early months of their infant's life and this reduced to lows of 41% at the 18-month visit of the wellness clinics where they received routine weighing, immunizations and other counseling (Wolf *et al.*, 2018) .

Most of the other findings of this study point towards the role of the social support system in appointment adherence. The number of household members staying with the caregiver provides a safety net for the child's health probably by ensuring that the caregiver is put under a social stress to adhere to the tenets provided by the health care provider. It is not surprising that the presence of two or more reminders to the caregiver acted as a significant factor in keeping with a study in the USA (Mellins *et al.*, 2003). The study found that caregiver reminders play a critical role to the adherence of clinical appointments in the health sector in keeping with the findings from a study in Kisumu County (Sarna *et al.* 2019). This finding espouses the role of the nuclear social fabric in appointment keeping. The socio-demographic factors at the child level that were significant at the bivariate analysis were the young age of the child and the young age of the first exposed or HIV positive child.

Contrary to our findings, studies in Western Kenya (Braitstein *et al.*, 2010; Musenjeri *et al.*, 2015) and another in Kilifi Kenya (Hassan *et al.*, 2012) showed that young infant age had a lower predictive value for appointment keeping. It is assumed that those that are married should be able to have a shared responsibility for keeping appointments, but this was not the case in our study as opposed to other study findings elsewhere (Mucedzi *et al.*, 2010). Surprisingly, it is important to note that this study did not find the reminders by health care providers as significant and instead regarded the husband as reminder as of significance among all the types of reminders, pointing to the role played by the social fabric in adherence. In keeping with a study in Kericho, (Kigen *et al.*, 2018), our study did not find any role in education as a factor in appointment keeping which is not consistent with that reported elsewhere (Karcher *et al.*, 2007). This points to the non-significance of higher technical and cognitive skills such as understanding of the clinical concepts and the language used by health providers, in appointment adherence. Our study did not find distance to health facility or transport costs as factors influencing adherence as opposed to what others have deduced by Varga and the group (Varga, 1998).

5.2 Clinical Characteristics and Adherence To Schedule Appointment

This study sought to determine the clinical factors influencing adherence to scheduled appointments among caregivers of infants on HIV care at the Kakamega County Referral Hospital, Kenya. The study findings reveal that the following caregiver factors affected adherence to appointment; attending antenatal clinics early (on or before 14 weeks of gestation) ($p < 0.001$); number of antenatal visits made during pregnancy ($p = 0.036$); having less than 10 cumulative appointments ($p = 0.047$); a self-reported adherence of $> 80\%$ ($p = 0.035$); and those who had infants whose birthweight was within the desired 2,500 and 3,500 grams ($p = 0.019$).

A study in India found that a woman who was registered into antenatal care after 20 weeks of pregnancy was 1.75 times more likely to be a loss to follow-up than a woman who was registered earlier in the pregnancy (Panditrao *et al.*, 2011). In South Africa, a study revealed that late attendance of the pregnant women for their antenatal clinics (> 28 weeks of gestation) when compared to early trimester attendance was a predictor for loss to follow-up of their infants that eventually enter HIV care (Chetty *et al.*, 2012). In a study in

Ethiopia, it was found that women with ≥ 4 visits in pregnancy were more adherent in the postnatal visits (Alemayehu *et al.*, 2020). This study's findings are aligned to those of a Ugandan study where motivated caregivers that knew the duration and number of visits, reasons for not missing appointments, consequences of missing visits, were more adherent (Ahoua *et al.*, 2010).

Our study concurred with one where caregivers had a higher appointment adherence in the 2-, 4-, and 6-month visits compared to the later visits including the 18-month visits (Wolf *et al.*, 2018). In keeping with the findings of a study in Malawi (Ioannidis *et al.*, 1999), this study showed that the tendency to keep appointments was higher among caregivers who had infants whose birthweight was within the desired 2,500 and 3,500 grams. This was also seen in the study in Kenya where a low weight for height of the child was a flag of poor adherence (Braitstein *et al.*, 2010).

Early – in pregnancy- and serial (≥ 4 visits) interactions with the health system has antecedent benefits leading to a higher adherence to appointments. The caregivers that had < 10 cumulative appointments as well as those that self-reported an adherence of $> 80\%$ had a significantly higher appointment adherence. This is inferred to mean that a possibility of system fatigue sets in for the caregivers that have older infants in the clinics. This study's findings are aligned to those of a study in Uganda where motivated caregivers that knew the duration and number of visits, reasons for not missing appointments, consequences of missing visits, were more adherent (Ahoua *et al.*, 2010). When subjected to the multivariate regression analysis, only self-reported adherence of $> 80\%$ was remained significant.

While there are studies that have shown a significance among the other caregiver clinical factors that were studied in this research, period of maternal HIV testing (Fayorsey *et al.*, 2016), being on ART (Massavon *et al.*, 2013), and maternal immunity status (Catz, *et al.*, 1999), this research study did not find these as significant on both bivariate and multivariate analysis. The level of immune suppression as inferred by the latest viral load count in this study was not significantly associated with appointment adherence among the caregivers ($p=0.837$). Some studies have found health status (Catz, *et al.*, 1999, Israelski, et al., 2001) to be associated with ARV medication adherence and it would be reasonable to infer that

an illness or injury can negatively influence a person's ability to attend an appointment. However, since ART appointments are clinical visits during which a physician is seen and medication is prescribed, this could serve as motivation for someone who is experiencing symptoms of illness to seek treatment. However, in the case of the caregivers of infants, the presence of an illness on the caregiver could deter them from taking their child for a clinical appointment.

5.3 Status of Adherence To Schedule Appointment

The study findings show that adherence to schedule appointment determined from the appointment records was 81.6%. This finding is lower than the one reported in Uganda, which reported an adherence to schedule appointment of 89% (Kunutsor *et al.*, 2010a), and that required by the WHO of $\geq 90\%$ appointment keeping status (WHO, 2012a). This study found that 43.6% of the caregivers of the infants in HIV care at the Kakamega County Referral hospital kept their appointment, and thus 56.4% did not adhere to their appointments. These findings are near those from other African countries, such as Cameroon where 51% kept appointments (Bigna *et al.*, 2014a); South Africa where a study deduced that 59.6% of the caregivers kept appointment (Chetty *et al.*, 2012) while another one from the same country reported this at 51% at two weeks of age (Sherman *et al.*, 2004). Findings of a study in Busia, Kenya, were close to this study at 40.2% completion of the appointment protocol (Azcoaga-Lorenzo *et al.*, 2011) as was the 45.7% clinic appointment keeping reported among caregivers of children on ARVs in Kericho District Hospital (Langat *et al.*, 2012).

However, this study's findings differ from that in Kakamega county (79.9%) - (Musenjeri *et al.*, 2015). As well the appointment keeping status reported in this study is lower than that reported from the general population in the USA of 60% to 80% (Gardner *et al.*, 2005). The inconsistency of this study with other findings is attributable to the differences in the – methodologies as well as the definitions that are employed. This study used a cross-sectional model that factored in all the appointments that had been given to the caregiver-child pair. Some studies such as that done in Busia, Kenya (Azcoaga-Lorenzo *et al.*, 2011)

looked at missing of at least one appointment, others cite absence of one week from clinic from a scheduled appointment (Bisson *et al.*, 2008)

5.4 Prediction Model For Clinical Appointment Adherence

This Study Sought To Develop A Prediction Model For Clinical Appointments Adherence Among Caregivers Of Infants In HIV Care At The Kakamega County Referral Hospital, Kenya. The Study Findings Reveal That At The Multivariate Regression analysis level, only the caregiver who stayed with two or more people; had two or more forms of reminders; attended ANC clinic before the 14th week of pregnancy; self-reported an appointment rate of 81% to 100%; and the child birth weight was between 2,500 and 3,500; remained statistically significant ($p < 0.05$) as predictors of clinical appointment adherence. Demographic and clinical variables interact in a complex manner as factors influencing appointment adherence among clients in HOV care (Ugoji *et al.* 2015). Identification of predictors of low HIV clinical appointment adherence could help in the development of interventions and minimize viral transmission (Cohen *et al.*, 2011). A study in Uganda found that in examining retention among a cohort using a multivariate logistic regression analysis, age category 35 years and below were less likely to achieve regular attendance (Kunutsor *et al.* 2010b). Adherence prediction models have been employed, in focusing the health care providers on those clients that need the highest attention for adherence and thus improve the adherence of the caregivers to the tenets of the elimination of mother to child transmission of HIV (Goffman *et al.*, 2017).

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1 Summary of the findings

In summary, the analysis found direct associations between caregiver socio-demographic factors of number of persons they stay with and the number of types of reminders; clinical factors of early ANC attendance and high self-reporting of adherence; and an optimal child birth weight and clinical appointment attendance both independently and in models with other factors. These information is useful in identifying issues in clinical appointment attendance that can be more fully examined and understood through the application of qualitative methods and with further study may guide interventions and strategies aimed at improving caregiver clinical appointment attendance rates.

6.2 Conclusions

This study revealed a challenge in the clinical appointment adherence among the caregivers of infants in HIV care at the Kakamega County Referral Hospital, given the discerned low status of appointment adherence. It is concluded that a majority of the caregivers in this setting were unable to attain the optimal appointment of $\geq 90\%$. An appointment adherence status of 43.6% is associated with a high non-adherence to the tenets of elimination of mother to child transmission and is indicative of a concerted need, if we are to achieve the UNAIDS goal of 90-90-90.

As much as adherence to clinical appointments is a fairly complex and difficult task, especially given that the caregivers in most cases are faced with an infant who visits the health facility for just serial tests and prophylactic drug refills, it is paramount for the health care providers to take note of the possible predictors and risks to appointment adherence at the Kakamega County Referral Hospital, in a bid to raise the low rates towards the desired 90%.

It was revealed that at the sociodemographic level, younger age of the caregiver, having a young infant, young age of the first HIV exposed or infected infant, staying with more than

one person in the household, two or more forms of clinical reminders; significantly increased the caregiver appointment adherence levels.

According to the clinical factors that were explored, caregivers who started ANC clinics early were four times likely to be adherent to the clinical appointments while those that attended more than four ANC visits were twice likely to be adherent. Having fewer than 10 clinical appointments increased the likelihood of appointment adherence twofold while normal birthweight of the infant increased the chances of adhering threefold. These point to the need for early and continued engagement of the pregnant and lactating women with the health system to with a resulting favourable birth outcome of the infant.

From the multivariable logistical regression analysis, the study showed that predictors of clinical appointment adherence could be identified. Five such predictors, which by extension denote the profile of clinic appointment adherent caregivers, included staying with more than two persons, two or more forms of reminders, early ANC starters, reporting an appointment adherence of >81% and normal child birthweight. These are factors that require low or minimal investments and health care providers would be advised to consider some of the present findings when dealing with the caregivers of infants in HIV care. The model explains 91.4% of variation observed (Nagelkerke's $R^2 = 0.914$). This resulted in 79.1% of participants being correctly classified as adherent/non-adherent. Moreover, a nonsignificant result ($p=0.750$) of Hosmer and Lemeshow test supported the goodness-of-fit of this model.

6.3 Recommendations

From this study, we wish to draw the following conclusions:

1. Health care providers need to consider the age of the caregiver, and the social support system such as who the caregiver stays with as a guide in assessing the ability of the caregiver in adhering to the clinical appointments, at the Kakamega County Referral Hospital. Caregivers with older infants in HIV care have a predictably lower adherence to clinical appointments and should receive more

- support from the health care system to ensure that they do not fall off from being assisted.
2. Since early and serial interactions with the health system leads fosters better birth outcomes such as optimal birthweight and eventually leads to higher adherence of postnatal attendance, the policy makers should be cognizant of the need to put in place structures that would promote optimal ANC attendance. These structures should encourage early interaction in pregnancy of women for them and their infants to reap favourable outcomes.
 3. Due to the complexity of the factors associated with appointment adherence, no single strategy is likely to be effective for every caregiver-child pair. Nonetheless, the importance of clinical appointment adherence needs to be emphasized if the benefits that accrue with such adherence are to be realized. There is also need for close monitoring of adherence; the caregivers need to understand the need for and importance of regular clinical follow ups.

6.4 Recommendations for Further Research

Further studies can be undertaken to address the following emergent issues:

1. What is the status of clinical appointment adherence among caregivers of infants in HIV care in Kenya?
2. What are the most feasible and cost-effective interventions to improve the clinical appointment adherence in Kenya?

REFERENCES

- Abdulrahman, S.A., Rampal, L., Othman, N., Ibrahim, F., Hayati, K.S. and Radhakrishnan, A. (2017) Sociodemographic profile and predictors of outpatient clinic attendance among HIV-positive patients initiating antiretroviral therapy in Selangor, Malaysia. *Patient Preference and Adherence*. 11: 1273-1284.
- Adino, D.O. (2016) Factors affecting adherence to antiretroviral therapy in Siaya County, Western Kenya. Unpl. PhD Thesis, Institute of Anthropology, Gender and African studies, The University of Nairobi.
- Ahoua, L., Ayikoru, H., Gnauck, K., Odaru, G., Odar, E., Ondoa-Onama, C., Pinoges, L., Balkan, S., Olson, D., Pujades-Rodríguez, M. (2010) Evaluation of a 5-year programme to prevent mother-to-child transmission of HIV infection in Northern Uganda. *J Trop Pediatr*. 56(1): 43–52.
- Alemayehu, M., Gebrehiwot, T.G., Medhanyie, A.A., Desta, A., Alemu, T., Abrha, A. and Godefy, H. (2020) Utilization and factors associated with antenatal, delivery, and postnatal care services in Tigray region, Ethiopia: a community based cross-sectional study. *BMC Pregnancy Childbirth* 20, 334.
- Alshammari, A., Almalki, R. and Alshammari, R. (2021) developing a predictive model of predicting appointment no-show by using machine learning algorithms. *J. Adv. Inf. Technol*. 12(1): 234-239.
- Anoje, C., Agu, K.A., Oladele, E.A., Badru, T., Adedokun, O., Oqua, D., Khamofu, H., Adebayo, O., Torpey, K. and Chabikuli, O.N. (2017) Adherence to on-time ART pick-up and its association with CD4 changes and clinical outcomes amongst HIV infected adults on first-line antiretroviral therapy in Nigerian hospitals. *AIDS Behav* 21(2), 386-392.
- Azcoaga-Lorenzo, A., Ferreyra, C., Alvarez, A., Palma, P.P., Velilla, E. and del Amo, J. (2011) Effectiveness of a PMTCT programme in rural Western Kenya. *AIDS Care* 23, 274-80.
- Bastard, M., Pinoges, L., Balkan, S., Szumilin, E., Ferreyra, C. and Pujades-Rodriguez, M. (2012) Timeliness of clinic attendance is a good predictor of virological response and resistance to antiretroviral drugs in HIV-infected patients. *PLoS One* 7, e49091.
- Bennet, D.E., Jordan, M.R., Bertagnolio, S., Hong, S.Y., Ravasi, G., McMahon, J.H., Saadani, A., and Kelley, F.K. (2012) HIV drug resistance early warning indicators in cohorts of individuals starting antiretroviral therapy between 2004 and 2009: World Health Organization global report from 50 countries. *Clin Infect Dis*. 54(suppl 4): S280-S289.

- Bigna, J.J., Noubiap, J.J., Kouanfack, C., Plottel, C.S. and Koulla-Shiro, S. (2014a) Effect of mobile phone reminders on follow-up medical care of children exposed to or infected with HIV in Cameroon (MORE CARE): a multicentre, single-blind, factorial, randomised controlled trial. *Lancet Infect Dis* 14, 600-8.
- Bigna, J.J., Noubiap, J.J., Plottel, C.S. Kouanfack, C., and Koulla-Shiro, S. (2014b) Factors associated with non-adherence to scheduled medical follow-up appointments among Cameroonian children requiring HIV care: a case-control analysis of the usual-care group in the MORE CARE trial. *Infectious Disease of Poverty* 3:44
- Bisola, O., Higgins-Biddle, M., Greeson, D., Phelps, B. R., Amzel, A., Okechukwu, E., Kolapo, U., Cabral, H., Cooper, E. and Hirschhorn, L.R. (2014) The association between quality of HIV care, loss to follow-up and mortality in pediatric and adolescent patients receiving antiretroviral therapy in Nigeria. *PLoS One* 9(7), e100039.
- Bisson, G.P., Gaolathe, T., Gross, R., Rollins, C., Bellamy, S., Mogorosi, M., Avalos, A., Friedman, H., Dickson, D., Frank, I., and Ndwapi, N. (2008) Overestimates of survival after HAART: implications of global scale-up efforts. *PLoS One* 3(3), e1725.
- Blanco, A.J., Micek, M.A., Frenkel, L.M., Montoya, P., Karagianis, M., Matunha, L., Johnson, W., Gloyd, S., and Pfeiffer, J. (2015) Loss to follow up among HIV-exposed children in an HIV-clinic in Beira, Mozambique. *SAGE Journals* <https://doi.org/10.1177/2158244015590841>
- Bofill, L., Waldrop-Valverde, D., Metsch, L., Pereyra, M., Kolber, M.A. (2011) Demographic and psychosocial factors associated with appointment attendance among HIV-positive outpatients. *AIDS Care* 23(10): 1219–1225.
- Braitstein, P., Songok, J., Wools-Kaloustian, K.K., Ayaya, S., Nyandiko, W. Vreeman, R.C., and Yiannoutsos, C. (2011) "Wamepotea" (they have become lost): outcomes of HIV-positive and HIV-exposed children lost to follow-up from a large HIV treatment program in western Kenya. *J Acquir Immune Defic Syndr* 57, e40-6.
- Braitstein, P., Katshcke, J., Shen, C., Sang, E., Nyandiko, W., Ochieng, V.O., Vreeman, R.C., Yiannoutsos, C., Wools-Kaloustian, K.K., and Ayaya, S. (2010) Retention of HIV-infected and exposed children in a comprehensive HIV care clinical program in Western Kenya. *Trop Med Int Health* 15 (7), 833-841.
- Brennan, A.T., Maskew, M., Sanne, I. and Fox, M.P. (2010) The importance of clinic attendance in the first six months on antiretroviral treatment: a retrospective analysis at a large public HIV sector HIV clinic in South Africa. *J Int AIDS Soc* 13: 49.

- Catz, S.L., McClure, J.B., Jones, G.N. and Brantley, P.J. (1999) Predictors of outpatient medical appointment attendance among persons with HIV. *AIDS Care* 11, 361-73.
- Chandio, A., Shaikh, Z., Chandio, K., Naqvi, S.M. and Naqvi, S.A. (2017) Impact of missed hospital appointments. *Surg Rehab* 1(5), 3-4.
- Chandiwana, N., Sawry, S., Chersich, M., Kachingwe, E., Makhathini, B. and Fairlie, L. (2018) High loss to follow-up of children on antiretroviral treatment in a primary care HIV clinic in Johannesburg, South Africa. *Medicine (Baltimore)* 97(29):e10901.
- Cohen, M.S., Chen, Y.Q., McCauley, M., Gamble, T., Hosseinipour, M.C., Kumarasamy, N., Hakim, J.G., Kumwenda, J., Grinsztejn, B., Pilotto, J.H., Godbole, S.V., Mehendale, S., Chariyalertsak, S., Santos, B.R., Mayer, K.H., Hoffman, I.F., Eshleman, S.H., Piwowar-Manning, E., Wang, L., Makhema, J., Mills L.A., de Bruyn G., Sanne I., Eron J., Gallant J., Havlir D., Swindells S., Ribaud H., Elharrar V., Burns D., Taha T.E., Nielsen-Saines K., Celentano D., Essex M. and Fleming T.R. (2011) Prevention of HIV-1 infection with early antiretroviral therapy. *N Engl J Med.* 365(6): 493-505.
- Cohen D., Lungu M., and van Oosterhout J.J. (2010) HIV testing coverage of family members of adult antiretroviral therapy patients in Malawi. *AIDS Care.* 22(11): 1346-9.
- Chetty, T., Knight, S., Giddy, J., Crankshaw, T.L., Butler, L.M. and Newell, M.L. (2012) A retrospective study of Human Immunodeficiency Virus transmission, mortality and loss to follow-up among infants in the first 18 months of life in a prevention of mother-to-child transmission programme in an urban hospital in KwaZulu-Natal, South Africa. *BMC Pediatr* 12, 146.
- Diamantopoulos, A. and Schlegelmilch, B.B. (2000) Taking the fear out of data analysis: a step-by-step analysis. London, UK: Business Press.
- DHHS (2021) Panel on Antiretroviral Guidelines for Adults and Adolescents. Guidelines for the use of antiretroviral agents in HIV-1-infected adults and adolescents. Department of Health and Human Services; Available at: <http://aidsinfo.nih.gov/contentfiles/AdultandAdolescentGL003371.pdf> (Last accessed October 20, 2014).
- Ekop, E.E. (2019) Scheduled clinic appointment keeping among HIV-infected adolescents attending a single tertiary centre in Abuja, Nigeria. *Jos Journal of Medicine* 13(1) *The Journal for Nurse Practitioners* 8, 797-803.
- Eticha, T. and Berhane, L. (2014) Caregiver-reported adherence to antiretroviral therapy among HIV-infected children in Mekelle, Ethiopia. *BMC Pediatr* 14, 114.

- Fan, J., Upadhye, S., and Worster, A. (2006) Understanding receiver operating characteristic (ROC) curves. *CJEM* 8, 19-20.
- Fayorsey, R.N., Chege, D., Wang, C., Reidy, W., Peters, Z., Syengo, M., Barasa, C., Owino, S.O., Sirengo, M, Hawken, M.P., and Abrams, E.J. (2016) Mother infant retention for health (MIR4Health): study design, adaptation, and challenges with PMTCT implementation science research. *J Acquir Immune Defic Syndr* 72, 137-144.
- Gardner, L.I., Metsch, L.R., Anderson-Mahoney, P., Loughlin, A.M., del Rio, C., Strathdee, S., Sansom, S.L., Siegal, H.A., Greenberg, A.E. and Holmberg, S.D. (2005) Efficacy of a brief case management intervention to link recently diagnosed HIV-infected persons to care. *Aids* 19, 423-31.
- Geng, E. H., Nash, D., Kambugu, A., Zhang, Y., Braitstein, P., Christopoulos, K. A., Muyindike, W., Bwana, M. B., Yiannoutsos, C. T., Petersen, M. L., and Martin, J. N. (2010). Retention in care among HIV-infected patients in resource-limited settings: emerging insights and new directions. *Current HIV/AIDS reports*, 7(4), 234–244.
- Goffman R.M., Harris S.L., May J.H., Milicevic A.S., Monte R.J., Myaskovsky L., Rodriguez K.L., Tjader Y.C. and Vargas D.L. (2017) Modeling patient no-show history and predicting future outpatient appointment behavior in the veterans health administration. *Mil Med.* 182(5):e1708-e1714.
- Gouveia, P.A., da Silva, G.A. and de Albuquerque Mde, F. (2014) Predictors of loss to follow-up among children registered in an HIV prevention mother-to-child transmission cohort study in Pernambuco, Brazil. *BMC Public Health* 14, 1232.
- Hanley, J.A. (1989) Receiver operating characteristic (ROC) methodology: the state of the art. *Crit Rev Diagn Imaging* 29, 307–35.
- Hassan, A.S., Sakwa, E.M., Nabwera, H.M., Taegtmeier, M.M., Kimutai, R.M., Sanders, E.J., Awuondo, K.K., Mutinda, M.N., Molyneux, C.S. and Berkley, J.A. (2012) Dynamics and constraints of early infant diagnosis of HIV infection in Rural Kenya. *AIDS Behav* 16, 5-12.
- Hickey, M.D., Omollo, D., Salmen, C.R., Mattah, B., Blat, C., Ouma, G.B., Kathryn J Fiorella, K.J., Njoroge, B., Gandhi, M., Bukusi, E.A., Cohen, C.R., and Geng, E.H. (2016) Movement between facilities for HIV care among a mobile population in Kenya: transfer, loss to follow-up and re-engagement. *AIDS Care* 28(11): 1386-1393
- Hickey, M.D., Salmen, C.R., Omollo, D., Mattah, B., Fiorella, K.J., Geng, E.H., Bacchetti, P., Blat, C., Benard Ouma, G.B., Zoughbie, D., Tessler, R.A., Salmen, M.R., Campbell, H., Gandhi, M., Shade, S., Betty Njoroge, B., Bukusi,

- E.A., and Cohen, C.R.. (2015) Pulling the network together: quasi-experimental trial of a patient-defined support network intervention for promoting engagement in HIV care and medication adherence on Mfangano Island, Kenya. Movement between facilities for HIV care among a mobile population in Kenya: transfer, loss to follow-up and re-engagement. *J Acquir Immune Defic Syndr* 69(4):e127-e134.
- Horstmann, E., Brown, J., Islam, F., Buck, J. and Agins, B.D. (2010) Retaining HIV-infected patients in care: Where are we? Where do we go from here? *Clin Infect Dis* 50, 752-61.
- Ioannidis, J.P., Taha, T.E., Kumwenda, N., Broadhead, R., Mtimavalye, L., Miotti, P., Yellin, F., Contopoulos-Ioannidis, D.G. and Biggar, R.J. (1999) Predictors and impact of losses to follow-up in an HIV-1 perinatal transmission cohort in Malawi. *Int J Epidemiol* 28, 769-75.
- Israelski, D., Gore-Felton, C., Power, R., Wood, M.J. and Koopman, C. (2001) Sociodemographic characteristics associated with medical appointment adherence among HIV-seropositive patients seeking treatment in a county outpatient facility. *Prev Med* 33, 470-5.
- Jacobs, C., Moshabela, M., Maswenyeho, S., Lambo, N. and Michelo, C. (2017) Predictors of antenatal care, skilled birth attendance, and postnatal care utilization among the remote and poorest rural communities of Zambia: A multilevel analysis. *Front. Public Health* 5(11) doi.
- Janssen, S., Wieten, R.W., Stolp, S., Cremers, A.L., Rossatanga, E.G., Klipstein-Grobusch, K., Belard, S. and Grobusch, M.P. (2015) Factors associated with retention to care in HIV clinic in Gabon, Central Africa. *PLoS One* 10(10), e0140746.
- Karcher, H., Omondi, A., Odera, J., Kunz, A., and Harms, G. (2007) Risk factors for treatment denial and loss to follow up in an antiretroviral treatment cohort in Kenya. *Trop Med Int Health* 12(5): 687-94.
- Kigen, H.T., Galgalo, T., Githuku, J., Odhiambo, J., Lowther, S., Langat, B., Wamicwe, J., Too, R., and Gura, Z. (2018). Predictors of loss to follow-up among HIV-exposed children within the prevention of mother to child transmission cascade, Kericho County, Kenya. *Pan Afr Med J.* 30 (178):15837.
- Kimeu, M., Burmen, B., Audi, B., Adeg, A., Owuor, K., Arodi, S., Bii, D., and Zielinski-Gutiérrez, E (2016). The relationship between adherence to clinic appointments and year-one mortality for newly enrolled HIV infected patients at a regional referral hospital in Western Kenya, January 2011 - December 2012. *Catz, S.L., McClure, AIDS Care* 28(4): 409-415.
- Kirimi, M.P, Magu, D., Everisto, O. and Mutai, J. (2020). Social demographic factors associated with retention to medical appointments among HIV infected children

- attending HIV care services at KNH, Kenya. *Journal of Nursing and Health Science* 9(1):55-60.
- Kheirkhah, P., Feng, Q., Travis, L.M., Tavakoli-Tabasi, S., and Sharafkhaneh, A. (2016). Prevalence, predictors, and economic consequences of no-shows. *BMC Health Services Research* 16:13.
- Kop, V.D., Nagide, P.I., Thabane, L., Gelmon, L., Kyomuhangi, L.B., Abunah, B., Ekström, A.M. and Lester, R.T. (2018) Retention in clinic versus retention in care during the first year of HIV care in Nairobi, Kenya: a prospective study. *Journal of the International AIDS Society* 21:e25196.
- Kranzer, K., Lewis, J.J., Ford, N., Zeinecker, J., Orrell, C., Lawn, S.D., Bekker, L.G., and Wood, R. (2010) Treatment interruption in a primary care antiretroviral program in South Africa: cohort analysis of trends and risk factors. *J Acquir Defic Syndr.* 55(3):e17-e23.
- Kunutsor, S., Walley, J., Katabira, E., Muchuro, S., Balidawa, H., Namagala, E. and Ikoona, E. (2010a) Using mobile phones to improve clinic attendance amongst an antiretroviral treatment cohort in rural Uganda: a cross-sectional and prospective study. *AIDS Behav* 14, 1347-52.
- Kunutsor, S., Walley, J., Katabira, E., Muchuro, S., Balidawa, H., Namagala, E. and Ikoona, E. (2010b) Clinic attendance for ARV medication refills and medication adherence amongst an antiretroviral treatment cohort in Uganda: a prospective study. *AIDS Research and Treatment* 2010, 8 pages.
- Langat, N.T., Odero, W., and Gatongi, P. (2012) Antiretroviral drug adherence by HIV infected children attending Kericho District Hospital, Kenya. *East Afr J Pub Health* 9(3)101-4.
- Lee, K.S., Quintiliani, L., Heinz, A., Johnson, N.L., Xuan, Z., Truong, V. and Lasser, K.E. (2020) A financial incentive program to improve appointment attendance at a safety-net hospital-based primary care hepatitis C treatment program. *PLoS One* 15(2), e0228767.
- Lemly, D., Mandelbrot, L., Meier, F., Firtion, G., Matheron, S., Jeantils, V. and Scott, T.A. (2007) Factors related to medical appointment attendance after childbirth among HIV-infected women in the Paris region. *AIDS Care* 19, 346-54.
- Lima, V.D., Harrigan, R., Bangsberg, D.R., Hogg, R.S., Gross, R., Yip, B. and Montaner, J.S. (2009) The combined effect of modern highly active antiretroviral therapy regimens and adherence on mortality over time. *J Acquir Immune Defic Syndr* 50, 529-36.

- Long, J.S. and Freese, J. (2006) Regression models for categorical dependent variables using stata. College Station, TX, Stata Press.
- Lucas, G.M., Chaisson, R.E. and Moore, R.D. (1999) Highly active antiretroviral therapy in a large urban clinic: risk factors for virologic failure and adverse drug reactions. *Ann Intern Med* 131, 81-7.
- Makokha, F.M., Wanjala, P.M., Githuku, J. and Kutima, H.L. (2015) Uptake of second dose of measles-containing vaccine among children in Kakamega County, Kenya. *International Journal of Scientific and Research Publications* 5(7), 2250-3153.
- Massavon, W., Lundin, R., Costenaro, P., Penazzato, M. and Namisi, P. (2013) Attrition and loss to follow-up Among Children and Adolescents in a Community Home-Based Care HIV Programme in Uganda. *Pediatrics & Therapeutics* 3, 183-190.
- McCoy, D., Besser, M., Visser, R. and Doherty, T. (2002) Interim Findings on the national PMTCT pilot sites: Summary of lessons and recommendations. . In: H.S. Trust. (Ed), Durban.
- Mellins, C.A., Brackis-Cott, E., Richards, A. and Abrams, E. (2003) Patterns of HIV disease disclosure to Perinatally-infected children and subsequent mental health outcomes: *Clinical Child Psychology and Psychiatry*. 7:101-114
- Muchedzi, A., Chandisarewa, W., Keatinge, J., Stranix-Chibanda, L., Woelk, G., Mbizvo, E. and Shetty, A.K. (2010) Factors associated with access to HIV care and treatment in a prevention of mother to child transmission programme in urban Zimbabwe. *J Int AIDS Soc* 13, 38.
- Mugavero, M.J., Amico, K.R., Westfall, A.O., Crane, H.M., Zinski, A., Willig, J.H., Norton, W.E., Raper, J.L., Kitahata, M.M. and Saag, M.S. (2012) Early retention in HIV care and viral load suppression: implications for a test and treat approach to HIV prevention. *J Acquir Immune Defic Syndr* 59(1):86-93.
- Mugavero, M.J., Davila, J.A., Nevin, C.R. and Giordano, T.P. (2010) From access to engagement: measuring retention in outpatient HIV clinical care. *AIDS Patient Care STDs*. 24 (10): 607-613.
- Mugavero, M.J., Lin, H.Y., Willig, J.H., Westfall, A.O., Ulett, K.B., Routman, J.S., Abrams, S., Raper, J.L., Saag, M.S. and Allison, J.J. (2009) Missed visits and mortality among patients establishing initial outpatient HIV treatment. *Clin Infect Dis* 48, 248-56.
- Mugavero, M.J., Norton, W.E. and Saag, M.S. (2011) Health care system and policy factors influencing engagement in HIV medical care: Piecing together the fragments of a fractured health care delivery system. *Clin Infect Dis* 52 (Suppl 2):S238-S246.

- Musenjeri, S., Mbatia, S., Nganga, J. and Mwau, M. (2015) Factors affecting adherence to treatment of HIV exposed infants in Mumias region, Western Kenya. *Science Journal of Public Health*. 3, 366-372.
- Nagelkerke, N.J.D. (1991) A note on general definition of the coefficient of determination. *Biometrika*. 78, 691-2
- Nagata, D., and Gutierrez, E. B. (2015) Characteristics of HIV patients who missed their scheduled appointments. *Revista de Saúde Pública*. 49, 95.
- NASCOP. (2016) Kenya HIV Estimates 2015. In: M.o. Health (Ed). GoK, Nairobi, p. 14-17.
- NASCOP. (2018) Kenya HIV Estimates 2017. In: M.o. Health (Ed). GoK, Nairobi, p. 22.
- NASCOP. (2020) Kenya HIV Estimates 2019. In: M.o. Health (Ed). GoK, Nairobi, p. 42.
- Nyandiko, W., Vreeman, R.C., Liu, H., Shangani, S., Sang, E., Ayaya, S., and Braitstein P. (2013) Nonadherence to clinic appointments among HIV-infected children in an ambulatory care program in western Kenya. *J Acquir Immune Defic Syndr* 63(2), e49-55.
- Obai, G., Mubeezi, R. & Makumbi, F. (2017) Rate and associated factors of non-retention of mother-baby pairs in HIV care in the elimination of mother-to-child transmission programme, Gulu-Uganda: a cohort study. *BMC Health Serv Res* 17, 48. doi 10.1186/s12913-017-1998-5
- Ojwang', V.O., Penner, J., Blat, C., Agot, K., Bukusi, E.A., and Cohen, C.R. (2016) Loss to follow-up among youth accessing outpatient HIV care and treatment services in Kisumu, Kenya *AIDS Care* 28(4): 500-7.
- Ong'ech, J.O., Hoffman, H.J., Kose, J., Audo, M., Matu, L., Savosnick, P. and Guay, L. (2012) Provision of services and care for HIV-exposed infants: a comparison of maternal and child health clinic and HIV comprehensive care clinic models. *J Acquir Immune Defic Syndr* 61, 83-9.
- Panditrao, M., Darak, S., Kulkarni, V., Kulkarni, S. and Parchure, R. (2011) Socio-demographic factors associated with loss to follow-up of HIV-infected women attending a private sector PMTCT program in Maharashtra, India. *AIDS Care* 23, 593-600.
- Park, W.B., Choe, P.G., Kim, S.H., Jo, J.H., Bang, J.H., Oh, M., and Choe, K.W. (2007) One-year adherence to clinic visits after highly active antiretroviral therapy: a predictor of clinical progress in HIV patients. *J Intern Med* 261(3):268-278

- Parsons, J., Bryce, C. and Atherton, .H. (2021) Which patients miss appointments in general practice and why? A systematic review. *British Journal of General Practice*. 71. BGJP.2020.1017.
- Phillips, J.D. (2008) Evaluating patient compliance: Effect of appointment reminder systems on attendance. Wright State University, Dayton, Ohio.
- Sarna, A., Saraswati, L.R., Okal, J., Matheka, J., Owuor, D., Singh, R.J, Reynolds, N. and Kalibala, S. (2019) Cell-phone counseling improves improves retention of mothers with HIV infections in care and infant HIV testing in Kisumu, Kenya: a randomized controlled study: *Global Health: Sceince and Practice*. 7(2):171-188.
- Samuels, R.C., Ward, V.L, Melvin, P., Match-Greenberg, M., Wenren, L.M., Yi, J., Massey, G., and Cox, J.E. (2015) Missed Appointments: Factors contributing to high-show rates in an urban pediatrics primary clinic. *Clinical Pediatrics*. 54(10), 976-982.
- Sengayi M., Dwane N., Marinda E., Sipambo N., Fairlie L., and Moultrie H. (2013) Predictors of loss to follow-up among children in the first and second years of antiretroviral treatment in Johannesburg, South Africa. *Glob Health Action*. 6 (19248) doi:10.3402/gha.v6i0.19248
- Sherman, G.G., Jones, S.A., Coovadia, A.H., Urban, M.F. and Bolton, K.D. (2004) PMTCT from research to reality--results from a routine service. *S Afr Med J* 94, 289-92.
- Tanyi, W.N., Gachuno, O., Odero, T., Farquhar, C., Kimosop, D. and Mayi, A. (2021) Factors affecting adherence to antiretroviral therapy among children and adolescents living with HIV in the Mbita Sub-County Hospital, Homa Bay- Kenya *African Health Sciences* 21(Suppl 1) doi: [10.4314/ahs.v21i1.4S](https://doi.org/10.4314/ahs.v21i1.4S).
- Talam, N.C., Gatongi, P., Rotich, J., and Kimaiyo, S. (2008) Factors affecting antiretroviral drug adherence among HIV/AIDS adults attending HIV/AIDS clinic at Moi Teaching and Referral Hospital, Eldoret, Kenya. *East Afr J Pub Health* 5(2)74-8.
- Talam, N.C., Odero, W. and Gatongi, P.M. (2015) Factors influencing anti-retroviral drug adherence in HIV infected children attending Kericho District Hospital, Kenya. *East Afr J Pub Health* 92(9)442-7.
- Tomar, D. and Agarwal, S. (2013) A survey on data mining approaches for healthcare. *Int J Biochem Biotechnol* 2013; 5(5): 241–66.
- Torres, O., Rothberg, M.B., Garb, J., Owolabi, O., Judepatricks O., and Higgins, T. (2015) Risk factor model to predict a missed clinic appointment in an urban, academic, and undeserved setting. *Population Health Management* 18, 131-136.

- Triemstra, J.D. and Lowery, L. (2018) Prevalence, predictors, and the financial impact of missed appointments in an academic adolescent clinic. *Cureus* 10(11):e3613
- Turkcan, A., Nuti, L., DeLaurentis, P., Tian, Z., Daggy, J., Zhang, L., Lawley, M., and Sands, L. (2013) No-show modeling for adult ambulatory clinics. In: Denton B (Ed). *Handbook of healthcare operations management: methods and applications*.
- Ugoji, C., Okere, N., Dakum, P., Ake-Uzoigwe, R., Igboelina, D., Ndembi, N., Ekong, E., Charurat, M. and Blattner, W.A. (2015) Correlates of patient retention in HIV care and treatment programs in Nigeria. *Current HIV Research* 13, 300-308.
- UNAIDS. (2021) Fact Sheet - Latest global and regional statistics on the status of HIV. In. UN.
- UNAIDS. (2011) UNAIDS Data Tables 2011. In UN.
- UNAIDS. (2017) Start Free Stay Free AIDS Free 2017 Progress Report. Geneva, Switzerland. In. UN.
- Urassa, D.P., Matem, S. and Sunguyo, B.F. (2018) Antiretroviral therapy clinic attendance among children aged 0-14 years in Kahama district, Tanzania: a cross-sectional study. *Tanzania Journal of Health Research* 20(1), <https://doi.org/10.4314/thrb.v20i1.8>.
- Varga, C. (1998) Health Care Utilization among rural and urban Zulu adolescents. In. University of Pennsylvania, Philadelphia.
- Wachira, J., Middlestadt, S.E., Vreeman, R. and Braitstein, P. (2012) Factors underlying taking a child to HIV care: implications for reducing loss to follow-up among HIV-infected and -exposed children. *Sahara J* 9, 20-9.
- Weisstein, E.W. (2003) "Logistic Equation". From MathWorld - A Wolfram Web Resource. <https://mathworld.wolfram.com/LogisticEquation.html>
- WHO. (2011) Retention in HIV programmes defining the challenges and identifying solutions. Available at: http://apps.who.int/iris/bitstream/10665/44878/1/9789241503686_eng.pdf (Accessed: 20 September 2021).
- WHO. (2012a) Global Strategy for the surveillance and monitoring of HIV drug resistance: an update. In: Health (Ed). World Health Organization.
- WHO. (2015) Global summary of the HIV/AIDS Epidemic 2015. Available at: http://www.who.int/hiv/data/en/-global_summaries. (Accessed: 20 September 2021).

Wolf, E.R., Hochheimer, C.J., Sabo, R.T, DeVoe, J., Wasserman, R., Geissal, E., Opel, D.J., Warren, N., Puro, J., O'Neil, J., Pecsock, J. and Krist, A.H. (2018) Gaps in well-child care attendance among primary care clinics serving low-income families. *Pediatrics* 142(5)e20174019.

Yamane, T. (1967) *Statistics : an introductory analysis*. Harper and Row, New York.

Zhang, Y., Dou, Z., Sun, K., Ma, Y., Chen, R.Y., Bulterys, S.M., Zhu, H., Liu, Z. and Zhang, F. (2012) Association between missed early visits and mortality among patients of China national free antiretroviral treatment. *J Acquir Immune Defic Syndr* 60(1), 59-67.

Appendices

Appendix I: Consent form

English

CONSENT TO PARTICIPATE IN THE STUDY

Title: Predictors of adherence to clinical appointments among caregivers of infants on HIV care in Kakamega county referral hospital, Kakamega-Kenya

Investigator's telephone number: Habel A. Alwang'a, Department of Public Health, Maseno University – 0722 446 075

INVESTIGATOR'S STATEMENT: I am requesting you to participate in a public health research study on clinical appointments keeping among the caregivers of infants in HIV care. The purpose of this consent form is to give you information you need to help you decide whether to be in this study or not. Please read this form carefully or listen as it is read to you. You may ask questions about what we will ask you to do, the risks, the benefits and you rights as a volunteer, or anything about the research or in this form that is not clear. When all your questions have been answered, you can decide whether you would participate in the study. This process is called “informed consent”. If you wish we will give you a copy of this form for your records. You are free to refuse to participate and to withdraw from the study at any time without penalty or loss of benefits.

I am a Master of Public Health student with Maseno University. I am undertaking a study for my Thesis upon which I am interested in understanding why so many of our patients in the HIV program do not keep their clinic appointments and risk being lost to follow-up. In particular, my study focuses on children enrolled in HIV care. The target are children aged 0-18 months.

What we will do

This study will be conducted at the county referral hospital in Kakamega County. Working with the health care providers in the facility, we will be asking you questions that relate to the sociodemographic, and clinical circumstances of you and your child/children; examine your antenatal care records, and also examine the clinical notes for the appointments given and honoured. These will be recorded in our data collection tools. No oral recordings will be made of your responses.

Why we have come to you

Our interactions with the health care providers in your facility and the health system in general has indicated to us that many caregivers are facing problems that seem to be resulting in them not bringing their children for follow-up care.

It is with this in mind that we hope to understand the reasons behind this phenomenon by interviewing key individuals. We are requesting whether you will be willing to give an in-depth interview about this issue. Your experience and understanding will greatly help us understand what the issues are, and how the HIV program can be modified to help overcome the issues. Your opinions will also help in developing effective strategies to address this problem.

Risks and benefits

There are no more risks involved in participation in this study than those in routine clinical visits. The clinical records of you and your child/children will be examined for adherence to clinical appointments. Those participants who will be found to be non-adherent to clinical appointments will be offered advice on how to remain adherent to appointments. Any remedial handicaps will be handled by the facility team.

Conditions for participation

You are free to accept or reject inclusion of your child/yourself into the study. If you accept (consent) to take part, you will be enrolled into the study and you remain free to withdraw your child/ yourself from the study at any time. Your rejection will not affect your or your child's access to any public health service.

OTHER INFORMATION: We will keep your identity as a research subject confidential. Only the Maseno University Ethics Review Committee can have access to information about you. The information about you will be identified only by the study number and will not be linked to your name in any records. Although we will make every effort to keep your information confidential, no system for protecting your confidentiality can be completely secure. Therefore, it is still possible that someone could find out that you were in this study and could find out information about you. Your name will not be used in any published reports about this study. You may withdraw from the study, refuse to answer any of the questions asked about you or your child/ children without loss of benefit or penalty to you or your child/children. If you have any questions regarding the study you can contact the Principal Investigator, Habel Alwang'a cell phone 0722-446-075. If you suffer any injuries or adverse effects due to participation in the study call the principal investigator on the emergency number shown above. If you have any injuries or adverse effects due to participating in this study, the study will be responsible for referring you to the nearest Public Health facility and ensuring that you are admitted and treated at no cost to you. You are free to refuse to participate in the study; if you decide not to participate in the study you will receive similar care to that provided to participants in the study.

Signature of investigator _____ Date _____

Name of investigator _____

Subject's statement:

This study has been explained to me. I volunteer to take part in this research. I have had a chance to ask questions. If I have questions about my rights as a research subject, I can call the Maseno University Ethics Review Committee at +254-721-543-976. I will receive a copy of this consent form.

Signature of subject _____ Date _____

OR

Left thumbprint of subject _____ Date _____

Name of subject _____

Signature of witness (if thumbprint used) _____

Name of witness _____

Kiswahili

IDHINI YA KUSHIRIKI KATIKA UTAFITI

Kichwa: Predictors of adherence to clinical appointments among caregivers of infants on HIV care in Kakamega county referral hospital, Kakamega-Kenya

Nambari ya simu ya mtafiti mkuu

Habel A. Alwang'a, Department of Public Health, Maseno University – 0722 446 075

TAARIFA YA MTATIFITI: Ninakusihia ujumuike katika utafiti huu wa afya ya umma ambao unaangazia kuchunguza uzingatiaji wa tarehe za kliniki kati ya wale wanaoishi na watoto ambao wameambukizwa virusi vya Ukimwi au wamo katika hatari ya kuambukizwa virusi hivi. Umuhimu wa fomu hii ya idhini ni kukupa wewe habari zote zitakazo kukusaidia kufanya uamuzi wa kushiriki au kutoshiriki katika utafiti huu. Tafadhali soma kwa makini fomu hii au sikiza unaposomewa na mwakilishi wa mtafiti. Unaweza kuuliza maswali kuhusu yale tutakayo taka ufanye, hatari iliyopo, manufaa, na haki zako kama mhusika katika utafiti huu, au chochote kile kuhusu utafiti huu au kuhusu fomu hii ambacho huelewi. Wakati maswali yako yote yamejibiwa, unaweza kuamua kushiriki katika utafiti huu. Mfumo huu ndio uitwao “uamuzi ulio makinika”. Ukipenda tutakupua nakala moja ya fomu hii ili uweze kuihifadhi. Uko huru kukataa kushiriki katika utafiti huu na unaweza kujiondoa kutoka utafiti huu kwa wakati wowote ule bila kupigwa faini au kupoteza manufaa yoyote.

Mimi ni mwanafunzi wa kitivo cha Ustadi wa afya ya umma katika chuo kikuu cha Maseno. Ninafanya utafiti kuelewa mbona wagonjwa wengi waliomo katika kliniki za virusi vya HIV hawazingatii tarehe zao za kliniki na kwa hivyo wamo katika hatari ya kutoweka kutoka kwa mpangilio huu wa matibabu. Haswa, utafiti wangu unalenga walezi wa watoto kati ya miezi 0 hadi 18.

Ni nini tutafanya katika utafiti huu

Utafiti huu utafanyika katika hospitali ya rufaa ya county ya Kakamega. Kwa kushirikiana na wahudumu wa afya, tutakuuliza maswali kuhusu jamii na demografia, na afya yako wewe na mwanao; tutachunguza stakabadhi zako za kliniki ya uja uzito; kisha kuchunguza stakabadhi zako za kliniki ya virusi vya HIV kudhibiti uzingatiaji wako wa kliniki. Haya yote yatanakiliwa katika fomu zetu za utafiti. Kwa vyovyote vile hatutanakili sauti yako.

Mbona tukaamua kukuja kwako

Katika kushirikiana na wahudumu wa afya katika vituo vyetu vya afya humu nchini na kwenye utaratibu mzima wa sekta ya afya umeonyesha ya kwamba walezi wengi wanapata changamoto mingi ambazo zinawazuia kuleta watoto wao kwenye kliniki.

Ni kwa kuzingatia uvumbuzi huu tumeamua kufanya utafiti kuelewa sababu zinazoleta changamoto hii kwa kuweza kuhoji washikadau kama wewe. Tungependa kuuliza ikiwa

utashiriki mahojiano haya kudadisi swala hili. Tajriba yako pamoja na ueledi wa jambo hili tunalololifanyia utafiti utaweza kusaidia kuvumbua zaidi changamoto zilizopo, na vile tunaweza imarisha mradi wa HIV kuepuka changamoto hizi. Maoni yako pia yatachangia kubuni mikakati dhabiti kuangazia swala hili.

Athari na Manufaa

Utafiti huu sio zaidi ya ratiba yako ya kawaida ya kliniki na kwa hivyo hamna athari zozote utakazokumbana nazo. Stakabadhi zako na za mwanao au wanao za kliniki zitachambuliwa ili kuweza kubaini uzingatiaji wa tarehe za kliniki. Ikiwa itabainika ya kwamba hauzingatii kliniki ipasavyo, basi tutaweza kukupa mawaidha mwafaka ili uweze kuboresha kuzingatia hizi tarehe za kliniki. Wahudumu wa afya wataweza kutilia mkazo yale tutakayokueleza.

Sheria za kushiriki

Upo huru kukubali au kukataa kuhusishwa wewe binafsi au mwanao katika utafiti huu. Ukikubali kushiriki, utaandikishwa kwenye mpango wa wale wanaoshiriki utafiti huu na upo huru kujiondoa wakati wowote, wewe au mwanao. Kutokubali kushiriki hakutaadhiri utumizi wa huduma za afya ya umma.

TAARIFA NYINGINE: Katika utafiti huu, tutazingatia kuweka siri utambulisho wako kama mhusika. Kamati ya maadili mema ya utafiti katika chuo kikuu cha Maseno ndiyo itakayo kuwa na ufikivu wa habari ulizozitoa kwetu. Taarifa zako kwetu zitaweza tambulishwa tu kwa kupitia kwa Nambari sajili katika utafiti huu na kwa vyovyote vile haitambatanishwa na jina lako. Ingawaje tutajaribu itupasavyo kuweka siri habari utakazotupea, hamna utaratibu wa kuhifadhi usiri ambao hauna dosari. Kwa hivyo, kuna uwezekano, kwamba yale utakayotuarifu yaweza kijulikana na mtu asiye faa. Jina lako litabanwa kwenye ripoti zote zitakazo chapishwa kuhusu utafiti huu. Una uhuru wa kujiondoa kutoka kwenye utafiti huu; waweza kataa kujibu swali lolote kuhusu wewe binafsi, au mwana au wanao bila kupoteza manufaa yoyote ya utafiti huu au kupigwa faini. Ikiwa una maswali yoyote ambayo ungependa kuuliza kuhusu wewe, mwanao au wanao unaweza piga simu kwa mtafiti mkuu kwa Nambari 0722-446-075. Ikiwa utapata majeraha yoyote au mateso yoyote kwa sababu ya kuhusika katika utafiti huu tafadhali muarifu mtafiti mkuu kupitia Nambari ya simu iliyopo hapo juu. Majeraha au mateso yoyote yakitokea kwa sababu ya kuhusika katika utafiti huu, mtafiti atachukua jukumu la kuhakikisha ya kwamba unapata matibabu katika Kituo cha afya kilicho karibu nawe ambapo utatibiwa bila kutozwa pesa zozote. Uko huru kutoshiriki katika utafiti hii; ukiamua kutoshiriki utapata maangalizi sawia na wale wengine ambao watakuwa wamehusika katika utafiti huu.

Sahihi ya mtafiti _____ Tarehe _____

Jina la mtafiti _____

Kauli ya mhusika katika utafiti:

Nimeelezewa kuhusu utafiti huu kwa kikamilifu. Ninakubali kwa hiari huru kushiriki utafiti huu. Nilipewa fursa ya kuuliza maswali kuhusu utafiti huu. Nikiwa na maswali zaidi kuhusu uhuru wangu kushiriki utafiti huu nitapiga simu kwa Kamati ya maadili mema ya utafiti katika chuo kikuu cha Maseno +254-721-543-976. Nitapokea nakala ya fomu hii.

Sahihi ya mhusika katika utafiti _____

Tarehe _____

AU

Alama ya kidole cha gumba cha mkono wa kushoto _____ Tarehe

Jina la mhusika katika utafiti huu _____

Sahihi ya shahidi (ikiwa alama ya kidole cha gumba ilitumika)

Jina la Shahidi _____

Appendix II: Informed Consent Form for minors (Under 18 years of age)

English

I being of 18 years or older and having full capacity to consent for my child/ children named below, have been informed about the study entitled:

Title: Predictors of adherence to clinical appointments among caregivers of infants on HIV care in Kakamega county referral hospital, Kakamega-Kenya
Under the direction of the study investigator Habel A. Alwang'a.

The nature, duration, purpose, voluntary nature and inconveniences or hazards that may reasonably be expected have been fully explained to me. I have understood the information regarding the study, and what will happen. I have been given the opportunity to ask questions concerning this study and these (if any) have been answered to my satisfaction.

I understand that I may at any time withdraw during the study, withdraw the consent in the best interest of the subject without any loss or penalty. My refusal of the subject to participate will involve no penalty or loss of benefits to which my family are otherwise entitled.

Mark one box with X

I DO CONSENT: **I do agree my child/children to take part in this study**

I DO NOT CONSENT: **I do not wish my child/children to participate in this study**

Parent's/Guardian's name

Parent's/Guardian's signature/mark

Date

Village

ID card number

Child's name

Date of Birth

Age

Witness: I hereby confirm that the study has been explained to the parent/guardian. All questions (if any) have also been answered to his/her satisfaction, and s/he, of his/her own free will, has consented for his/her child/children to take part in the study.

Name of witness

Signature of witness

Date:

Name of person explaining the study: _____

Kiswahili

Mimi nikiwa miaka 18 au zaidi na mwenye uwezo kamili wa kupeana idhini kwa ajili ya mtoto au watoto wangu ambao majina yao yamejumulishwa hapo chini, nimeweza kuarifiwa kikamilifu kuhusu uchunguzi huu ufuatao:

Title: Predictors of adherence to clinical appointments among caregivers of infants on HIV care in Kakamega county referral hospital, Kakamega-Kenya
Mtafiti mkuu anayeekeleza utafiti huu: Habel A. Alwang'a.

Asili, muda, dhumuni, uhiari, na madhara yote yanahusiana au yanayoweza kutokea na utafiti huu nimeelezewa kikamilifu. Nimeelezewa kikamilifu kuhusu utafiti huu na kitakochochotendeka. Nimepewa fursa ya kuuliza maswali kuhusu utafiti huu na maswali yangu yamejibiwa jinsi ifaayo.

Naelewa ya kwamba wakati wote ambapo utafiti huu unapoendelea ninaweza kujiuzulu kutoka utafiti huu; niko huru kuiondoa idhini yangu ya kushiriki utafiti kwa minajili ya mtoto/ watoto wangu bila hasara au faini. Ninapochukua hatua hiyo ya kujiondoa kwenye utafiti huu sitapewa faini wala kupoteza manufaa ambazo familia yangu ingepata.

Nakili alama X kwenye sanduku ifuatayo

NINAPEANA IDHINI YA KUSHIRIKI: **Ninakubali mtoto/ watoto wangu kushiriki utafiti huu**

SIKUBALI KUSHIRIKI: **Sikubali mtoto/ watoto wangu kushiriki utafiti huu**

Jina la mzazi/ mlezi

*Sahihi au alama ya kidole cha
gumba cha mzazi//mlezi*

Tarehe

Kijiji

Nambari ya kitambulisho

Jina la mtoto

Tarehe ya kuzaliwa

Umri

Shahidi: *Ninadhibitisha ya kwamba mzazi/mlezi ameelezewa kuhusu utafiti huu. Maswali yote (ikiwa yapo) yamejibiwa kwa Uradhi wa mzazi/ mlezi, ambaye bila kushurutishwa amekubali mwanawe/ wanawe kushiriki katika utafiti huu.*

Jina la Shahidi

Sahihi ya Shahidi

Tarehe:

Jina la anayeelezea mhusika kuhusu utafiti: _____

Appendix III: Interviewer administered questionnaire

English version

**FIELD DATA COLLECTION TOOL
Interviewer administered questionnaire**

Case Code

| | | | |
|--|---|-------------------------------|---------------------------------|
| | Are you willing to participate in this interview? | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| If "NO" STOP and thank the interviewee | | | |
| Identification Panel | | | |
| | Sex of Respondent | Male <input type="checkbox"/> | Female <input type="checkbox"/> |

Section 1: Socio-demographic Information for Caregiver

| | | | | |
|-----|--|-----------------------|---|---------------------------------|
| 1.1 | Date of Birth (dd/mm/yyyy) | Age (completed years) | ----- | ----- |
| 1.2 | Gender of the caregiver | | Male <input type="checkbox"/> | Female <input type="checkbox"/> |
| 1.3 | Marital Status | | Single <input type="checkbox"/> | |
| | | | Monogamous Married <input type="checkbox"/> | |
| | | | Polygamous Married <input type="checkbox"/> | |
| | | | Divorced <input type="checkbox"/> | |
| | | | Widowed <input type="checkbox"/> | |
| 1.4 | What is your highest level of education? | | Primary School <input type="checkbox"/> | |
| | | | Secondary School <input type="checkbox"/> | |
| | | | College Education <input type="checkbox"/> | |
| | | | University <input type="checkbox"/> | |
| | | | None <input type="checkbox"/> | |
| 1.5 | What is your Occupation | | Fomal Employment <input type="checkbox"/> | |
| | | | Manual work <input type="checkbox"/> | |
| | | | Business <input type="checkbox"/> | |
| | | | Farmer <input type="checkbox"/> | |
| | | | Domestic service <input type="checkbox"/> | |
| | | | None <input type="checkbox"/> | |
| | | | Other (specify) <input type="checkbox"/> | |
| 1.6 | Where do you stay? (state below and determine locality on the 3 choices) | | Urban <input type="checkbox"/> | |
| | | | Rural <input type="checkbox"/> | |

| | | |
|------|---|---|
| | <hr/> | Peri-urban <input type="checkbox"/> |
| 1.7 | Who do you stay with? (can select more than one response) | Alone <input type="checkbox"/> My Father <input type="checkbox"/> My mother <input type="checkbox"/> Friends <input type="checkbox"/> Mother in-law <input type="checkbox"/> Father in-law <input type="checkbox"/> My husband <input type="checkbox"/> My wife <input type="checkbox"/> Other (specify) <input type="checkbox"/> _____ |
| 1.8 | What is your relationship with the HIV infected or exposed child/children? | Mother <input type="checkbox"/> Father <input type="checkbox"/> Step mother <input type="checkbox"/> Step father <input type="checkbox"/> Grand father <input type="checkbox"/> Grand mother <input type="checkbox"/> Auntie <input type="checkbox"/> Uncle <input type="checkbox"/> Neighbour <input type="checkbox"/> Other (specify) <input type="checkbox"/> _____ |
| 1.9 | For the caregiver that is not the biological parent, how did they become responsible for the child? | Death of parent(s) <input type="checkbox"/> Abandoned child <input type="checkbox"/> Parental engagement <input type="checkbox"/> Other (specify) <input type="checkbox"/> _____ Not Applicable <input type="checkbox"/> |
| 1.10 | HIV status of caregiver | HIV positive <input type="checkbox"/> HIV Negative <input type="checkbox"/> Unknown HIV status <input type="checkbox"/> |
| 1.11 | If caregiver is HIV Positive, on medication? | Yes <input type="checkbox"/> No <input type="checkbox"/> Not Applicable <input type="checkbox"/> |
| 1.12 | Who is the decision maker in your household | My husband <input type="checkbox"/> My wife <input type="checkbox"/> Myself <input type="checkbox"/> |
| 1.13 | Who else is responsible for making decisions in your family? | My Father <input type="checkbox"/> My mother <input type="checkbox"/> Friends <input type="checkbox"/> Mother in-law <input type="checkbox"/> Father in-law <input type="checkbox"/> No one else <input type="checkbox"/> Other (specify) <input type="checkbox"/> _____ |

| | | |
|------|---|--|
| 1.14 | Are you the only one responsible for taking the child/children to clinic? | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 1.15 | If NO to Q1.14, who else is responsible for taking the child/ children to clinic? | My husband <input type="checkbox"/> My wife <input type="checkbox"/> Sibling of child <input type="checkbox"/> Child's grandmother <input type="checkbox"/> Child's grandfather <input type="checkbox"/> Child's auntie <input type="checkbox"/> Child's uncle <input type="checkbox"/> My Neighbour <input type="checkbox"/> Other Specify <input type="checkbox"/> _____ Not Applicable <input type="checkbox"/> |
| 1.16 | Do your family, friends and relatives encourage you to take children for care at the Hospital? | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 1.17 | If YES to Q1.16, in what ways do they support you | Volunteer to take the child to hospital <input type="checkbox"/> Financial support for transport <input type="checkbox"/> Accompanying me with the child to hospital <input type="checkbox"/> Moral support <input type="checkbox"/> Other (Specify) <input type="checkbox"/> _____ Not Applicable <input type="checkbox"/> |
| 1.18 | Do you face any challenges from your family in taking your to hospital? | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 1.19 | If YES, which challenges have you faced? | No provision of fare to hospital <input type="checkbox"/> No reminder of clinic dates <input type="checkbox"/> Stigma due to HIV infection <input type="checkbox"/> Other (specify) <input type="checkbox"/> _____ |
| 1.20 | Who helps you remember to take your child to the health facility? | My husband <input type="checkbox"/> My wife <input type="checkbox"/> My mother <input type="checkbox"/> My father <input type="checkbox"/> My mother in-law <input type="checkbox"/> My father in-law <input type="checkbox"/> Co-workers <input type="checkbox"/> Friends <input type="checkbox"/> Health care provider <input type="checkbox"/> Other (specify) <input type="checkbox"/> _____ None <input type="checkbox"/> |
| 1.21 | I feel satisfied with the overall support I get from my family and friends in taking my child to hospital | Never <input type="checkbox"/> Sometimes <input type="checkbox"/> Often <input type="checkbox"/> Always <input type="checkbox"/> |
| 1.22 | Which is the nearest health facility to where you stay? | _____ |

| | | |
|------|---|---|
| 1.23 | What is the distance to this facility from your place of stay? | Less than 5 kilometers <input type="checkbox"/> More than 5 Kilometers <input type="checkbox"/> |
| 1.24 | Which facility does your child seek services from? | _____ |
| 1.25 | If the nearest health facility is NOT the same as that where services are sought, then ASK: Why do you choose to attend the latter? | Stigma <input type="checkbox"/> This facility provides better services <input type="checkbox"/> Convenience of this facility <input type="checkbox"/> Bad reputation of nearest facility <input type="checkbox"/> High cost of services of nearest facility <input type="checkbox"/> Additional services for me and child in this facility <input type="checkbox"/> Other (specify) <input type="checkbox"/> _____ Not Applicable <input type="checkbox"/> |

Section 2: Socio-demographic Information for the Child/ Children

| | | |
|-----|--|---|
| 2.1 | Date of Birth (dd/mm/yyyy) ----- ---- | Age (completed months) ----- |
| 2.2 | Gender of the child | Male <input type="checkbox"/> Female <input type="checkbox"/> |
| 2.3 | Birth order of the child (enter the order, 1st, 2nd ...nth) | _____ |
| 2.4 | Total number of living children | _____ |
| 2.5 | Ages of the living children | 1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____ |
| 2.6 | Has the child been treated in the hospital for childhood illnesses like Malaria, Pneumonia, Measles, Diarrhea etc. | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 2.7 | Number of HIV infected or Exposed children | _____ |
| 2.8 | Ages of the HIV Exposed or Infected | Age 1. _____ 2. _____ 3. _____ 4. _____ |
| 2.9 | What is the means you use for transport to the health facility? | Motorbike <input type="checkbox"/> Bicycle <input type="checkbox"/> Matatu <input type="checkbox"/> |

| | | |
|------|--|--|
| | | Tuktuk <input type="checkbox"/> Own car <input type="checkbox"/> Walking <input type="checkbox"/> Hired taxi <input type="checkbox"/> Other Specify <input type="checkbox"/> _____ |
| 2.10 | How much fare do you pay from your house to this facility and back (in KShs) | <=50 <input type="checkbox"/> 60 to 100 <input type="checkbox"/> >100 <input type="checkbox"/> Not applicable <input type="checkbox"/> |

Section 3: Clinical Factors

| 3.1 Maternal Clinical Factors | | |
|------------------------------------|---|--|
| 3.1.1 | Did you attend Antenatal Care (ANC) Clinic during the pregnancy for this child? | Yes <input type="checkbox"/> No <input type="checkbox"/> Not Applicable <input type="checkbox"/> |
| 3.1.2 | If YES to Q 3.1.1 (attended ANC clinic): At what gestation did you begin the clinics? | Gestation of Antenatal Clinic attendance _____ weeks |
| 3.1.3 | How many ANC clinic visits did you make in the pregnancy of this child? | _____ visits |
| 3.1.3 | When did you test HIV positive | Before bearing this child (Known Positive) <input type="checkbox"/> During the pregnancy of this child <input type="checkbox"/> After delivery of this child <input type="checkbox"/> Not Applicable <input type="checkbox"/> |
| 3.1.4 | Upon testing HIV positive, did you start of ART? | Yes <input type="checkbox"/> No <input type="checkbox"/> Not Applicable <input type="checkbox"/> |
| 3.1.5 | How long after diagnosis for HIV did you start ART? | Same day <input type="checkbox"/> 1 day to 14 days <input type="checkbox"/> After 14 days <input type="checkbox"/> Not Applicable <input type="checkbox"/> |
| 3.1.6 | What is your latest viral load? | Less than 1,000 copies/ml <input type="checkbox"/> More than 1,000 copies/ml <input type="checkbox"/> Not Applicable <input type="checkbox"/> |
| 3.2 Infant/ Child Clinical Factors | | |
| 3.2.1 | Where was your child delivered from? | In a Health Facility <input type="checkbox"/> At my home <input type="checkbox"/> Born Before arrival to Health Facility <input type="checkbox"/> At the TBA's home/place <input type="checkbox"/> |
| 3.2.2 | Who assisted you in delivery? | Midwife <input type="checkbox"/> TBA <input type="checkbox"/> Family member <input type="checkbox"/> Neighbour <input type="checkbox"/> |
| 3.2.3 | At what gestation was the child delivered? | At 9 months of pregnancy <input type="checkbox"/> Between 7 and 9 months of pregnancy <input type="checkbox"/> Before 7 months of pregnancy <input type="checkbox"/> |
| 3.2.4 | What was the birth weight of the child? | _____ grams |
| 3.2.5 | Has the child received a HIV test? | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 3.2.6 | For the HIV positive confirmed child, is s/he on ARVs? | Yes <input type="checkbox"/> No <input type="checkbox"/> Not Applicable <input type="checkbox"/> |
| 3.2.7 | For the HIV exposed child, or HIV negative, was s/he put on ARV prophylaxis? | Yes <input type="checkbox"/> No <input type="checkbox"/> Not Applicable <input type="checkbox"/> |

| | | |
|--|--|---|
| 4.0 Reasons for clinical non-adherence | | |
| 4.1 | On the overall, what percentage of clinical appointments have you kept? | < 50% <input type="checkbox"/> 50 – 60% <input type="checkbox"/> 60 -70% <input type="checkbox"/> 70%-80% <input type="checkbox"/> 80%-90% >90 <input type="checkbox"/> |
| 4.2 | If the clinical appointment attendance percentage is <90% then ask: What reasons do you have for not keeping appointments at 100% among the following listed? Check (√) applicable | |
| | Reason for not keeping appointment | Check (√) appropriately |
| 4.2.1 | Different appointment dates for the clinics of baby and caregiver | |
| 4.2.2 | Long distance to the health facility | |
| 4.2.3 | Lack of means of transport to the Health facility | |
| 4.2.4 | Lack of reminder on clinic appointment date | |
| 4.2.5 | Lack of support in taking child to clinic | |

Kiswahili version

DODOSO LA KUKUSANYA UJUMBE

Mwanzo

Nakupa shukrani kwa kujitolea na kukutana nami leo. Jina langu ni Mimi ni mwanafunzi wa Chuo kikuu cha Maseno ambapo naendeleza masomo katika Huduma ya Afya ya umma. Ninafanya uchunguzi ambapo ningependa kuelewa kwa nini wagonjwa wetu wanaougua virusi vya HIV na wako katika mpango wa wanaougua ugonjwa huu hawatilii maanani jukumu lao la kuenda kliniki kwa terehe inayotengwa. Kwa ufupi, uchunguzi wangu unahusisha watoto wanaozaliwa kwa kina mama walio na virusi vya HIV pamoja na waliombukizwa virusi hivyo wakiwa bado wachanga. Uchunguzi unalenga watoto wa miezi 0-18.

Mazungumzo kati yetu na wahudumu wa afya katika hospitali zenu zimeonyesha kuwa wazazi wengi au wahudumu wengine wanaoishi na hawa watoto wanakumbwa na changamoto ya kutoleta watoto wao kuchunguzwa kiafya.

Changamoto hizi ndizo zimetupa motisha ya kujua ni kwa nini haya yanatendeka kwa kuuliza wanaohusika. Tunakuomba kama utakuwa huru kupeana ujumbe kwa undani kuhusu jambo hili. Ustadi wako utatusaidia kuelewa mambo mengi kuhusu hizi changamoto na kuelekeza mipango halisi ya matibabu ili kupunguza changamoto hizi. Wazo lako pia litatusaidia kuweka mikakati inayofaa kukabiliana na shida hii.

Nitakuwa ninanakili yote utakayoniambia ili niweze kuyakumbuka. Ukiwa umekubali kuhusishwa katika uchunguzi huu, tafadhali nieleze ili tuweze kuanza mahojiano. Majina yako hayataandikwa popote. Yote utakayotueleza yatakuwa fiche. Tatalibana jina lako ikiwa kutakuwa na maelezo kwamba wewe ama mtoto wako mpo katika hali ya hatari na mnahitaji usaidizi ya dharura. Tutajadiliana zaidi tutakavyo endelea tukihusisha mhudumu wa afya.

Je, unaelewa ya kuwa:

- Huu ni uchunguzi?
- Uko huru kujihusisha au kutojihusisha?
- Kujihusisha kwako hakutakusababisha upoteze chochote?
- Yote utakayotueleza yatawekwa fiche na majina yako hayataandikwa popote na kujihusisha na yote umetueleza?

Je, uko tayari kujihusisha na uchunguzi huu?

Kitambulisho cha kesi.....

| | | |
|--|--|---|
| | Je, ungelipenda kuhusishwa na uchunguzi huu? | Ndiyo <input type="checkbox"/> La <input type="checkbox"/> |
| Asipokuwa huru, usiendeele na uchunguzi na umrudushie shukrani mhusika | | |
| Kifungu cha kujitambulisha | | |
| | Umme ama uuke wa mhojiwa | Mume <input type="checkbox"/> Kike <input type="checkbox"/> |

Sehemu ya kwanza: Maelezo kuhusu wahojiwa binafsi

| | | | | |
|-----|---|---|--|---|
| 1.1 | Tarehe ya kuzaliwa (tarehe/mwezi/mwaka) | Miaka ya mhojiwa | ----- | ----- |
| 1.2 | Jinsia ya mhojiwa | Mume <input type="checkbox"/> | Kike <input type="checkbox"/> | |
| 1.3 | Ni ipi hali yako ya ndoa? | Hajawaiolewa <input type="checkbox"/> | Katika ndoa yenye mke ama mme mmoja <input type="checkbox"/> | Katika ndoa yenye mke ama mme zaidi ya mmoja <input type="checkbox"/> |
| | | Talaka <input type="checkbox"/> | Mjane <input type="checkbox"/> | |
| 1.4 | Umehitimu kiwango gani cha juu kimasomo? | Shule ya msingi <input type="checkbox"/> | Shule ya upili <input type="checkbox"/> | Chuo cha kati <input type="checkbox"/> |
| | | Chuo kikuu <input type="checkbox"/> | Hakuwahi soma <input type="checkbox"/> | |
| 1.5 | Ni nini unachofanya kujiendelesha kimaisha? | Ajira rasmi <input type="checkbox"/> | Kazi ya mkono <input type="checkbox"/> | Ajira binafsi <input type="checkbox"/> |
| | | Ukulima <input type="checkbox"/> | Kazi za nyumbani <input type="checkbox"/> | Hakuna ninachofanya <input type="checkbox"/> |
| | | Mengine (tambulisha) <input type="checkbox"/> | _____ | |
| 1.6 | Unaishi wapi (nakili hapa chini kijiji anachoishi; kisha dhibitisha Sehemu anapoishi kati ya tatu zilizotajwa)? | Mjini <input type="checkbox"/> | Mashambani <input type="checkbox"/> | Kijijini <input type="checkbox"/> |
| 1.7 | Ni nani unayeishi naye | Pekee yangu <input type="checkbox"/> | | |

| | | |
|------|--|--|
| | | Baba yangu mzazi <input type="checkbox"/> Mama yangu mzazi <input type="checkbox"/> Marafiki <input type="checkbox"/> Mama mkwe <input type="checkbox"/> Baba mkwe <input type="checkbox"/> Mume wangu <input type="checkbox"/> Mke wangu <input type="checkbox"/> Mwingine (tambulisha) <input type="checkbox"/> _____ |
| 1.8 | Una uhusiano upi kati yako na mwanao/wanao aliyekatika hatari ya kuambukizwa au wanaougua Ukimwi? | Mamake mtoto <input type="checkbox"/> Babake mtoto <input type="checkbox"/> Mama kambo <input type="checkbox"/> Baba kambo <input type="checkbox"/> Babu ya mtoto <input type="checkbox"/> Nyanya ya mtoto <input type="checkbox"/> Shangaziye <input type="checkbox"/> Mjomba wa mtoto <input type="checkbox"/> Jirani <input type="checkbox"/> Mwingine (Tambulisha) <input type="checkbox"/> _____ |
| 1.9 | Ikiwa anayeshugulikia mtoto siye mzazi wa mtoto huyu halisi, alishika usukani wa kushugulikia mtoto huyu kwa nini? | Mzazi/wazazi waliaga dunia <input type="checkbox"/> Mtoto aliachwa na wazazi <input type="checkbox"/> Kuhusishwa na wazazi <input type="checkbox"/> Mengine(Tambulisha) <input type="checkbox"/> _____ Haiambatani (N/A) <input type="checkbox"/> |
| 1.10 | Hali ya virusi vya HIV ya mlinzi wa mtoto/watoto hawa | Anaugua Virusi <input type="checkbox"/> Hana Virusi <input type="checkbox"/> Hajui hali yake ya Virusi <input type="checkbox"/> |
| 1.11 | Ikiwa mlinzi anaugua Virusi, yuko katika matibabu au la? | Ndiyo <input type="checkbox"/> La <input type="checkbox"/> Haiambatani <input type="checkbox"/> |
| 1.12 | Ni nani hutoa uamuzi nyumbani? | Mume wangu <input type="checkbox"/> Mke wangu <input type="checkbox"/> Mimi binafsi <input type="checkbox"/> |
| 1.12 | Je, ni wewe pekee unayeshugulika kupeleka mtoto/watoto hospitalini? | Ndiyo <input type="checkbox"/> La <input type="checkbox"/> |
| 1.13 | Kama sio wewe pekee unayeshugulika, ni nani mwingine hushugulika? | _____ |
| 1.14 | Je, familia yako inakupa usaidizi wowote kwa kupeleka mtoto kupokea huduma ya afya? | Ndiyo <input type="checkbox"/> La <input type="checkbox"/> |

| | | |
|------|---|---|
| 1.15 | Familia ikikupa usaidizi, je, inakupa usaidizi vipi? | Kujitolea kepeleka mtoto hospitalini <input type="checkbox"/> Usaidizi kifedha <input type="checkbox"/> Kuambatana pamoja na mtoto <input type="checkbox"/> Mengine(Tambuisha) <input type="checkbox"/> _____ Haiambatani <input type="checkbox"/> |
| 1.16 | Ni njia gani familia inakuwa kizuizi katika kupeleka mtoto katika kliniki? | _____ _____ _____ |
| 1.18 | Una shuhudia changamoto au uzuizi wowote kutoka kwa familia kwa kumpeleka mwanao hospitalini? | Ndiyo <input type="checkbox"/> La <input type="checkbox"/> |
| 1.19 | Ikiwa jibu ni NDIYO , elezea changamoto hizi kati ya zifuatazo | Ukosefu wa nauli ya kwenda hospitalini <input type="checkbox"/> Kutokumbushwa tarehe ya kliniki <input type="checkbox"/> Unyanyapaa kwa ajili ya virusi za HIV <input type="checkbox"/> Mengine (tambulisha) <input type="checkbox"/> _____ |
| 1.20 | Ni nani hukukumbusha kumpeleka mtoto hospitalini kwa kliniki yake? | Mume wangu <input type="checkbox"/> Bibi yangu <input type="checkbox"/> Mama yangu <input type="checkbox"/> Baba yangu <input type="checkbox"/> Mama mkwe <input type="checkbox"/> Baba mkwe <input type="checkbox"/> Wafanyi kazi wenzangu <input type="checkbox"/> Rafiki zangu <input type="checkbox"/> Mhudumu wangu wa afya <input type="checkbox"/> Mwingine (tambulisha) <input type="checkbox"/> _____ Hakuna <input type="checkbox"/> |
| 1.21 | Ninaridhishwa na msaada ninaopata kutoka kwa watu wa jamii yangu na marafiki katika kumpeleka mtoto wangu hospitalini | La hasha <input type="checkbox"/> Nyakati zingine <input type="checkbox"/> Mara kwa mara <input type="checkbox"/> Nyakati zote <input type="checkbox"/> |
| 1.22 | Ni kipi Kituo cha afya kilicho karibu na kwako nyumbani? | _____ |
| 1.23 | Kituo cha afya kiko na umbali gani kutoka unapoishi? | Chini ya kilomita 5 <input type="checkbox"/> Kuzidi kilomita 5 <input type="checkbox"/> |
| 1.24 | Ni kituo kipi cha afya gani ambapo mtoto wako anapata huduma ya afya? | _____ _____ |

| | | |
|------|--|---|
| 1.25 | Ikiwa hiki sio kituo cha afya kilicho karibu, mbona ukaamua kukuja hapa? | Unyanyapaa <input type="checkbox"/> Huduma bora zaidi katika kituo hiki <input type="checkbox"/> Rahisi kwangu <input type="checkbox"/> Sifa mbovu ya kituo kilicho karibu nami <input type="checkbox"/> Gharama ya juu ya kituo kilicho karibu <input type="checkbox"/> Naweza pata huduma pamoja na mwana wangu <input type="checkbox"/> Mengine(Tambulisha) <input type="checkbox"/> _____ Haiambatani <input type="checkbox"/> |
|------|--|---|

Sehemu ya pili: Maelezo kuhusu mtoto/watoto binafsi

| | | | | |
|------|---|--|-------------------------------|-------|
| 2.1 | Tarehe ya kuzaliwa (tarehe/mwezi/mwaka) | Umri wa mtoto <i>miezi kamilifu</i> | ----- | ----- |
| 2.2 | Jinsia ya mtoto | Kiume <input type="checkbox"/> | Kike <input type="checkbox"/> | |
| 2.3 | Mfuatilio wa kuzaliwa wa mtoto (eleza mfuatilio, kwanza, pili ...hadi ya mwisho) | _____ | | |
| 2.4 | Watoto wote walio hai | _____ | | |
| 2.5 | Miaka za watoto walio hai | 1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____ | | |
| 2.6 | Je mtoto ametibiwa hospitalini kutokana na magonjwa ya utotoni kama malaria, Pneumonia, Surua, Kuharisha n.k. | Ndio <input type="checkbox"/> | La <input type="checkbox"/> | |
| 2.7 | Idadi ya watoto wanaougua ugonjwa wa virusi vya HIV au wapo katika uwezekano wa kuambukizwa | _____ | | |
| 2.8 | Miaka ya watoto ambao wako katika uwanja mbaya wa kuambukizwa ukimwi ama walioambukizwa na wakati wa kutibiwa kwa Ukimwi. | Mwaka 1. _____ 2. _____ 3. _____ 4. _____ | | |
| 2.9 | Unatumia njia ipi ya usafiri kwenda hospitalini? | Pikipiki <input type="checkbox"/> Baiskeli <input type="checkbox"/> Matatu <input type="checkbox"/> Tuktuk <input type="checkbox"/> gari la binafsi <input type="checkbox"/> Kutembea <input type="checkbox"/> Taxi <input type="checkbox"/> Nyingine (tambulisha) <input type="checkbox"/> _____ | | |
| 2.10 | Nauli ya kwenda kituo cha afya ambapo huduma za virusi za HIV kwa mtoto hupatikana na kurudi nyumbani ni shilingi ngapi? | | | |

| | | |
|--|--|--|
| | | <=50 <input type="checkbox"/> 60 to 100 <input type="checkbox"/> >100 <input type="checkbox"/> Hainihusu <input type="checkbox"/> |
|--|--|--|

Sehemu ya tatu: Maswala ya hali ya afya

| 4.1 Maswala ya afya ya mama | | |
|-------------------------------------|--|---|
| 3.1.1 | Je, uliwahi hudhuria kliniki ya ujauzito wakati ulikuwa na mimba ya huyu mawano? | Ndiyo <input type="checkbox"/> La <input type="checkbox"/> Hainihusu <input type="checkbox"/> |
| 3.1.2 | Kama ndio; Ulihudhuria kliniki mara ngapi wakati ulikuwa na mimba ya huyu mwanao? | _____ wiki za uja uzito |
| 3.1.3 | Je, ulipimwa na kupatikana na virusi vya HIV lini? | Kabla nizae huyu mtoto <input type="checkbox"/> Wakati nilikuwa na mimba ya huyu mto <input type="checkbox"/> Baada ya kuzaa mtoto huyu <input type="checkbox"/> Hainihusu <input type="checkbox"/> |
| 3.1.4 | Ulipogundua una virusi vya HIV, je ulianza kutumia dawa za ARVs ya kupunguza makali ya virusi? | Ndiyo <input type="checkbox"/> La <input type="checkbox"/> Hainihusu <input type="checkbox"/> |
| 3.1.5 | Ulianza kutumia dawa za ARVs baada ya muda gani baada ya kupatikana virusi vya HIV? | Siku niliyopimwa <input type="checkbox"/> Kati ya siku moja na kumi na nne baada ya kupimwa day to 14 days <input type="checkbox"/> Baada ya siku kumi na nee za kupimwa <input type="checkbox"/> Hainihusu <input type="checkbox"/> |
| 3.1.6 | Kiwango chako cha virusi (yaani viral load) ni ngapi? | Chini ya 1,000 <input type="checkbox"/> Zaidi ya 1,000 copies/ml <input type="checkbox"/> Hainihusu <input type="checkbox"/> |
| 3.2 Maswala ya afya ya mtoto | | |
| 3.2.1 | Mtoto wako alizaliwa wapi? | Katika kituo cha afya <input type="checkbox"/> Nyumbani kwangu <input type="checkbox"/> Alizaliwa kabla kufika kwenye kituo cha afya <input type="checkbox"/> Nyumbani kwa mkunga kijijini <input type="checkbox"/> |
| 3.2.2 | Ni nani aliyekusaidia kujifungua/ kuzaa mwanao? | Mkunga aliyehitimu <input type="checkbox"/> Mkunga wa nyumbani <input type="checkbox"/> Mmoja wapo wa familia yangu <input type="checkbox"/> Jirani <input type="checkbox"/> |
| 3.2.3 | Ni wakati upi wa ujauzito mtoto huyu alizaliwa? | Nikiwa mimba ya miezi tisa <input type="checkbox"/> Kati ya miezi saba na miezi tisa <input type="checkbox"/> Kabla ya miezi saba <input type="checkbox"/> |
| 3.2.4 | Mtoto alikuwa na kilo ngapi alipozaliwa? | _____ gramu |
| 3.2.5 | Je, hali ya virusi vya HIV ya mtoto huyu imehakikishwa au kupimwa? | Ndiyo <input type="checkbox"/> La <input type="checkbox"/> |

| | | |
|-------|--|---|
| 3.2.6 | Kama hali ya virusi vya HIV ya mtoto huyu imehakikishwa, je yuko katika mpango ya kutumia dawa za ARVs? | Ndiyo <input type="checkbox"/> La <input type="checkbox"/> Haimhusu <input type="checkbox"/> |
| 3.2.7 | Ikiwa mtoto hana virusi, umezingatia mikakati ya kuhakikisha kwamba hataambukizwa virusi, kama kumpa madawa ya kuzuia? | Ndiyo <input type="checkbox"/> La <input type="checkbox"/> Haimhusu <input type="checkbox"/> |

| Sehemu ya nne: sababu za kutohudhuria kliniki ipasavyo | | |
|---|--|---|
| 4.1 | Kwa jumla, wadhania ni asilimia ngapi ya Kliniki umehudhuria kwa wakati ufaao | < 50% <input type="checkbox"/> 50 – 60% <input type="checkbox"/> 60 -70% <input type="checkbox"/> 70%-80% <input type="checkbox"/> 80%-90% <input type="checkbox"/> >90 <input type="checkbox"/> |
| 4.2 | Ikiwa mhusika hauzingatii kliniki kwa kikamilifu, yaani amenakili chini ya asili mia tisini (90%) basi uliza swali hili: Una sababu gani za kutozingatia tarehe za kliniki kwa kikamilifu kati ya zifuatazo? Tia alama ya (✓) ipasavyo | |
| | Sababu ya kutozingatia tarehe za kliniki | Nakili alama (✓) ipasavyo |
| 4.2.1 | Tarehe tofauti za Kliniki ya mtoto na mimi | |
| 4.2.2 | Kituo cha afya kiko mbali na kwangu | |
| 4.2.3 | Ukosefu wa nauli ya kwenda hospitalini | |
| 4.2.4 | Kutokumbushwa kuhusu tarehe ya kliniki | |
| 4.2.5 | Ukosefu wa msaada wa kupeleka mtoto hospitalini | |

Appendix V: School of Graduate Studies Proposal Approval



**MASENO UNIVERSITY
SCHOOL OF GRADUATE STUDIES**

Office of the Dean

Our Ref: EL/ESM/00389/2013

Private Bag, MASENO, KENYA
Tel: (057) 351 22/351008/351011
FAX: 254-057-351153/351221
Email: ags@maseno.ac.ke

Date: 15 August, 2018

TO WHOM IT MAY CONCERN

**RE: PROPOSAL APPROVAL FOR HABEL A. ALWANG'A —
EL/ESM/00389/2013**

The above named is registered in the Master of Public Health programme in the School of Public Health, Maseno University. This is to confirm that his research proposal titled *"Predictors of Adherence to Clinical Appointments among Caregivers of Infants on HIV Care in Kakamega County General Hospital, Kakamega"* has been approved for conduct of research subject to obtaining all other permissions/clearances that may be required beforehand.


+Prof. J.O. Agure
DEAN, SCHOOL OF GRADUATE STUDIES



Maseno University

ISO 9001:2008 Certified



Appendix VI: Ethical Clearance



MASENO UNIVERSITY ETHICS REVIEW COMMITTEE

Tel: +254 057 351 622 Ext: 3050
Fax: +254 057 351 221

Private Bag – 40105, Maseno, Kenya
Email: muerc-secretariate@maseno.ac.ke

FROM: Secretary - MUERC

DATE: 26th October, 2018

TO: Habel Ang'ani Alwang'a
EL/ESM/00389/2013
Department of Public Health
School of Public Health and Community Development
Maseno University
P. O. Box, Private Bag, Maseno, Kenya

REF: MSU/DRPI/MUERC/00620/18

RE: Predictors of adherence to Clinical Appointments among Caregivers of Infants on HIV care in Kakamega County General Hospital, Kenya. Proposal Reference Number MSU/DRPI/MUERC/00620/18

This is to inform you that the Maseno University Ethics Review Committee (MUERC) determined that the ethics issues raised at the initial review were adequately addressed in the revised proposal. Consequently, the study is granted approval for implementation effective this 26th day of October, 2018 for a period of one (1) year.

Please note that authorization to conduct this study will automatically expire on 25th October, 2019. If you plan to continue with the study beyond this date, please submit an application for continuation approval to the MUERC Secretariat by 15th September, 2019.

Approval for continuation of the study will be subject to successful submission of an annual progress report that is to reach the MUERC Secretariat by 15th September, 2019.

Please note that any unanticipated problems resulting from the conduct of this study must be reported to MUERC. You are required to submit any proposed changes to this study to MUERC for review and approval prior to initiation. Please advise MUERC when the study is completed or discontinued.

Thank you.


Dr. Bonuke Anyona,
Secretary,
Maseno University Ethics Review Committee.

Cc: Chairman,
Maseno University Ethics Review Committee.

MASENO UNIVERSITY IS ISO 9001:2008 CERTIFIED



Appendix VII: Kakamega County Research Authorization

REPUBLIC OF KENYA
COUNTY GOVERNMENT OF KAKAMEGA



MINISTRY OF HEALTH SERVICES

Telephone: 056 31125
E-mail: pdmswestern@gmail.com
Website : www.kakamega.go.ke
When replying please quote

THE COUNTY DIRECTOR
P O BOX 2309- 50100
KAKAMEGA

Ref : CGK/MOH/CDH/1/9/395

DATE: 29th October 2018

The Medical Superintendent
Kakamega County General Hospital
P.O. Box 15, KAKAMEGA

RE: RESEARCH AUTHORIZATION – Predictors of Adherence to Clinical Appointments among Caregivers of Infants on HIV Care in Kakamega County General Hospital, Kenya.

Dr. Habel Ang'ani Alwanga, EL/ESM/00389/2013 of Maseno University School of Public Health and Community Development is hereby approved by the County Department of Health Services to carry out the aforementioned Research. This is following Ethical authorization vide letter Ref:

MSU/DRPI/MUERC/00620/18 dated 26th October 2018 by the Maseno University Ethics Review Committee to undertake the same.

Dr. Abel Ang'ani Alwang'a is instructed to remain within the confines of the Research Protocol as has been underscored in the ethical approval. He is to submit an executive summary report within 90 days upon completion of the study to the County Director of Medical Services, Kakamega County.

Kindly accord him the necessary assistance as he carries out the research.

Thank you


NOV 2018
Dr. Nisiani Ayub Wastara
Ag. County Director of Medical Services
KAKAMEGA COUNTY