

Uptake of early infant diagnosis (EID) at six weeks after cessation of breastfeeding among HIV exposed children: A cross sectional survey at six high volume health facilities in Iringa, Tanzania

Sophia Samson^{1,2,&}, Rose N. Mpembeni¹, Prosper F. Njau³, Rogati S. Kishimba^{2,3}

¹Muhimbili University of Health and Allied Sciences, Tanzania, ²Tanzania Field Epidemiology and Laboratory Training Program, Tanzania, ³Tanzania Ministry of Health and Community Development

Abstract

Introduction: Approximately 6% of the deaths among children aged below five years in Tanzania is attributed to HIV/AIDS. Most of these deaths could be prevented if these children were identified, diagnosed and initiated on HIV treatment early. Despite the risk of acquiring HIV infection during the breastfeeding period, the uptake of Early Infant Diagnosis (EID) among HIV Exposed Infants (HEI), six weeks after cessation of breast feeding has received less attention in Tanzania. We assessed factors associated with uptake of EID among HIV Exposed Infants (HEI) in Tanzania. **Methods:** A facility based cross-sectional study was conducted in Iringa region from December 2015 to February 2016. HIV exposed children aged between 13.5 and 18 months were recruited for the study. Mothers and caregivers were interviewed using pretested structured questionnaires. Logistic regression analysis was used to assess factors influencing uptake of the test while controlling for potential confounders. **Results:** We recruited 387 HIV exposed children. Only 34.6% (95% CI: 29.9%-39.6%) had received the HIV test. Having adequate knowledge on PMTCT [(aOR) = 5.1 (95% CI (2.26-11.64)), living in urban areas [(aOR)=4.1 (95% CI: 1.57-10.53)], awareness of the test before pregnancy [(aOR)=4.5 (95% CI: 1.50-13.69)] or during pregnancy [(aOR)=4.3 (95% CI: 1.63-12.26)], and being attached to psychosocial support groups [(aOR)=2.6 (95% CI: 1.06-6.20)] were significantly associated with uptake of the test. Health-system related factors, unavailability of the test kits, and client related factor, long distance from home to facility and transport costs were common reasons for non-uptake. **Conclusion:** Uptake of the early infant diagnosis after breastfeeding cessation was found to be low. Socio-demographic factors including knowledge, awareness and place of residence were mostly associated with high uptake rate while low health system readiness was among the hindering factors. Tanzania PMTCT program needs to scale up early infant diagnosis services in rural areas, strengthen formation of psychosocial supportive groups and ensure availability of test kits in health facilities.

*CORRESPONDING AUTHOR

Sophia Samson, Tanzania Field Epidemiology and Laboratory Training Programs, Tanzania. Email: sophiasamson71@yahoo.com

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Introduction

Globally, it is estimated that by 2015 there were about 36.7 million people living with HIV [1]. Among these, 2.1 million were children under the age of 15 years. Sub-Saharan Africa carried the highest burden of about ninety percent [2]. In Tanzania, it is estimated that, 1.35 million people are infected with HIV [1]. The disease is the fourth killer accounting for 6% of deaths among children under-five years old after pneumonia, malaria, and diarrheal illnesses in the country [3].

Studies have shown that mother-to-child transmission of HIV is the most common route for HIV infection among HIV exposed children, and breastfeeding carries the highest risk compared to any other route. Available data suggests that if HIV exposed children are followed, identified, diagnosed and linked to care, their quality of life is improved, averting these preventable deaths during childhood [2,4,5].

The Tanzania Ministry of Health recommends HIV positive mothers to breastfeed their babies exclusively for the first six months of life and then introduce complimentary foods while continuing to breastfeed up to 12 months of age. When the infant is 12 months old, breastfeeding must be stopped completely within one week (rapid cessation of breastfeeding) and then six weeks later the child must be tested for HIV [1]. There are different strategies recommended by National Guidelines on Management of HIV in Tanzania to ensure that children who become HIV positive are initiated onto treatment early. Among these strategies has been changing the eligibility criteria for Anti-retrovirus Therapy (ART) in which all children aged below 24 months and confirmed to be HIV positive regardless of WHO paediatric staging and CD4 counts, must be initiated on ART immediately [1]. Despite these efforts, the country still lags behind in following up these children for early infant diagnosis and through the cascade of HIV care. Because most of the post delivery HIV transmission that occurs among children happens during breastfeeding, more attention has been given when a child is below two months old for the first DNA PCR test and less attention when breastfeeding is ceased after one year. Without more effort to ensure children who breastfeed from their HIV infected mothers are followed up and identified, many deaths will occur unknowingly.

Previous studies have mentioned maternal age, knowledge on prevention of mother to child of transmission of HIV (PMTCT) and early infant diagnosis (EID) among mothers and caregivers, turnaround time of dried blood Spot (DBS) results, fear of discrimination, poor adherence to ART, time mother got diagnosed as HIV positive, waiting times at the clinic, opposition from partner, distance from health facility, fear of stigma and test kits stock outs as the factors associated with uptake of early infant diagnosis [6–11]. Most of these studies assessed the uptake and associated factors when the child was below two months old. However, less has been written on follow up of these children on uptake of the test when the breastfeeding period is ceased. We assessed the uptake of the HIV test and associated factors among HIV exposed children six weeks after cessation of breastfeeding. The findings may inform the PMTCT program and implementing partners on interventions needed to improve the uptake of the HIV test among HIV exposed children who have ceased breastfeeding.

Methods

Study design

We conducted a cross sectional survey in six health facilities in Iringa region from December 2015 through February 2016.

Study area Iringa region is located in the southern highlands of Tanzania. The region is among the five major food producers in the country. It lies between latitudes 7' and 9' south of the equator and between longitudes 32' and 35' east of Greenwich Meridian. Iringa region borders Dodoma region in the north, Morogoro region to the east, Njombe region to the south and Mbeya region to the west. Iringa region lies at an altitude of 475 meters above sea level. The region covers an area of 35503Km². The region has a population of approximately 941,238 as projected from the 2012 population census. Seven per cent of Tanzanian adults aged 15-49 years are living with HIV and Iringa region has a prevalence rate of 13%.

Study population

We recruited all HIV exposed children aged between 13.5 and 18 months from the selected health facilities who had ceased breastfeeding and whose mothers were enrolled for PMTCT services. Children whose

mothers or caregivers were severely sick or with impaired verbal communication were excluded.

Sample size determination: The study targeted every eligible HIV exposed infant 13.5 to 18 months of age at the selected 6 health facilities. So it was a 100% survey

Sampling technique: The study was restricted to only high volume health facilities. We defined a high volume facility as a site with >25 HIV exposed children with age between 13.5 to 18 months.

Six high volume facilities were sampled from the total of 24 facilities to reflect geographical representativeness of all the regions in the study area (Table 1). We intended to reach out to all the eligible infants in the six high volume facilities. Therefore our survey targeted 414 HIV-exposed infants. However 27 HIV-exposed infants were excluded because their caretakers were unable to participate in the interviews.

Data collection procedures: We interviewed consented mothers and caregivers of sampled HIV exposed children using semi-structured questionnaires. We verified information on uptake of the test in the mother and child follow up registers and HIV Exposed Infant cards. We utilised clients' mobile contact numbers, home based care volunteers and mobile clinics to track children who were not found at facility level.

Variables and measurement: In our study, the dependent variable was uptake status of the test while the independent variables were level of education, occupation, maternal age, marital status, attendance to EID clinic, time to reach clinic, knowledge on PMTCT and EID, area of residence, time mother got diagnosed, disclosure status, being attached to psychosocial support groups and awareness of the test.

Data management and analysis: Data were entered and cleaned using Epi Info software version 3.5.1 and analysed using STATA software version 12. Categorical variables were summarised using frequency distributions while continuous variables were summarised using measures of central tendency and dispersion. The association between the dependent variable and independent variables was assessed using Chi-squared or Fisher exact test

where appropriate. A P-value < 0.05 was considered statistically significant. All predictors with p-value \leq 0.2 at bivariate analysis were included in multiple logistic regression model to identify factors associated with the EID uptake while controlling for potential confounders. We used *svy* STATA command to adjust for cluster effect at health facility level.

Analysis of the level of knowledge

We gave all knowledge assessment questions equal weight (i.e. a correct answer was given 1 mark and a wrong answer was given 0). We summed up scores to get a total score. The highest score was 32 while the lowest score was 0. The scores were allocated on a scale of 0-21 and 22-32 based on the two-thirds rule whereby respondents who scored equal or greater to two-thirds of the scores were regarded as having adequate knowledge while those that scored less were considered as having inadequate knowledge [14].

Ethical consideration

We obtained ethical clearance from Muhimbili University of Health and Allied Sciences Institutional Review Board (Ref. No. MU/PGS/SAEC/vol.XIV/). We obtained permission to conduct the study from the Iringa Regional Administrative Secretary office. We did not include participants' names and identifiers in the data collection tool for confidentiality purposes. Mothers and caregivers were interviewed for this study only after they had provided written informed consent.

Results

A total of 387 HIV exposed children with ages ranging from 13.5 to 18 months were recruited into the study. The median age of the study participants was 16 months (range 13.5-18 months). About half 51.9% (201/387) of them were females. The majority 97.2% (376/387) of HIV exposed children were born in health facilities (Table 2).

The majority 86% (333/387) of the mothers and caregivers had primary level of education and below. Over two-thirds 70.3% (272/387) were unemployed. Nearly half 49.4% (191/387) were aged between 21-

30 years. About seventy one percent resided in rural areas (274/387) (Table 3).

The uptake of HIV testing (2nd PCR) at 6 weeks after cessation of breastfeeding was found to be 34.6% (95% CI: 29.9 – 39.6). The median age at testing was 14 months (range 13.5-18 months). The highest uptake 79.4% (95% CI: 73.1 – 85.3) was observed at Nzihi health centre while the lowest 8.6% (95% CI: 3.5 – 14.1) at Usokami health centre (Figure 1).

Less than half 179 (46.3%, 95% CI: 41.2 -51.4) of the mothers and caregivers had adequate knowledge on prevention of mother to child transmission of HIV and early infant diagnosis. The mean score was 21 (SD= 7). The majority 243 (87%, 95% CI: 82.1-91.4) knew that exclusive breastfeeding reduced the risk of HIV to an HIV exposed child while forty percent 113 (40.4%, 95% CI: 37.4-46.9) knew that use of condom prevented mother to child transmission of HIV. Less than one-third 115 (29.7%, 95% CI: 23.5- 32.6) knew that high maternal viral load contributed to mother to child transmission of HIV. Only a quarter 107 (27.6%, 95% CI: 20.5 - 32.9) of the respondents knew that the child had to receive a test at six weeks after complete cessation of breastfeeding.

Results from the multivariable model indicated that mothers or caregivers who had adequate knowledge on PMTCT and EID had five times the odds of bringing their children for the test compared to those with inadequate knowledge (aOR=5.1, 95% CI: 2.26-11.64). The Odds of Infant HIV testing at 6 weeks after cessation of breastfeeding were 5 times among infants whose mothers/caretakers had heard about the test before pregnancy compared to infants whose mothers heard about the test after delivery (aOR=4.5, 95% CI: 1.50-13.69). The Odds of Infant HIV testing at 6 weeks after cessation of breastfeeding were 4 times in infants whose mothers/caretakers resided in urban areas compared to their counterparts whose mothers/caretakers resided in rural areas (aOR=4.1, 95% CI: 1.57-10.53). The Odds of Infant HIV testing at 6 weeks after breastfeeding were 3 times among infants whose mothers/caretakers were attached to psychosocial support groups compared to infants whose mothers were not attached to any support, (aOR=2.6, 95% CI: 1.06-6.20) (Table 4).

The most common reasons for non-uptake of the test mentioned by respondents were unavailability of test

kits at health facilities 59 (23%, 95% CI: 19.7 - 25.1), long distance from home to clinic 58 (22.9%, 95% CI: 20.3 - 25.4) and high transport costs 56 (22.1%, 95% CI: 19.1 - 24.0). The least common reasons were long waiting times at the clinic 11 (4.3%, 95% CI: 2.4 - 6.2), no need for testing after breastfeeding cessation 6 (2.4%, 95% CI: 0.7 - 3.2), and forgetting the date of testing 5 (2%, 95% CI: 0.9-3.6) (Figure 2).

Discussion

We found that only a third of HIV exposed children were diagnosed early, a figure that was lower than the national target of 90%. Less than half of the mothers and caregivers had adequate knowledge on PMTCT. Having adequate knowledge on PMTCT, being aware about the test before pregnancy or during pregnancy, being attached to psychosocial groups and living in urban areas were independent predictors to the uptake. The EID uptake rate in Iringa concurred with findings obtained in Ethiopia but differed with what was found in other part of the country and in Malawi [13,15]. The findings found in Iringa may be due to lack of important commodities for performing the test as evidenced by test kits stock-outs which was also among the common reason for non-uptake mentioned by respondents.

In our study, less than half of the mothers and caregivers of HIV exposed children had adequate knowledge on PMTCT, these findings are similar to those found in other studies conducted in Tanzania, Botswana and Kenya but higher than those found in Burkina Faso and northwest Ethiopia [16–20]. Mothers or caregivers who had adequate knowledge on PMTCT issues were five times more likely to bring their children for the test compared to those who had inadequate knowledge. These findings are similar with those found in a study conducted in South Africa and Kenya whereby high maternal knowledge was associated with EID uptake [16,21]. Having adequate knowledge goes together with comprehensive attendance to EID clinic. However it was not established if mothers and caregivers in our study learnt about PMTCT at the clinic or from other sources. Inequality in accessing information may also differ by residence with individuals living in rural areas being less likely to take up the test compared to their urban peers which could explain the difference in the uptake rates observed.

We also found that, mothers who had heard about the test before or during pregnancy had higher odds of sending their children for the test compared to those who heard about the test after delivery. These findings concurred with those found in Kenya, where being informed about the test by health care providers during pregnancy was more likely to be associated with on-time testing [22].

Mothers or caregivers who resided in urban areas were four times more likely to send their children for the test compared to their counterparts who resided in rural areas. These findings concurred with those found in Brazil whereby children whose mothers or caregivers lived in rural and remote areas, were more likely to be lost to follow up from care compared to those who lived in urban areas. This may be due to the fact that in urban areas there is availability of equipment, supplies and skilled health care providers compared to the rural areas. In our study, mothers or caregivers who were attached to psychosocial support groups were more prompt to send their children for tests compared to those who were not attached. These findings concurred to those found in Kenya [16]. This may be due to the fact that when these mothers meet, they discuss together on different issues regarding PMTCT as well as EID services and how can they succeed in getting an HIV free generation. Mothers of HIV exposed children become confident when they interact together and pull those who are lagging behind back on track. Our study had wide confidence intervals which could have been caused by a small sample size.

Study limitations

Our study regarded an HIV exposed child as one who received the test if it was documented in either; the mother and child follow up register, HIV exposed infant card or the routine child health clinic card. This may have led to missing of those children who were tested but the test was not documented in any of the records.

Conclusion

Uptake of recommended HIV testing (2nd PCR) at 6 weeks after cessation of breastfeeding among HIV exposed children found in this study is low. Mother or caretaker factors that were found to be

significantly associated with uptake of HIV testing (2nd PCR) at 6 weeks after cessation of breastfeeding among HIV exposed infants included; having heard about the test before pregnancy, residing in an urban setting, and being attached to a psychosocial group. Non availability of the test kits, long distances to the health facilities, and high cost of transport were mentioned as factors preventing mothers/caretakers from taking their HIV exposed infants for HIV testing at 6 weeks after cessation of breastfeeding. We recommend that, Tanzania PMTCT programme in collaboration with implementing partners in Iringa region, scale up EID services in rural areas, ensure availability of test kits in health facilities, increase awareness and understanding of PMTCT and EID services.

Competing interests

The authors declare no competing interest.

Tables and figures

Table 1: Allocation of sample size in each health facility

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Table 3: Socio-demographic characteristics of the mothers and caregivers of HIV exposed children in Iringa, December 2015 – February 2016, (n=387)

Table 4: Factors associated with the Uptake of the test among HIV exposed children in Iringa, December 2015 – February 2016 (N=387)

Figure 1: Distribution of the uptake of Early Infant Diagnosis test by a facility in Iringa, December 2015 – February 2016 (N = 387)

Figure 2: Reasons for non-uptake of the test among HIV exposed children, (n=253)

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Facility name	Total number of HIV exposed children who met inclusion criteria (sampling frame)	Sample drawn
Ilula	99	93
Mafinga	93	86
Usokami	86	81
Ipogolo	75	70
Nzihi	36	34
Usokami	25	23
Total	414	387

Characteristic	Frequency (n)	Percentage (%)
Distribution of HIV exposed children by health facility		
Ilula hospital	93	24.0
Mafinga hospital	86	22.2
Usokami Health Centre	81	20.9
Ipogolo Health Centre	70	18.1
Nzihi Health Centre	34	8.8
Iringa Referral Hospital	23	5.9
Sex		
Male	186	48.1
Female	201	51.9
Place of delivery		
At health facility	376	97.2
At home	11	2.8
Mode of feeding before age of six months		
Exclusively breastfeeding	233	60.2
Mixed feeding	154	39.8
Age of the child (months)		
13-14	79	20.4
15-16	144	37.2
17-18	164	42.4
Median age of the child	16(13.5-18)	

Table 3: Socio-demographic characteristics of the mothers and caregivers of HIV exposed children in Iringa, December 2015 – February 2016, (n=387)

Characteristic	Frequency(n)	Percentage (%)	95% CI
Education level			
Primary & below	333	86.0	82.2-89.3
Secondary & above	54	14.0	10.7-17.9
Occupation			
Employed	115	29.7	25.3-34.6
Unemployed	272	70.3	65.4-74.7
Marital status			
Single	82	21.2	17.3-25.7
Married/Cohabiting	275	71.1	66.2-75.5
Divorced/Separated/Widowed	30	7.8	5.4-11.0
Relationship with HIV exposed child			
Biological mother	380	98.0	94.6-99.8
Biological father	2	0.5	0.1-0.8
Guardian	5	1.3	0.8-1.6
Mothers or caregivers age			
<20yrs	18	4.7	2.7-7.4
21-30yrs	191	49.4	44.3-54.4
31yrs+	178	46.0	41.0-51.1
Attendance to EID clinic			
Every month	270	69.8	64.9-74.3
After two months & above	117	30.2	25.7-35.1
Time to reach EID clinic(minutes)			
≤30	181	46.8	41.4-51.6
31-60	64	16.5	13.1-20.8
61+	142	36.7	32.1-41.9
Area of residence			
Rural	274	70.8	66.0-75.2
Urban	113	29.2	24.8-34.0

Table 4: Factors associated with the Uptake of the test among HIV exposed children in Iringa, December 2015 – February 2016 (N=387)

Factors	Crude OR(95%CI)	Adjusted OR(95%CI)
Area of residence		
Urban	6.0(3.73-9.67)	4.1(1.57-10.53) *
Rural	Ref	Ref
Education level of caregiver		
Primary/No formal education	Ref	Ref
Secondary and above	2.5(1.41-4.51)	1.3(0.68-2.54)*
Place of delivery		
At health facility	0.9(0.27-3.22)	
At home	Ref	
Disclosure status to husband		
Yes	1.1(0.65-1.77)	
No	Ref	
Attached to psychosocial support groups		
Yes	5.1(3.10 -8.50)	2.6(1.06-6.20) *
No	Ref	Ref
Heard about the test		
Yes	3.0(1.93-4.63)	1.5(0.68-3.41)
No	Ref	Ref
Time heard about the test		
Before pregnancy	2.0(0.87-4.11)	4.5(1.50-13.69)*
During pregnancy	2.4(1.18-4.11)	4.3(1.63-11.26)*
After delivery	Ref	Ref
Attendance to EID clinic		
Every month	1.8(1.12-2.94)	0.9(0.31-2.48)
After every two months & above	Ref	Ref
Time mother got diagnosed HIV positive		
Before pregnancy	2.6(0.85-8.16)	0.3(0.02-4.43)
During pregnancy	1.7(0.55-5.44)	0.2(0.01-3.59)
After delivery	Ref	Ref
Occupation status		
Employed/Business	3.4(2.17-5.40)	2.5(0.93-6.75)
Housewife/Peasant	Ref	Ref
Marital status		
Married/cohabiting	1.4(0.82-2.44)	2(0.70-6.27)
Divorced/Separated/Widowed	2.1(0.82-4.67)	2(0.25-16.73)
Single	Ref	Ref
Age of the mother/ caregiver		
≤20yrs	Ref	Ref
21-30yrs	0.8(0.29-2.26)	0.2(0.01-4.03)
31+yrs	1.4(0.50-3.90)	0.3(0.02-4.45)
Time to reach clinic		
<30minutes	8.0(4.55-14.10)	2.7(0.93-8.06)
31-60minutes	2.0(0.93-4.20)	0.7(0.17-2.84)
61+minutes	Ref	Ref
Level of knowledge on PMTCT		
Adequate knowledge	5.5(3.45-8.67)	5.1(2.26-11.64)*
Inadequate knowledge	Ref	Ref

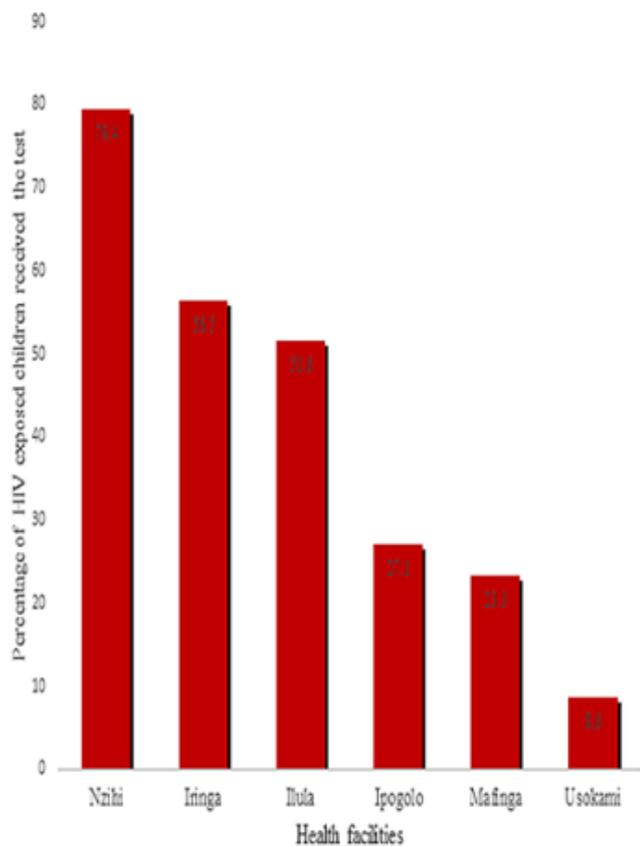


Figure 1: Distribution of the uptake of Early Infant Diagnosis test by a facility in Iringa, December 2015 – February 2016 (N = 387)



Figure 2: Reasons for non-uptake of the test among HIV exposed children, (n=253)

