Delayed HIV status identification and associated factors among HIV exposed children in Lindi region

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DELAYED HIV STATUS IDENTIFICATION AND ASSOCIATED FACTORS AMONG HIV EXPOSED CHILDREN IN LINDI REGION

By

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A Dissertation Submitted in (Partial) Fulfillment of the Requirement for the Degree of Master of Public Health of

Muhimbili University of Health and Allied Sciences
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CERTIFICATION

The undersigned certify that she has read and hereby recommends for acceptance by Muhimbili University of Heath and Allied Sciences a dissertation entitled**: ‘‘Delayed HIV status identification and associated factors among HIV exposed children in Lindi region’’,** in (partial) fulfillment of the requirements for the degree of Master of Public Health of the Muhimbili University of Health and Allied Sciences.

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Dr. Candida Moshiro

(Supervisor)

_____

Date

DECLARATION AND COPYRIGHT

I**, Karim Mohamed**, declare that this **dissertation** is my own original work and that it has not been presented and will not be presented to any other University for a similar or any other degree award.

Signature: ……. **Date:**……

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DEDICATION

This dissertation is dedicated to every HIV positive mother struggling to have HIV free siblings.

ABSTRACT

Background: The rate of HIV exposed children missing the opportunity of early HIV status identification world wide is progressively worsening from 58% in 2016 to 64% in 2017. In Tanzania, 58% of HIV exposed infants delayed receiving HIV status identification services in 2016. There is limited knowledge on the factors affecting delayed HIV testing among HIV exposed children in the remote areas of Tanzania.

Objective: To assess the proportion with delayed HIV status identification among HIV exposed children and associated factors in Lindi region.

Methodology: A cross sectional health facility-based study was done from March to April 2019 involving four councils and 15 health facilities. Subjects meeting the inclusion criteria from the selected health facilities were consecutively recruited and interviewed. Univariate and multivariate logistic regression analysis was done to examine the association of socio-demographic and clinical factors with delayed HIV status identification.

Results: A total of 231 HIV exposed children were sampled for this study. The mean age of their mothers was 32.9 years (standard deviation of 6.5 years). All exposed children had their DNA PCR sample collected by the time of the study whereby 98 (42.4%) received DNA PCR testing at the age more than two months hence delayed HIV status identification. Twelve (5.2%) out of 231 children were HIV positive. Mothers' primary level of education (adjusted odds ratio= 2.1, 95% CI =1.09 – 4.09) and less than 4 antenatal clinic visits status during pregnancy (adjusted odds ratio = 2.17, 95% CI=1.19 – 3.95) were associated with delayed HIV status identification among HIV exposed children.

Conclusion and Recommendation:

Four out of ten HIV exposed children delayed HIV status identification in Lindi region. Delayed HIV status identification among exposed children was associated with less than four maternal ANC visits during pregnancy and maternal primary level of education. In order to improve delayed HIV status identification among exposed children, continuous health education on the timing of the early infant diagnosis and the significance of completing four standard antenatal visit, should be provided to all HIV positive women of reproductive age before conceiving, during pregnancy and throughout breastfeeding period.

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LIST OF ABBREVIATIONS

AIDS	Acquired Immunodeficiency Syndrome
ANC	Antenatal clinic
ART	Antiretroviral treatment
CTC	Care and treatment clinic
DBS	Dried Blood Spot
DNA- PCR	Deoxyribonucleic acid Polymerase chain reaction
EID	Early Infants Diagnosis of HIV
HCW	Health Care Worker
HEI	HIV Exposed Infant
HIV	Human Immunodeficiency Virus
MoHCDEC	Ministry of Health, Community Development, Gender, Elderly and Children
MTCT	Mother to child transmission of HIV
PLWHIV	People living with HIV
PMTCT	Prevention of mother to child transmission of HIV
PNC	Post-natal care
RCH	Reproductive and child health
UNAIDS	United Nations Program on HIV/AIDS
WHO	World Health Organization

DEFINITIONS

HIV exposed child- is the child born to HIV positive mother regardless of the mothers' antiretroviral status before, during or after delivery.

Early infant diagnosis of HIV - World Health Organization (WHO) recommends HIV exposed children to be tested for HIV by deoxyribonucleic acid polymerase chain reaction (DNAPCR) at the age of 4 – 8 weeks. This service is called early infant diagnosis of HIV(EID).

Delayed HIV status identification - HIV exposed child tested for HIV by DNA-PCR test at the age of more than eight weeks or did not receive it by the time this study was done and she/he was at the age of four weeks to five years, was considered to delay HIV status identification.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

In the United Republic of Tanzania, 84% of the annual HIV positive pregnant women were covered with ART for PMTCT and their life by 2016. During the same period 10000 children were newly infected with HIV (3). The coverage of HIV positive pregnant women needing ART for their life and PMTCT has increased to 99% by 2017 (3). This has been possible owing to the scale up of PMTCT sites from 5361 (2014) to 5806 (2017) and DNA PCR analyzing laboratory from four zonal hospitals to nine more referral hospitals (3,4). Lindi is one of the leading region that has high proportion of HIV positive infants(9% overall positivity and 3.1% for the DBS test at 8 weeks) (3,5). One of the possible reasons to this stagnation might be contributed by 42% delay of EID whereby the mothers of these infants might be inadequately exposed to PMTCT knowledge hence unknowingly transmitting to their infants. An investigation to find out the possible causes of delay of EID is of necessity in trying to address this challenge.

Universal scale up of antiretroviral treatment, played the key role in dropping down the AIDS related death by 48%, increasing the global number of people living with HIV to 36.7 million by 2016, where by 17.8 and 2.1million are women and children respectively (6). New HIV infections remained static at 1.9 million among general population between the year of 2010 and 2016. From 2000 to 2016, about 2 million new HIV infections among pediatrics were prevented nonetheless, this is not at the pace of global super-fast track target of eliminating mother to child transmission of HIV and reducing childhood HIV infections to 20,000 by 2020(7)**.** So far, the target is out of reach as pediatric HIV testing and treatment is still unsatisfactory. In 2016, a total of 160000 children contacted HIV infections while 120000 died. Moreover, 100,000 new HIV infections in pediatrics are estimated to occur by 2020 if at all we continue at this pace(7).

Eastern and Southern Africa continued to be the highest burdened area, with 19.4 million of her people living with HIV globally where by 59% of these, are adult females (8). In the United Republic of Tanzania, 1400000 people were living with HIV by 2016 (6). Women are more affected compared to men, contributing more than 50% of PLHIV while children accounting for 14.3% (9). In the same year, 55000 people were newly identified with HIV infection whereby 18.2% were children (6). The global effort has succeeded to scale up provision of antiretroviral treatment to pregnant women from 47% (2010) to 76% (2016). The remained one third of HIV+ pregnant women who did not receive ART infected 160000 pediatrics with HIV(6).

Mother to child transmission of HIV infection contributes to over 90% of HIV infection in pediatrics. This transmission can occur during pregnancy, labor and delivery and breast feeding. At natural course, the overall risk of MTCT is approximately at 20% to 45%(10) from pregnancy to the end of breast feeding period. Infants born to HIV+ pregnant women have antibodies to HIV passively transferred from their mothers while in uterus. These antibodies continue to exist in the blood stream of the children until 9 to 18 months of age. Thus, rapid HIV tests cannot be used to confirm HIV infection in exposed children below 15 months(11). Therefore DNA PCR is mandatory to substantiate the HIV status of exposed children of this age group (11).

HIV exposed infants have been categorized into two groups depending on the risk of vertical transmission from their mothers(11). The groups are high risk and low risk HIV exposed infants. The high-risk infants are those born from the mothers newly identified to be living with HIV, mothers that have been in antiretroviral treatment for less than a month before delivery, mothers with high viral load (>50copies/ul) and mothers identified at labor and post-natal clinic. The low risk infants are those born from women already in ART and have attained viral suppression (50copies/ul). It is recommended by World Health Organization that all high risk HIV exposed infants to be tested for HIV using nucleic acid test (NAT) at birth while those with low risk, to receive virologic HIV testing at the age of 4 – 6 weeks (2). For the easy of programmatic implementation, this golden period has been extended to 8 weeks after

delivery (12). Assays of HIV DNA whole blood and dried blood spot or HIV RNA plasma and dried blood spots are equally highly recommended to be used (2). However, for the simplicity of transportation at many of resource constrained areas, the DNA dried blood spots are the commonly preferred technique (13).

HIV prevalence among pregnant women remains at 6% while Antenatal proportion of positivity among pregnant women stabilizes at 3.7% between 2015 to 2017 (3). The proportion of HIV exposed infants receiving early infant diagnosis by DNAPCR at the age of 8 weeks or below has increased from 27% (2013) to 58% (2016) (14,15). This is the profound achievement, although the country is still facing 22% gap on EID towards 80% coverage recommended by WHO (10). The proportion of HIV positivity among HIV exposed infants has significantly dropped from 12% (2011) to 5.4% (2015), then plateaued at 4.8% between 2016 and 2017 (3). This stagnation of overall HIV positivity among exposed infants is a new mystery towards achieving elimination of mother to child transmission of HIV. Other challenges facing EID program in Tanzania are, 50% HEIs delivered at home, DNAPCR analyzing laboratory being stationed at few large hospitals, long turnaround time of DBS results (40days) and the challenge on documentation and data quality (3).

1.2 Problem statement

The Tanzanian estimates of new HIV positive pediatrics is progressively increasing from 10000 in 2016 to 11000in 2017. However, the rate of early HIV identification among the HIV exposed children is not promising, only 36% of HIV exposed infants were tested for HIV at or below 2 months in 2017 (16). The antiretroviral treatment coverage among pediatrics is decreasing from 48% (2016) to 18% (2017)during which, 6000 HIV/AIDS related pediatric death were estimated to occur as well. Vertical transmission of HIV from the mother to the child, contributes 90% of the newly identified HIV positive pediatrics. Early identification of HIV status among exposed children is of profound importance in preventing HIV/AIDS related deaths among pediatrics.

Lindi is one of the Tanzanian regions with overall proportion of HIV positive results of 9% among HIV exposed infants and 3.1% for the infants taken within 8 weeks (3,5). It is the highest proportion of HIV positive result than any region.

Various factors have been shown to be associated with delay of HIV status identification among HIV exposed infants. These factors are mothers' literacy on the significance of early dried blood spot (DBS) collection, distance from home to the DBS collection center, poverty and need of travel cost to reach DBS collection facility (12,17) Others were timing on identification of maternal HIV status, maternal use of triple ART, facility delivery, geographical relocation and low male involvement are also found to be associated with delay of DBS collection (12,17,18). Inadequate skilled staff on DBS collection, poor communication between antenatal clinic (ANC), labor ward and post-natal clinic (PNC) on tracing HEIs eligible for DBS collection, weak community system on tracking HIV exposed infants (HEIs) eligible for DBS when doesn't showed up on appointment, and unstable supply of DBS kits are also reported to influence delay of early identification of HIV status among HIV exposed infants (12,17,19).

This study endeavored on finding out the regional magnitude of delay of HIV status identification and its associated factors in Lindi region.

1.3 Conceptual framework

This study concerns HIV exposed children missing the opportunity of timely HIV testing hence delay receiving the recommended intervention in case they are HIV infected or protective measures if HIV negative. Literature shows groups of independent variables of HIV exposed children socio-demographic, clinical and programmatic factors are independently and collectively influence the delay of identification of HIV status HIV exposed children (12,14,17).

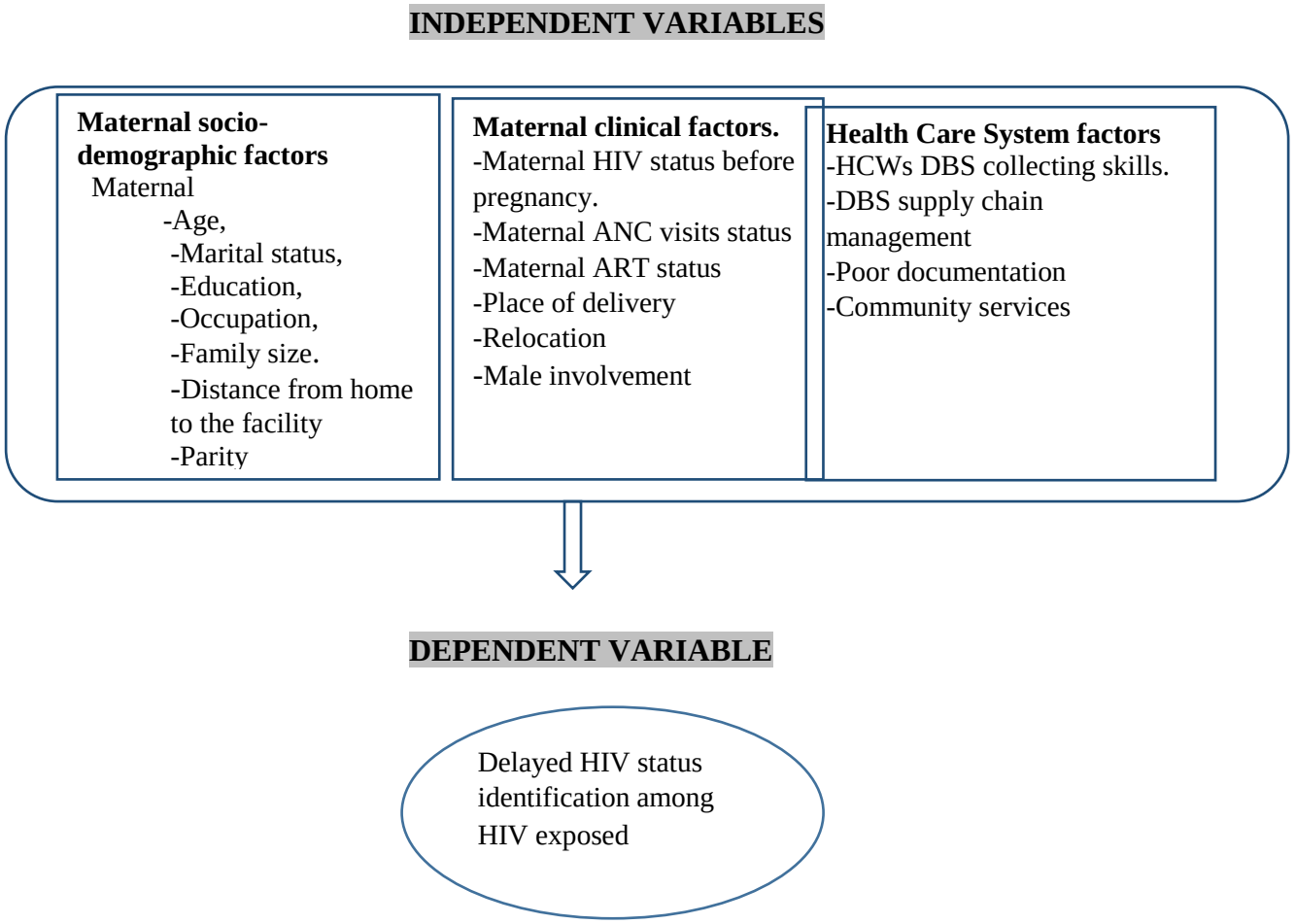
In social demographic factors, literature mentioned mothers and care givers who did not receive or completed primary education were found to have great possibility of delaying their children to receive HIV testing at recommended age in Malawi (18). Similarly, the mothers/care givers with inadequate knowledge or completely not informed on early infant diagnosis at ANC were found to be associated with delayed identification of HIV status of exposed children in Kenya and Republic of South Africa (17,20). Moreover, the mothers and care givers with independent source of income are more likely to bring their children on time for HIV status identification (EID)(19). Same observation was seen in Kenya whereby poverty was observed to influence delay of EID (17). Both having source of income or being poor affected EID through ability or inability to pay for travel cost to the DBS collection center. Long distance from livelihood to the facility also affects early testing of HIV among HIV exposed children. There was a paradoxical finding, whereby exposed children of the mothers living at a distance of more than 10km from the health facility accessing early testing compared to those living at a distance below 10 kilometers(19). This was attributed to affordability of the transport cost and avoidance of the social stigma at the facilities near residence where the mother and the child are known. Other studies reported an association of larger family size or extended family and early identification of HIV status of HIV exposed children. Families with more than 5 members were observed to have more accessibility to early identification of HIV among exposed children compared to those with less members. This was attributed to increased social support(17,19).

Early maternal HIV status identification prior to pregnancy increases completeness of the recommended antenatal clinic attendance hence improves mother's knowledge on early EID. It increases maternal-care giver relation and reduces stigma as well hence influencing mothers' early seeking behavior of the early infant diagnosis(21–23). Similarly, mothers who are in ART during pregnancy was found to have high chance of bring their children for EID (12,19,21,22). Infants delivered at the health facility were observed accessing HIV status identification earlier compared to those delivered at home (21). Changing of residence due to human activities was found to be more likely delaying HIV status identification(18,24). Mothers, who had to seek permission to their partners for visiting the health facilities were more likely to delay compared to those who are independent in decision making (23,25,26).

Health care system has the great role in facilitating timely uptake of EID. But studies show the negative contribution of health system in delaying identification of HIV status of HEIs. This is through inadequate skilled health care workers, particularly on DBS collection, poor communication between antenatal, labor and postnatal clinics and weak community systems that fails to link continuity of services between the facility and the community (12,17,20,24,27). Also, unstable supply of EID commodities especially DBS kits and poor documentation in monitoring and evaluation tools for PMTCT and EID.

This study concentrated on socio-demographic and clinical factors associated with delayed HIV status identification among HIV exposed children.

Figure 1: Diagrammatic presentation of the conceptual framework



1.4 Rationale

- Results from this study will be useful for the Ministry of Health, Community Development, Gender, Elderly and Children (MoHCDEC), and other early infant diagnosis stakeholders for monitoring early infant diagnosis (EID) interventions.
- The study will be useful for policy makers at Ministry of Health, Community Development, Gender, Elderly and Children (MoHCDEC), PMTCT/EID program managers, coordinators and officers at ministry of health and other implementing partners by providing insights into formulating clear strategies, SOPs, guidelines and IEC and BCC tools essential in facilitating early identification of HIV status among HEIs to improve implementation of EID services in the region and national as whole.

1.5 Research questions

1. What is the proportion with delayed HIV status identification among exposed children in Lindi region?
2. What are the factors associated with delayed HIV status identification among exposed children?

1.6 Objectives

1.6.1 Broad objective

To determine the magnitude of delayed HIV status identification and associated factors among exposed children in Lindi region.

1.6.2 Specific objectives

1. To determine the proportion of HIV exposed children with delayed HIV status identification among exposed children attending reproductive and child health clinics.
2. To determine maternal socio demographic factors associated with delayed HIV status identification.
3. To determine maternal clinical factors associated with delayed HIV status identification.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Magnitude of delayed HIV status among exposed infants

By 2016, 57% of the global HIV exposed infants missed the opportunity of knowing their HIV status within the WHO recommended age of 4 – 8 weeks (7).The observation is almost the same at the Caribbean and Asian countries of Haiti 66%(24) and Myanmar 58%(12). Although, the proportion is bit higher at Eastern and Southern Africa by 4% above the global picture(14). The individual country level performance of this sub-continent area, varies between 38% - 85% (24).Previous studies reported the least delay of 38% in Republic of South Africa and Zambia, followed by Malawi 53%, Ethiopia 59% and Ivory Coast 61%. The worst performing country is Nigeria which reported the delay of 96% (22,24). Moreover, the eastern part of Africa correlates the global magnitude with a slight increment of 1% for Kenya and 6% for Uganda (15,28). In Tanzania the magnitude of delay EID is at 58% by 2016(15).

2.2 Maternal social demographic characteristics and delayed HIV status identification

Mothers/caregivers with low education level status or who are not informed on EID earlier during ANC clinic have a high chance of not showing up for sample collection of their infants at appropriate age (17,18,20). Kebede etal found no association between mothers literacy status and early identification of HIV while study done in Myanmar failed to assess association of education level and EID due to high co linearity(12,21).

A trip to the facility for EID services involves travel cost to the mother-infant pair at almost all developing countries. This hinders some mothers to reach timely at facilities for EID as it reported by Braun etal. Moreover, independent maternal source of income either through employment or agriculture was found to positively affecting early infant diagnosis at Mozambique while poverty was found to be source of delay at Kenya(17,29,30)**.** Nevertheless studies at Ethiopia and Nigeria found lack of association between occupation of the mother/care giver with EID meanwhile a study done in Kenya failed to assess the association between occupation of the mother and delay of HIV exposed children to receive HIV testing

services due to high co linearity(12,21,31).

Long distance from the DBS sample collection station to the PCR center was observed to have negative effect on accessibility of EID in Myanmar whereby a distance of >128kms between those two service points was found to delay Mother – infant pair from receiving EID services. Distances from community to the sample collection station was found to have no effect on EID services accessibility in Kenya and Ethiopia(17,21). Contrary to the previous observations, is the paradoxical finding in Mozambique whereby Mother – infant pair staying a distance of >10kms away from the hospital were found to receive timely EID compared to those who were <10kms(19). This was attributed to affordability of the transport cost and avoidance of social stigma from around community(12,19).

Larger family size was found to be positive predictive factor towards accessing early infant diagnosis in Mozambique while lack of social support was found to have negative effect in Kenya(17,19)**.**Maternal age and marital status has no significant association with early infant diagnosis at the studies done at Nigeria and Ethiopia (21,31). Also Kebede etal found maternal residence, parity and health condition to have no association with early infant diagnosis in Ethiopia(21).

2.3 Maternal clinical factors and delayed HIV status identification

Women identified their HIV status prior or during the current pregnancy or had the chance to attend most of the recommended ANC visits had higher chance of bringing their infants for EID compared to those diagnosed during labor and delivery or later at Postnatal clinic and immunization services in Ethiopia, Cote d'Ivoire and Nigeria(21,23,31)**.** This is attributed to the more exposure the mother receives on PMTCT and EID health education and counseling during frequent visits that increase her knowledge and understanding hence adherence to the program on later follow ups.

Mother being in triple ART therapy before pregnancy or at her first ART exposure was found to influence EID use at Nigeria and Myanmar (12,31). This finding was also observed at Mozambique and was attribute to mother HIV status understanding, frequent clinic visit and close relation of the mother and health providers that will give chance to providers to identify the timely HEI's need of EID and offer it (19). Kebede etal found that mother being in combination ART or ARV prophylaxis and her infant during labor or after delivery has high chance to come for EID compared to the mother infant pairs that did not receive this service(21).In contrast, Thiha etal reported the negative predictive effect of mother being on ARV prophylaxis only for PMTCT, or neither on prophylaxis nor combination ART towards delayed identification of HIV status among exposed infants.

HEIs delivered at the facility had three times advantage of receiving early infant diagnosis compared to those delivered at home in Ethiopia(21). In contrast, study done in Myanmar found out 80% of HIV+ women deliver at health facilities but less than half of the delivered HEIs received EID. This low performance in EID was attributed to poor linkage of mother infant pair from labor ward to DBS collection centers hence ending up lost to follow ups(12).

Geographical relocation due to farming activities or schooling was reported to be associated with higher mother infant pair lost to follow which ultimately affects early infant diagnosis as reported by Ioannidis etal and Karinidia etal (18,24).

CHAPTER THREE

3.0 METHODOLOGY

3.1 Study design

A cross sectional study based on health care facilities was done from March to April 2019 involving four districts of Lindi region namely Kilwa DC, Lindi DC, MC and Nachingwea DC.

3.2 Study area

Lindi region is on the south-eastern part of Tanzania mainland. It is bordered by coast region in north, Mtwara region in south, Morogoro region at west and Indian Ocean at east. The region has fivedistricts and six councils namely Kilwa DC, Ruangwa DC, Nachingwea DC, Lindi DC, Liwale DC and Lindi Municipal. There are 28 Division, 142 Wards, 541 Villages, 2,385 Hamlets and 80 Streets. The projected population is estimated to be 978,655 (NBS, 2012), of which 274,215, equivalent to 28% of population is living in urban and 704,440 equivalents to 72% of population lives in rural area. The region has the HIV prevalence of 0.3% for the general population.

The region has the total of 253 health facilities where by 9 are hospitals, 20 are health centers and 224 dispensaries. Four of these facilities are faith based where by three are hospitals and one is health center. HIV care and treatment services are provided at 103 facilities while PMTCT services are provided at 233 facilities. Among facilities offering PMTCT services,190 sites have skilled staff that can collect DBS for early infant diagnosis. Ten facilities namely Sokoine regional referral hospital, Kitomanga hospital, Nyangao designated hospital, Nachingwea designated hospital, Mnero hospital, Ruangwa designated hospital, Kibutuka health centre, Liwale designated hospital, Kinyonga hospital and Tingi health centre are used as the hub for collecting DBS and HVL samples from peripheral sites and transporting them to the nucleic acid testing center (Ligula hospital) in Mtwara region. Currently, there is no facility which is offering point of care services for early infant diagnosis of HIV using the Gene –Expert.

3.3 Study population

All HIV exposed children attending post-natal clinics with their mothers for immunization and MTCT preventive services at selected health care facilities during the study period and consented to participate in the study through their mothers were enrolled. The children and their mothers are followed up for HIV preventive services using a special ministry of health register called PMTCT Mother-Child Cohort register. The pair have clinical cards (care and treatment card for the mother and HIV exposed infants' cards for the infant) that are used for documenting their baseline and follow up information. Also, the children use the RCH card number 4 which has a place for documentation of exposure status. By using these tools, the identification of the HIV exposed children was done.

3.4 Inclusion criteria

All HIV exposed children attending with their mothers at post-natal clinic for immunization and HIV preventive services during the study period were included.

3.5 Exclusion criteria

HIV exposed children that were younger than the recommended age (1 month)for early infant diagnosis were excluded from the study.

3.6 Sample size

Sample size was calculated from Fisher's formula adjusting for finite population:

$n=Nz^2pq/(d^2(N-1) + z^2pq)$

Where:

n= sample size,

N=population size which is approximately 600 HIV+ pregnant women/care giver HIV exposed infant pair attending at RCH/PNC or immunization clinic for various services.

Z = 1.96 corresponding to 95% confidence interval.

P = 0.58 (proportion with delayed identification of HIV status among exposed children in Tanzania in 2016 (15).

q = 1-p =0.42

d = margin of error = 0.05

Therefore, n= 600(1.96) ² x 0.58x0.42/[0.05² (600 – 1) + (1.96)²0.58 x0.42] = 231

Thus, the sample size in this study was 231.

3.7 Sampling method

Four districts (Kilwa DC, Nachingwea DC, Lindi DC, and Lindi MC) were purposely selected to represent rural and municipal set up from the six districts. Facilities with high volume of HIV exposed children were selected which are 4 form Nachingwea DC(Naipanga dispensary, Mnero hospital, Nachingwea district hospital, Tunduruyaleo dispensay), 3 from Lindi DC(Mtua health centre, Nyangao designated hospital, Mahumbika dispensary), 3 from Lindi MC (Mingoyo dispensary, Sokoine regional referral hospital, Town health centre) and 5 sites from Kilwa DC(Tingi health center, Masoko health center, Kinyonga hospital, Njinjo health center and Somanga dispensary) making a total of 15 facilities. The sampled facilities had a sampling frame of 376 HIV positive mothers-exposed children pair actively attending at postnatal clinic for immunization or HIV preventive services. Study participants attending at postnatal clinic for immunization and HIV preventive services were consecutively recruited during the study period to make a total of 231. Number of study units sampled from each facility was decided depending on the volume of active mother-exposed child pair attending at the facility during the study period.

3.8 Variables

Independent variables

Age, marital status, parity, residence, level of education, occupation, HIV status, ART status, Antenatal clinic (ANC) visit status of the HIV positive mothers of the exposed children and family size, distance from residence to the facility, relocation from the village the infant was born, fathers' permission to attend post-natal and PMTCT services, place of delivery of the HIV exposed child. These variables were collected by using the structured questionnaire.

Dependent variable was delayed HIV status identification among HIV exposed children. This variable was collected using the date of DNA PCR sample collection and the HIV exposed child delivery date to obtain the exact age of the child during sample collection. All exposed children with the age more than two weeks at the time of sample collection were regarded as delayed HIV status identification.

3.9 Data collection tools and procedures

Data collection was accomplished through a structured questionnaire which was prepared in English by the investigator, was translated into Swahili and piloted at Nachingwea dispensary in Lindi MC which was not included in the study and then oriented to and used by research assistants. Information on the socio-demographics and clinical factors of the mothers of HIV exposed children was obtained from the respondents. The researcher and his assistants introduced themselves to the HIV positive mothers of the exposed children and provided an explanation regarding the aim of the study and the utility of the expected findings. Then, the mothers were requested to give consent before participating in the study. The interview was conducted in a private room. All questionnaires and checklists were reviewed daily for completeness. Incomplete and missing data were identified and rectified by the researcher and his assistants using the HIV exposed care and treatment cards (CTC2 cards, HIV exposed children cards (HEI cards) and PMTCTMC cohort registers.

3.10 Data Analysis

Data were analysed using STATA software. Categorical data is presented by using frequencies and percentages while continuous data is presented using means and standard deviation. Univariate analysis using the Chi-square test was done to examine the association between individual independent variables and the dependent variable. Multivariate logistic regression models were used to control for potential confounders. Adjusted odds ratios with 95% confidence intervals are presented. P-value of less than 0.05 is considered statistically significant.

3.11 Ethical Issues

Ethical clearance was obtained from the Research and Publication Committee of the Muhimbili University of Health and Allied Sciences. Permission was also sought from the regional administrative secretary (RAS), regional medical officer (RMO), district medical officers (DMO) and the facility in charges. Informed consent was sought from participants after providing explanation on the study objectives and utility of the expected findings. Participants were informed that their participation was voluntary, and they were free to participate or discontinue from the study at any time. Participants were also informed that their information will be handled at high degree of confidentiality and stored in a secured place. A contact number of the supervisor was given in case they had any concerns.

CHAPTER FOUR

4.0 RESULTS

4.1 Maternal and household characteristics.

A total of 231 HIV exposed children were included in the analysis of this study. The mean age of their mothers was 32.9 years (standard deviation of 6.5 years), 16% of them were adolescent girls and young women aged 10-24 years. Majority (63.6%) of the mothers had primary education and 10% had secondary education. Half of the mothers were single, 34.6% married and the rest of were divorced or widowed. During this study, 87% of the mothers had more than one child. More than half (59%) of the mothers were entrepreneurs, 30% unemployed and 11.3% had official employment. Most of the families (85%) of the HIV exposed children had less than five members and 97.8% of them are living at less than 10 kilometers from the health facilities (Table1).

4.2 Maternal clinical characteristics

Table 2 shows clinical characteristics of mothers of HIV exposed children. The Out of 231 HIV exposed children, two third of the mothers were aware of their HIV positive status prior to pregnancy, 29% during pregnancy while 4.3% knew it during delivery or post-natal services. Ninety-five percent were already in ART at the time of delivery. Most of the mothers (92.2%) disclosed their HIV to either their partners, parents or other relative. More than half of the HIV exposed children were born by the mothers that made four or more antenatal visit during their pregnancy and 79% of them were delivered at the facility. It is only 28.1% of the HIV exposed children that their mothers needed permission from their partner to attend the clinic for immunization or HIV preventive services. About 19% of mothers of HIV exposed children relocated from their original residence to another after delivery.

Table 1: Maternal social-demographic and household characteristics

Variable	Frequency	Percentage
Age of the mother		
Below25 years	37	16.0
25 years and above	194	84.0
Level of education		
No formal education	61	26.4
Primary education	147	63.6
Secondary education	23	10.0
Marital status of the mother		
Married	80	34.6
Single	117	50.7
Divorced	27	11.7
Widow	7	3.03
Occupation of the mother		
Employed	26	11.3
Unemployed	69	29.9
Other (self-employment)	136	58.9
Family size		
Less than 5	196	84.9
5and above	35	15.2
Parity of the mother		
One child	30	12.9
Two or more children	201	87.0
Distance from home to the facility		
<10 kms	226	97.8
10 or more kms	5	2.2

Table 2: Maternal clinical characteristics

Variable	Frequency	Percentage
Aware of HIV status		
Before pregnancy	154	66.7
During pregnancy	67	29.0
After pregnancy	10	4.3
Time of initiation of ART		
Before pregnancy	152	65.8
During pregnancy	69	29.9
After pregnancy	10	4.3
Disclosure of HIV status		
Disclosed to husband, mother, relative	213	92.2
No disclosure	18	7.8
Number of ANC visits		
<4	89	38.5
4 and above	142	61.5
Place of delivery		
Home	47	20.4
Facility	184	79.7
Relocation of residence after delivery		
Yes	44	19.1
No	187	80.9
Male involvement		
Male partners' permission	65	28.1
No male partners' permission	166	71.9

4.3 Proportion with delayed HIV status identification among HIV exposed children

Out of 231 HIV exposed children studied, 98 (42.4%) received DNA PCR testing at the age more than two months hence delayed HIV status identification. All the tested children had their results received at the time of the study and 12 (5.2%) of them were HIV positive. Among the HIV positive children, 7 (7.1%) delayed HIV status identification.

4.4 Factors associated with delayed HIV status identification

Table 3 and 4 shows the factors associated with delayed HIV status identification from univariate analysis. Four factors were significantly associated with delayed HIV status identification among HIV exposed children. These included HIV exposed children mothers' primary level of education (p=0.014), having two or more children (p=0.04), having disclosed their HIV status (p=0.031)and having less than 4 antenatal clinic visits during pregnancy (p=0.001). Other variables tested in the univariate analysis found to be statistically insignificant were HIV exposed children mother's age, marital status, occupational status, awareness of HIV status, time of initiation of ART, relocation of residence, number of family members, distance from residence to the facility, place of delivery and fathers' permission to attend post-natal and HIV preventive services.

Table 5 indicates results from multivariate analysis of factors associated with delayed HIV status identification. Findings show that after adjusting for parity, number of ANC visits and disclosure status, HIV exposed children whose mothers had primary level of education had significantly higher odds of delay in HIV testing(OR=2.11; 95% CI=1.09-4.09) compared to children whose mothers had no education. Likewise, children whose mothers had less than 4 ANC visits during pregnancy had an increased likelihood of having delayed HIV status identification (OR=2.17; 95% CI=1.19-3.95) compared to their counterparts whose mothers had 4 or more visits, after adjusting for level of education, parity and disclosure of HIV status.

Table 3: Univariate analysis of maternal socio-demographic factors associated with delayed HIV status identification

Factor	Total	Delayed HIV status identification No. (%)	Odds Ratio (95% CI)	P -value
Age of the mother (years)				
below 25	37	18(48.7)	Reference	
25 and above	194	115(59.3)	0.65 (0.32-1.32)	0.233
Level of education				
No formal education	61	43(70.5)	Reference	
Primary education	147	76(51.7)	2.2 (1.18-4.23)	0.014
Secondary education	23	14(60.9)	1.5(0.56-4.18)	0.401
Marital status of themother				
Married	80	46(57.5)	Reference	
Single	117	63(53.9)	1.15(0.65-2.06)	0.613
Divorced	27	18(66.7)	0.67(0.27-1.69)	0.402
Widow	7	6(85.7)	0.22(0.03-1.96)	0.177
Occupation of the mother				
Employed officially	26	17(65.4)	Reference	
Un employed	69	38(55.1)	1.54(0.60-3.93)	0.366
Other (self-employment)	136	78(57.4)	1.41(0.58-3.37)	0.447
Family size				
Less than 5	196	111(56.6)	Reference	
5 and above	35	22(62.9)	0.77(0.37-1.62)	0.493
Parity of the mother				
One child	30	12(40.0)	Reference	
Two or more children	201	121(60.2)	0.44(0.20-0.97)	0.04
Distance from home to the facility				
<10 kms	226	129(57.1)	Reference	
10 or more kms	5	4(80.0)	0.33(0.04-3.02)	0.328

Table 4: Univariate analysis of the maternal clinical factors associated with delayed HIV status identification

Factor	Total	Delayed HIV status identification No. (%)	Odds Ratio (95% C.I)	P - value
Maternal HIV status				
Before pregnancy	154	61(39.6)	Reference	
During pregnancy	67	30(44.8)	1.23(0.69-2.21)	0.474
After pregnancy	10	7(70.0)	3.55 (0.89-14.29)	0.074
Maternal ART status				
Before pregnancy	152	59(38.8)	Reference	
During pregnancy	69	32(46.4)	7.74(0.96-62.33)	0.056
After pregnancy	10	7(70.0)	4.5(0.50-40.17)	0.178
Disclosure of HIV status				
Disclosed (Husband, parent, relative)	213	95(44.6)	0.25(0.69-0.88)	0.031
No disclosure	18	3(16.7)	Reference	
Maternal ANC visits				
less than 4 visits	89	25(28.1)	2.7(1.54-4.78)	0.001
4 and above visits	142	73(51.4)	Reference	
Place of delivery				
Home	47	19(40.43)	1.11(0.58-2.13)	0.756
Facility	184	79(42.93)	Reference	
Relocation				
Yes	44	18(40.9)	Reference	
No	187	80 (42.8)	1.08(0.55-2.10)	0.821
Male involvement				
Seeking male partners permission	65	33(50.8)	0.62(0.35-1.11)	0.11
Doesn’t seek male partners permission	166	65(39.2)	Reference	

Table 5: Multivariate analysis of maternal social demographic and clinical factors associated with delayed HIV status identification

Factor	Adjusted Odds Ratio (AOR)	95% Confidence Interval (CI)	P - Value
Level of education			
No formal education	Reference		
Primary education	2.11	1.09 - 4.09	0.027
Secondary education	1.54	0.54 - 4.43	0.416
Parity of the mother			
One child	1.89	0.83 - 4.28	0.127
Two or more children	Reference		
Maternal ANC visits			
<4 visits	2.17	1.19 - 3.95	0.011
4 and above visits	Reference		
Disclosure of HIV status			
Disclosed (to husband, mother, relative)	Reference		
No disclosure	0.35	0.09 - 1.31	0.12

CHAPTER FIVE

5.0 DISCUSSION

5.1 Magnitude of delayed HIV status identification among HIV exposed children

Early infant diagnosis of HIV among HIV exposed children is the corner stone of early identification of HIV status among exposed children hence offer them with preventive interventions in case they are not vertically infected with HIV and treat them found to be HIV positive timely to prevent HIV/AIDS related morbidity and mortality among pediatrics. This study revealed 42.4% of HIV exposed children in Lindi been delayed HIV status identification. This finding is similar to the findings in Kenya 42%, but lower compared to the national and global estimates which are at 58% and 56% respectively (7,15). It is also lower compared to the findings of the study done in Lake zone (87%) of Tanzania and in Myanmar 53 (12,17). However, it is higher compared to what has been found in Burkina Faso(29.4%). This observed difference might be due to facility set up approach where most of the attending mother child pair are those with good retention hence missing the true representative picture at the community.

5.2 Maternal Social demographic **factors associated with delayed HIV status identification**

In this study, the HIV exposed children of the mothers with primary and secondary education were found statistically significant to be more likely to delay HIV status identification in comparison to the mothers with no formal education. This can be due to more exposure of mothers without formal education to health education on timing of early HIV status identification from health care workers at the facilities compared to mothers with primary and secondary levels of education. This finding conforms what has been seen in Malawi, where children of teachers, were observed to delay compared to other women (18). However this finding is contrary to previous studies done in Kenya, Malawi and South Africa where mothers with no formal education were more likely to delay HIV status identification compared to those with formal education (17,18,20). Likewise, the study has found that HIV exposed children born with mothers having two or more children were less likely to delay HIV

status compared to those gave birth once. This might be due to awareness of the PMTCT services received by the mothers with many children through exposure to the health education on PMTCT services at reproductive and child health clinic in comparison to women gave birth once. However, a study done in Ethiopia found out that there was no association between HIV status identification with maternal parity (19).

There was no association elicited between maternal' age and the delayed HIV status identification of the HIV exposed children. Similar findings were observed by in Nigeria and Ethiopia respectively (21,22). Different finding was seen in Kenya where HIV positive mothers with young age ranging between 27.2 – 30.1 years were more likely to delay bringing their HIV exposed children for HIV testing (17).

There was no statistically significant association where between maternal marital status and the HIV exposed infant delayed HIV status identification as it has also been observed in Nigeria(22).

The study has found no association between HIV status identification among exposed children and maternal occupation. This finding was also seen in Ethiopia (21). In contrary, a study done in Mozambique found that mothers who were officially employed or doing agriculture, were more likely to send their children to the facility for early HIV status identification (19).

In this study, family size was found to have no statistically significant association with the delayed HIV status identification among HIV exposed children. This is contrary to what has been found in Mozambique whereby for each member increase in the family of HIV positive mother with an exposed child pair, there was an increased odds for the child to receive HIV status identification earlier (19).

There was no statistically significant association between distance from maternal residence to delayed HIV status identification among HIV exposed children. Similar findings were seen in Kenya and in Ethiopia (17,21). Different findings were observed in Myanmar whereby a distance of 128 kms was associated with delayed HIV status identification among HIV exposed children.

5.3 Maternal clinical factors associated with delayed HIV status identification

In this study, a statistically significant association was elucidated between HIV exposed children HIV status identification and maternal four or more antenatal clinic visits made during pregnancy. This finding conform the previous observation in Nigeria (21,22).Also, the study has found that HIV exposed children of the mothers that have disclosed to either their partner, parent or any other relative, to be less likely associated with the HIV status delay compared to those of the mothers that did not disclosed to anyone. Similar findings has been observed in South Africa(33). This observation might be due to increased confidence and self-esteem among disclosed mother-child pair brought about by social support and decreased self and social stigma.

This study found no statistically significant association between maternal health facility delivery and delayed HIV status identification among HIV exposed children. This finding correlate with what has been seen in Myanmar where 50% of the mothers delivered at health facility came back late for HIV status identification of their children (12).

In this study, there was no statistically significant association between prior to ANC awareness of maternal HIV positivity status and delayed HIV status identification of HIV exposed infants. This is contrary to what has been seen in Ethiopia where by mothers who new HIV status before or during their current pregnancy were more likely to bring their exposed children earlier for HIV testing at the facilities (21).

Maternal geographical relocation was one of the variables studied. No statistically significant association between this variable and the delayed HIV status identification of an exposed child. This is contrary to what has been seen in Malawi where geographical relocation was found to have an impact on the timeliness of HIV status identification HIV exposed children (18,24).

Ninety five percent of the of the HIV exposed children studied had their mothers on ART before delivery. However, there was no statistically significant association between prior to delivery ART exposure and the delayed HIV status identification among exposed children

(0.056). Contrary to this finding, is an observation in Myanmar, where mothers ART prior to delivery were more likely to send their children the facility for early HIV status identification(12,21).

5.4 Study Limitations

This study used a small sample from a single region which limits ability to generalize to other settings in the country. We included HIV exposed children and their mothers who were attending PMTCT services. Hence, the magnitude of delayed HIV identification status among exposed children might have been underestimated. A qualitative study among those who had delayed HIV status identification might have provided insight on additional factors contributing to this problem.

5.5 Conclusion

Four out of ten HIV exposed children delay HIV status identification in Lindi region. Delay of HIV status identification among exposed children was associated with less than four ANC visits during pregnancy and primary level of education of the mother.

5.6 Recommendation

In order to improve delayed HIV status identification among exposed children, continuous health education should be provided to all HIV positive women of reproductive age before conceiving, during pregnancy and throughout breastfeeding period. This should go parallel with information, education and communication to the entire community through radios, posters and village meetings on insisting early antenatal booking and adherence on at list four antenatal clinic visits.

REFERRENCES

1. Ministry of Helath , Community development E and C (MoHCDEC). The United Republic of Tanzania. Vol. 7, National Guideline for the management of HIV and AIDS. 2019.
2. World Health Organization. WHO recommendations on the diagnosis of HIV infection in infants and children. Geneva; 2010.
3. Ministry of Health Community Development Gender Elderly and Children. PMTCT Annual Program Report. 2017.
4. Nuwagaba-Biribonwoha H, Werq-Semo B, Abdallah A, Cunningham, A., Gamaliel JG, Mtunga S, Nankabirwa V, et al. Introducing a multi-site program for early diagnosis of HIV infection among HIV-exposed infants in Tanzania. BMC pediatrics. 2010;10(1):44.
5. National Aids Control Program. Early Infant Diagnosis Program | Tanzania [Internet]. HIV early Infant Diagnosis Dashboard. 2018 [cited 2019 Feb 5]. Available from: http://eid.nacp.go.tz/eid/
6. Unaids. Data 2017. Programme on HIV/AIDS. 2017;1–248.
7. UNICEF. Children & AIDS: Statistical Update. New York; 2017.
8. UNAIDS. Global AIDS update 2016. AIDS. Geneva; 2016.
9. UNAIDS. Progress report on the global plan:towards the elimination of new HIV infections among children and keeping their mothers alive. PLoS ONE. 2016;11(1):18–20.
10. World Health Organization. PMTCT strategic vision 2010–2015 : preventing mother-to-child transmission of HIV to reach the UNGASS and millennium development goals. World Health Organization. Geneva; 2010.

11. Ministry of Health Community Development Gender Elderly and Children. National guidelines for the management of HIV and AIDS. 6th ed. Dar es Salaam: National AIDS Control Programme; 2017. 1-6 p.

12. Thiha S, Shewade H., Philip S, Aung T., Kyaw NT., Oo M., et al. Early infant diagnosis of HIV in Myanmar: call for innovative interventions to improve uptake and reduce turnaround time. Global Health Action. 2017;10(1):1319616.

13. Nsojo A, Aboud S, Lyamuya E. Comparative evaluation of Amplicor HIV-1 DNA test, version 1.5, by manual and automated DNA extraction method using venous blood and dried blood spot for HIV 1 DNA PCR testing. Tanzania journal of health research. 2010;12(4):228–32.

14. Bwana V., Frimpong C, Simulundu E, Mfinanga S., Mboera LE, Michelo C. Accessibility of services for early infant diagnosis of human immunodeficiency virus in Sub-Saharan Africa: A systematic review. Tanzania Journal of Health Research. 2016;18(3):1–18.

15. Ministry of Health Community Development Gender Elderly and Children. Tanzania elimination of mother to child transmission of HIV strategic plan ii 2018 – 2021. Dar es Salaam; 2017.

16. UNAIDS. UNAIDS Data 2018. 2018.

17. Hassan AS, Sakwa EM, Nabwera HM, Taegtmeyer MM, Kimutai RM, Sanders EJ, et al. Dynamics and constraints of early infant diagnosis of HIV infection in rural Kenya. AIDS and Behavior. 2012;

18. Ioannidis J., Taha T., Kumwenda N, Broadhead R, Mtimavalye L, Miotti P, et al. Predictors and impact of losses to follow-up in an HIV-1 perinatal transmission cohort in Malawi. International Journal of epidemiology. 1999;28(4):769–75.

19. Cook R., Ciampa P., Sidat M, Blevins M, Burlison J, Davidson M., et al. Predictors of successful early infant diagnosis of HIV in a rural district hospital in Zambezia, Mozambique. Global Health Council Conference J Acquir Immune Defic Syndr J Acquir Immune Defic Syndr. 1999;34(564):104–9.

20. Woldesenbet S., Jackson D, Goga A., Crowley S, Doherty T, Mogashoa M., et al. Missed Opportunities for Early Infant HIV Diagnosis : Results of A National Study in South Africa. Journal of acquired immune deficiency syndromes. 2015;68(3):26–32.

21. Kebede B, Gebeyehu A, Jain S, Sun S, Haubrich R. Delay in early infant diagnosis and high loss to follow-up among infant born to HIV-infected women in Ethiopia. World Journal of AIDS. 2014;14(14(04)):402–12.

22. Audet M, Dunlap J, Sodangi I., Gebi U. Correlates of suboptimal entry into early infant diagnosis in rural north central Nigeria. Journal of acquired immune deficiency syndromes. 2014;67(1):e19.

23. Ndondoki C, Brou H, Timite-konan M, Oga M, Amani-bosse C, Ekoue D. Universal HIV screening at postnatal points of care: which public health approach for early infant diagnosis in Côte d'Ivoire? PLoS ONE. 2013;28(8):67996.

24. Diallo K. Early diagnosis of HIV infection in Infants — one Caribbean and Six Sub-Sah early diagnosis of HIV infection in infants—one Caribbean and six Sub-Saharan African countries 2011-2015. MMWR. 2016;65(46):46–51.

25. Dube Q, Dow A, Chirambo C, Lebov J, Tenthani L, Moore M. Lessons from the implementing early infant diagnosis of HIV infection at the primary care level : experiences and challenges in Malawi. Bulletin of the World Health Organization. 2012;90(May):699–704.

26. Kankasa C, Carter R., Briggs N, Bulterys M, Chama E, Cooper E., et al. Routine offering of HIV testing to hospitalized pediatric patients at university teaching hospital, Lusaka, Zambia: acceptability and feasibility. Journal of acquired immune deficiency

syndromes. 1999;51(2):202–8.

27. Cherutich P, Inwani I, Nduati R, Mbori-Ngacha D. Optimizing paediatric HIV care in Kenya: Challenges in early infant diagnosis. Bulletin of the World Health Organization. 2008;86(2):155–60.

28. Ashiono E, Achwoka D, Mutugi J, Rakwar J, Wafula A, Chabikuli O. Vertical HIV transmission in perinatally-exposed infants in South-Rift region of Kenya: a retrospective cross sectional study. BMC Public Health. 2017;17(1):1–8.

29. Sutcliffe C., Van Dijk J., Hamangaba F, Mayani F, Moss W. Turnaround time for early infant HIV diagnosis in rural Zambia: A chart review. PLoS ONE. 2014;9(1):1–6.

30. Braun M, Kabue M., McCollum E., Ahmed S, Kim M, Aertker L, et al. Inadequate coordination of maternal and infant HIV services detrimentally affects early infant diagnosis outcomes in lilongwe, Malawi. Journal of Acquired Immune Deficiency Syndromes. 2011;56(5):122.

31. Audet M, Dunlap J, Sodangi IS, Gebi UI. NIH Public Access. 2015;67(1):1–16.

32. Kimberlin C., Winterstein A. Validity and reliability of measurement instruments used in research. American Journal of Health-System Pharmacy. 2008;65(23):2276–84.

33. Adeniyi VO, Thomson E, Goon D Ter, Ajayi IA. Disclosure , stigma of HIV positive child and access to early infant diagnosis in the rural communities of OR Tambo District , South Africa : a qualitative exploration of maternal perspective. BMC pediatrics. 2015;15(1):1–10.

APPENDICES

Appendix I: Informed Consent (English version)

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES (MUHAS) DIRECTORATE OF RESEARCH ANDPUBLICATIONS

Dear participant,
I would like to tell you about the research study I am doing. The research study is a way of learning about something.

I would like to find out more about the proportion of HIV exposed children delayed receiving identification of their HIV status and related factors which may facilitate or hinder them to receive care and treatment services in case they are infected with HIV.

You are being asked consent for your baby to join in this interview because she/he is born to HIV infected mother.

If you will participate in this research, you will benefit by asking questions regarding HIV and services offered and in case there is a service that you were required to receive but not offered, you will be provided with that service.

If you accept to be interviewed on behalf of your child, you will be asked several questions regarding HIV and services which you and/or your child receive.

This study will help us to learn the burden of HIV exposed infants delaying receiving HIV testing at appropriate age and the possible influencing factors hence providing recommendations on the best ways of PMTCT program to responsible authorities for improving this condition.

You don’t have to join the study. It is up to you. You may say YES or NO and no one will blame you or decline you from receiving your intended services.

Before you say YES or No to be interviewed, I will answer any question you have and if you join interview you can ask questions at any time. Just tell the interviewer you have a question.

Should there be any question, your right as a participant kindly contact

Dr. Candida Moshiro, P.O. Box 65001 Dar es salaam or call 078495007

Appendix II: Informed Consent (English version)

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES (MUHAS) DIRECTORATE OF RESEARCH ANDPUBLICATIONS

Dear participant,

I would like to tell you about the research study I am doing. The research study is a way of learning about something.

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If you accept to be interviewed on behalf of your child, you will be asked several questions regarding HIV and services which you and/or your child receive.

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You don't have to join the study. It is up to you. You may say YES or NO and no one will blame you or decline you from receiving your intended services.

Before you say YES or No to be interviewed, I will answer any question you have and if you join interview you can ask questions at any time. Just tell the interviewer you have a question.

Should there be any question, your right as a participant kindly contact

Dr Candida Moshiro, P.O. Box 65001 Dar es salaam or call0 78495007

Appendix III: Informed Consent (Swahili Version)

CHUO KIKUU CHA SAYANSI ZA AFYA NA KURUGENZI YA UTAFITI NA MACHAPISHO.

Ndugu mshiriki,

Napenda kukuelezea kuhusu utafiti ninao ufanya. Utafiti ni njia ya kujifunza mambo fulani. Utafiti ninaoufanya utaangalia kiwango cha watoto waliozaliwa na mama wanaoishi na maambukizi ya VVU waliochelewa kupatiwa huduma za kutambua hali zao za VVU na visababishi vya kuchelewa huko.

Unaombwa kutoa ridhaa ili mwanao aweze kushirikishwa katika utafiti huu kwa nia mezaliwa na mama mwenye maambukizi ya virusi vya UKIMWI.

Ikiwa utaridhia kushiriki kwenye utafiti huu, kwa niaba ya mwanao utaulizwa maswali mbalimbali kuhusu UKIMWI na huduma zinazohusiana na virusi vya UKIMWI ulizopata wewe na mwanao.

Utafaidika na utafiti huu kwa kuweza kupatiwa majibu ya maswali yahusuyo maambukizi ya virusi vya UKIMWI napia kukusaidia kufanikisha wewe na mwanao kupata huduma sahihii wapo hujazipata. Utafiti huu utasaidia kujua utumiaji wa huduma ya upimaji wa hali ya maambukizi ya virusi vya UKIMWI kwa watoto na mapendekezo ya njia bora za utekelezaji wa huduma hii yatafikishwa kwa mamlaka husika.

Uamuzi wa kujiunga na utafiti huu ni wako wala hushurutishwi kujiunga. Una ridhaa ya kukubali au kukataa kujiunga na utafiti huu wala hutalaumiwa au kunyimwa huduma nyingine kwa kutojiunga na utafiti.

Kabla ya kutoa jibu la maombi ya kushiriki utafiti huu iwapo una swali lolote waweza kuuliza au ukijiunga kwenye utafiti waweza kuuliza swali muda wowote.

Kama utakuwa na swali lolote kuhusu haki zako kama mshiriki tafadhali wasiliana na

Dr Candida Moshiro, P.O. Box 65001 Dar es salaam or call 0784950071.

Appendix III: Consent Agreement Form (English Version)

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES (MUHAS)

DIRECTORATE OF RESEARCH AND PUBLICATION

I parent or legal guardian of …… has read the previous page of the consent form and the investigator has explained the details of the study. I parent or legal guardian understand that I am free to ask additional questions.

I parent or legal guardian understand that the research under way has no formal program for compensating clients for any hurt arising from this research. Medical treatment will be provided at the usual charge to me or to my insurer unless payment is otherwise provided for in this consent form.

I parent or legal guardian understand that the participation to this interview is voluntary and no penalty, loss of benefit or prejudice a quality of care I will receive upon my refusal to join the study interview.

……..	……
PARENT/LEGAL GUARDIAN	DATE&SIGNATURE/FINGERPRINT
KARIM MOHAMED	…….
INVESTIGATORS NAME	DATE & SIGNATURE OF INVESTIGATOR
TEL/MOBILE NUMBER	+255766311355/717319710.

Appendix IV: Consent Agreement Form (Swahili Version)

CHUO KIKUU KISHIRIKI CHA SAYANSI NA TIBA MUHIMBILI (MUHAS) IDARA YA UTAFITI

Mimi mzazi/ mlezi halali wa ……..nimesoma / nimesomewa maelezo ya ridhaa ya ushiriki kwenye utafiti ambayo pia mtafiti amenielezea kuhusu utafiti husika. Mimi mzazi/mlezi naelewa kwamba niko huru kuuliza maswali yeyote kuhusu utafiti huo.

Mimi mzazi/mlezi naelewa kwamba utafiti unaoendelea hauna mpango wowote wa fidia kwa wateja watakaopata athari zozote katika utafiti. Matibabu yatapatikana kwa kufuata mpango wa kawaida au kwa kutumia mfumo wa bima na wala si gharama zitokanazo na utafiti.

Mimi mzazi/mlezi na elewa kwamba ushiriki wangu kwenye mahojiano ya utafitini wa hiari na hakuna adhabu au kukosa huduma pindi nisipotoa ridhaa ya ushiriki au kujitoa kwenye mahajiano ya utafiti.

……..	……..
MZAZI/MLEZI WA MTOTO	TAREHE NA SAHIHI AU DOLE GUMBA
KARIM MOHAMED	……..
MTAFITI	TAREHE NA SAHIHI
NAMBA YA SIMU	+255766311355/717319710.

Appendix V: Questionnaire (English Version)

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES(MUHAS)

Early infant diagnosis and factors associated with its delay among HIV exposed children in Lindi Tanzania

SECTION A: SOCIAL DEMOGRAPHIC FACTORS:

1. Age of the mother…….
2. Marital status of the mother.
    i. Married
    ii. Single
    iii. Divorced
    iv. Widowed
3. Level of education of mother
    i. No formal education
    ii. Primary education completed
    iii. Secondary education
    iv. College (Specify ……
    v. University……..
4. How many members are in your family …….?
5. Parity of the mother.
    i. One child
    ii. Two or more children
6. Occupation of the mother ……..
    i. Self Employed
    ii. Employed
    iii. Housewife
7. Distance from home to the facility ……(in kms)

SECTION B: MATERNAL INFANT PAIR FACTORS

8. When was mother known to be HIV infected?
    i. Before pregnancy
    ii. During pregnancy
    iii. After pregnancy

9. Is mother enrolled to CTC?
    i. Yes, Writer CTC number……..
    ii. No

10. When was the mother in ART?
    i. Before Pregnancy ……
    ii. During pregnancy ……..
    iii. In labour ward or after delivery at post-natal clinic
    iv. None

11. To whom have you disclosed your HIV status
    i. Husband
    ii. Mother/ relative
    iii. None

12. Which social groups of PLWHA are you attached to
    i. Community
    ii. Psychosocial support groups
    iii. None

13. How many times did you visited RCH clinic before delivery of your child ……?
    Write the number of visits made to ANC seen in RCH 4 if available ……

14. Date of birth of infant ……/Current age……..

15. Place of birth
    i. Home
    ii. Hospital
    iii. Health center
    iv. Dispensary

16. Sex of the infant
    i. Male
    ii. Female

17. Did the mother migrate from the place she did her ANC services after delivery to another village or region?
    i. Yes
    ii. No

18. What was the reason for migration?
    i. Cultivation activities
    ii. Educational activities
    iii. Seeking rearing support from the mother/relative
    iv. Other mention …….?

19. Have you ever heard of HIV testing in infants?
    i. Yes, if Yes continue with question20
    ii. No Go to question 22

20. When did you hear about HIV testing in infants?
    i. Before pregnancy
    ii. During delivery
    iii. After delivery

21. Where did you hear about HIV testing in infants?
    i. Television/radio
    ii. Brochure/magazine
    iii. Health facility staff

22. Did your infant receive HIV testing?
    i. Yes, If Yes continue withquestion30.
    ii. No If No go to question32

23. Date of HIV testing……/Age at HIV testing……

24. What makes you to test your baby?
    i. Counselling from HCWs.
    ii. Eager to know results.
    iii. Others(specify)…….

25. What makes you not to test your baby?
    i. Fear
    ii. I did not know about the test
    iii. Others (specify)…….

26. How often do you bring your child for RCH services?
    i. Every month
    ii. After every 2 months
    iii. Others (specify)

27. How often do you bring your child for EID services?
    i. Every month
    ii. After 2 months
    iii. Other……(specify)
    iv. None

28. Do you need to seek permission to your husband/partner to attend ANC clinic or bring the child to the clinic for EID or immunization clinic?
    i. Yes
    ii. No

29. Have you received the HIV test result of your baby?
    i. Yes, If Yes continues with question number30.
    ii. No If No go questions31.
    iii.

30. What is the HIV result results of your child?
    i. Positive
    ii. Negative
    iii. I do not know

31. Why did you not receive HIV test results for your baby?
    i. Fear
    ii. Results delayed in previous visits
    iii. Long distance
    iv. Other (specify)……

Appendix VI: Questionnaire (Swahili Version)

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES(MUHAS)

Proportion of HIV status identification and associated factors among HIV exposed children in Lindi Tanzania.

SEHEMU A: SOCIAL DEMOGRAPHIC FACTORS:

1. Umri wa mama wa motto huyu…….
2. Hali ya ndoa ya mama wa motto huyu.
    i. Ameolewa
    ii. Hajaolewa
    iii. Ameachika
    iv. Amefiwa na mwenzi
3. Ngazi ya elimu ya mama wa mtotoh uyu
    i. Hajapata elimu rasmi kabisa
    ii. Elimu ya msingi
    iii. Elimu ya sekondari
    iv. Chuo Taja (……
    v. Chuo kikuu……..
4. Familia ya mama wa motto huyu ina wana familia wangapi ……..?
5. Mama wa motto huyu amejifungua mara ngapi.
    i. Amejifungua mara moja
    ii. Mara mbili au zaidi

6. Kaziya mama wa motto huyu ……..
    i. Ameajiliwa rasmi
    ii. Hajaajiriwa
    iii. Kazi nyengine(Taja)……..
7. Kuna umbali gani kutoka unapoishi mpaka kwenye kituo afya ……(kwa km)

SEHEMU B:

8. Ni lini mama wa motto huyu alijitambua kuwa anaishi na maambukizi ya VVU?
    i. Kabla ya ujauzito wa motto huyu
    ii. Wakati wa ujauzito wa motto huyu
    iii. Baada ya ujauzito wa motto huyu
    iv. Sijui
9. Je mama wa motto huyu amejiunga na kituo cha huduma na matunzo (CTC)?
    i. Ndio, Andika namba ya CTC……..
    ii. Hapana
10. Je mama wa motto huyu alipata huduma ya dawa za kufubaza (ART) kwa mara ya kwanza lini?
    i. Kabla ya ujauzito ……
    ii. Wakati wa ujauzito……
    iii. Katika wadi ya kujifungua au kiliniki ya huduma baada ya kujifungua

11. Mama wa motto huyu alimueleza nani hali yake ya maambukizi ya VVU.
    i. Mume/mwenzi
    ii. Mama/ Ndugu
    iii. Hakuna uliyemueleza
12. Ni kundi la aina gani la watu wanaoishi na maambukizi mama wa mtoto huyu alilojiunga nalo?
    i. Kundi la watu wanaoishina VVU lenye mchanganyiko wa wateja wa CTC na RCH.
    ii. Kundi la wamama wajawazito nawanyonyeshaji tu
    iii. Hujajiunga na kundi lolote
13. Ni mara ngapi mama wa motto huyu alihudhuria kiliniki ya mama na motto alipokuwa mjamzito kabla ya kujifungua ……?

Andika idadi ya mahudhurio yaliyoandikwa kwenye kadi ya RCH ya mama kama ipo …

14. Tarehe aliyojifungua ……/Umri wa motto wa sasa……
15. Alipojifungua
    i. Nyumbani
    ii. Hospitali
    iii. Kituo cha afya
    iv. Zahanati
16. Jinsi ya mtoto
    i. Mume
    ii. Mke

17. Je mama wa mtotohuyualikuwaakihamakutokasehemualiyokuwaakipatahudumaya ANC mpaka nyingine ndani au nje ya mkoa?

    i. Ndio

    ii. Hapana

18. Nini ili kuwasababu ya kuhama?

    i. Kilimo

    ii. Elimu

    iii. Msaada wa baada ya kujifungua

    iv. Sababu nyenginezo Taja …….?

19. Umewahi kusikia uwepo wa huduma ya kupima hali ya VVU ya motto aliyezaliwa na mama anayeishina VVU?

    i. Ndio Kama ndio endelea na swali 20

    ii. Kama hapana endelea na swali 22

20. Ni lini ulisikia huduma ya upimaji VVU kwa Watoto waliozaliwa na mama wanaoishi na VVU?

    i. Kabla ya ujauzito

    ii. Wakati wakujifungua.

    iii. Baada ya kujifungua

21. Wapi kwa mara ya kwanza ulisikia huduma ya upimaji VVU kwa Watoto waliozaliwa na mama wanaoishi na VVU?

    iv. TV/redio

    v. Kipeperushi/g a z e t i

    vi. Mtoa huduma kituoni

22. Je motto wako amepata huduma ya upimajiwa VVU?

i. Ndio, endeleaswali23

ii. Hapana, endelea swali25.

23. Tarehe motto alipopima VVU ……Umri wakati wa kupimaVVU ……

24. Kitu gani kilikufanya umpime VVU mwanao?

i. Ushauriwa watoa huduma.

ii. Shauku ya kujua majibu ya VVU ya mwanao.

iii. Sababu nyengine (Taja)…….

25. Kitugani kilikupelekea kutompima mwanao VVU?

i. Hofu ya kujua majibu

ii. Ulikuwa hujui kuhusu kipimo hiki

iii. Sababu nyengine (Taja)…….

26. Ni mara ngapi umekuwa ukimpeleka motto wako kwenye kituo cha huduma ya mama na mtoto (RCH)?

i. Kila mwezi

ii. Kila baada ya miezi miwili

iii. Idadi nyengine (taja)

iv. Hakuna

27. Ni mara ngapi umekuwa ukimpeleka motto wako kwa ajili ya huduma za utambuzi wa mapema wa VVU kwa motto na matibabu (EID services)?

i. Kila mwezi

ii. Kila baada ya miezi miwili

iii. Idadi nyengine (taja)

iv. Hakuna

28. Je unahitaji kuomba ruhusa kwa mumeo/mwenzi ili uweze kumleta motto kiliniki kwa ajili ya huduma ya ufuatiliaji hali yake?

i. Ndio

ii. Hapana

29. Je ulipata majibu ya mwanao ya kipimo cha VVU?

i. Ndio, endelea na swali 30.

ii. Hapana endelea na swali 31.

30. Majibu ya VVU ya mwanao yalikuwaje?

i. Chanya

ii. Hasi

iii. Sijui

31. Kwa nini hukupokea majibu ya mwanao ya kipimo cha VVU.?

i. Hofu ya majibu

ii. Majibu yalichelewa

iii. Umbali kutoka kituoni mpaka unapoishi

iv. Sababu nyengine (Taja)……

Appendix VII: Introduction letter from Muhimbili University of Health and Allied Sciences.

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES
OFFICE OF THE DIRECTOR OF POSTGRADUATE STUDIES

P.O. Box 65001
DAR ES SALAAM
TANZANIA
Web: www.muhas.ac.tz

Tel G/Line: +255-22-2150302/6 Ext. 1015
Direct Line: +255-22-2151378
Telefax: +255-22-2150465
E-mail: dpgs@muhas.ac.tz

Ref. No. HD/MUH/T.444/2015

15th March, 2019

Regional Administrative Secretary
Lindi Region
P.O. Box 1054
LINDI.

Re: INTRODUCTION LETTER

The bearer of this letter Dr. Karim Mohamed is a student at Muhimbili University of Health and Allied Sciences (MUHAS) pursuing MPH-Distance Learning.

As part of his studies he intends to do a study titled: ***"Early infant diagnosis and factors associated with its delay among HIV exposed children in Lindi Tanzania".***

The research has been approved by the Chairman of University Senate.

Kindly provide him the necessary assistance to facilitate the conduct of him research.

We thank you for your cooperation.

Ms. Sharifa Kamby
For: DIRECTOR, POSTGRADUATE STUDIES

cc: Dean, School of Public Health and Social Sciences, MUHAS

Appendix VIII: Introduction letter from Regional Government Authorities**.**

JAMHURI YA MUUNGANO WA TANZANIA
OFISI YA RAIS
TAWALA ZA MIKOA NA SERIKALI ZA MITAA

AnwaniyaSimu: REGCOM
SimuNambari: 023-220-2098
Fax Nambari: 023-220-2502
Unapojibutafadhalitaja:

OFISI YA MKUU WA MKOA,
S.L.P. 1054,
LINDI.

Kumb. Na. CA.52/194/01/53

19 Machi, 2019

Mkurugenzi wa Manispaa,
S.L.P. 1070,
LINDI.

Wakurugenzi Watendaji,
Halmashauri za Wilaya,
LINDI DC, NACHINGWEA, KILWA,
LIWALE NA RUANGWA.

YAH: **KUMTAMBULISHA DK. KARIM MOHAMED KUFANYA UTAFITI WA UTAMBUZI WA MAPEMA WA VVU KWA WATOTO WALIOZALIWA NA MAMA WANAOISHI NA VVU**

Tafadhali husika na somo tajwa hapo juu.

Dkt. Karim Mohamed ni mwanafunzi kutoka Chuo Kikuu cha Afya Muhimbili (MUHAS). Anakuja katika Halmashauri yako kufanya utafiti juu ya utambuzi wa mapema wa VVU kwa watoto waliozaliwa na mama wanaoishi na VVU na kutambua sababu zinazochangia kuchelewa utambuzi wa mapema.

Ni tumaini langu atapewa ushirikiano atakaouhitaji.

Nawatakia kazi njema.

Dkt. John Sijaona
Kny: KATIBU TAWALA MKOA
LINDI

KATIBU TAWALA MKOA
LINDI