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Utilization of Human Immunodeficiency Virus (HIV) Diagnosis and Its Associated Factors among Exposed Infants Attending Sigowet Sub-County Hospital, Kericho County

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Received: 10 November | Accepted: 16 November 2020 | published 17 November 2020

Abstract:

Background: Human immunodeficiency virus (HIV) infection in children continues to occur globally. Early and periodical diagnosis is critical particularly in Sub-Saharan Countries. Forty three percent of Kenyan infants born to HIV infected mothers die before celebrating their second birth days. **Objective:** To assess the extent and factors influencing utilization of HIV diagnosis among exposed infants attending Sigowet Sub- County Hospital, Kericho County. **Design:** A cross-sectional study **Setting:** Sigowet Sub-County Hospital, Kericho County, Kenya. **Subjects/Participants:** One hundred and ninety nine HIV-positive mother-baby pairs attended to at the Hospital between January and March 2019. **Results:** Majority 198(99.50%) of the recruited participants were mothers of which 93(46.73%) aged between 18-26 years whereby nearly all infants were exposed to HIV infection .Study showed that 76(38.19) mothers had low education level while 107(53.77%) mothers had no formal employment. Study showed that 76(38.29%) mothers had secondary level of education while 107(53.77%) reported high rate of unemployment whereas a greater proportion 194(97.49%) mothers were exclusively breastfeeding for 6 months and 104(52.26%) mothers had never heard of HIV testing of infants. Study also showed that 107(53.77%) mothers only knew they were HIV positive during pregnancy while 44(22.11%) mothers did not disclose their HIV status to their husbands. However, 199(100.0%) mothers enrolled to care whereas 192(96.48%) mothers were not attached to any social group of People Living with HIV/AIDS (PLWHA). Correlation test of the individuals indicated that there was a positive correlation relationship of next of kin to HEI and age of mother, Level of education , marital status and number of children mother's had($P=0.02$, $P=0.04$, $P=0.02$ and $P=0.01$). There was a significant correlation between age of the mother and number of children ($P=0.58$ and $P=0.92$). There was a positive correlation between Mode of infant feeding to Level of education of the mother while a positive correlation between occupation of the mother and number of children ($P=0.04$, $P=0.02$ and $P=0.18$). However, there was a correlation in time of the mother's awareness to her HIV status to the time of HIV status disclosure whereas a correlation between disclosure and attachment to social group of People Living with HIV/AIDS ($P=0.03$, $P=0.01$ and $P=0.02$).

Conclusion: Timely HIV testing was low, Improving maternal knowledge of EID during ANC and PMTCT visits and positive living empowerment is a key to Infant HIV diagnosis.

Introduction:

The plans towards elimination of HIV infections among children globally by 2015 and keeping their mothers alive initiative has had a substantial impact, leading to a 60% reduction in pediatric HIV infections

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in 21 high-burden countries in Sub-Saharan Africa. Nevertheless, the burden of HIV infections in children remains significant (UNAIDS, 2017). In 2017, there were 180 000 new infections in children globally, and 70% of these children were in the same 21 priority countries. Despite the overall decrease in mother-to-child transmission (MTCT) of HIV, new pediatric infections continue to occur and transmission dynamics have now shifted towards a proportional increase in transmission during the postnatal period (UNAIDS, 2017). Roughly, half of all new infections among children five years and below occurs during breastfeeding. Although countries continue to make progress, challenges remain in retaining HIV infections in women in health care services and on effective ART throughout pregnancy and breastfeeding. This shift in transmission dynamics has raised issues concerning optimal testing in all infants, with the identification of HIV-exposed and HIV-infected children continuing to present a significant bottleneck in several settings. Mother- to- Child transmission of HIV (MTCT) is accounting for about 90% of HIV infection in infants and young children. It has been reported that over 370, 000 infants acquire HIV infections globally each year within an approximately over 1000 children acquiring HIV everyday (UNAIDS, 2010). HIV Infections in infants and young children occurs during pregnancy, labor and delivery and postnatal through breast feeding. In breast feeding populations 15.4% of infants born to HIV infected mothers acquiring HIV infection without any intervention (WHO, 2015). Furthermore, although pediatric ART coverage has notably improved since 2010, only 51% of the estimated 1.8 million children living with HIV were receiving ART by the end of 2017 (UNAIDS, 2017). HIV-infected infants and young children have an exceptionally high mortality without treatment, approximately 30% by the first year and 50% by their second year of life. In Kenya, it is estimated that 1.4 Million people are living with HIV/AIDS of which 730,000 are women and 160,000 are children below 15 years (UNAIDS, 2010). In Kericho County, HIV related childhood mortality is still high despite of availability of antiretroviral therapy (ART) (Cook et al., 2011). HIV infected infants and young children have increased risk of death due to rapid progression of disease (Nuwagaba et al., 2010). It is estimated that up to 30% of ultimate HIV infected children die before 2 years of age implying the urgent need for identifying and enrolling them into care and treatment program. Infant Diagnosis of HIV has become a new priority for the US President Emergency plan for AIDS relief (PEPFAR) since 2009. Sigowet is among the resource constrained Sub-Counties that implemented infant diagnosis of HIV through PEPFAR support. The program started in 2006 as a pilot phase, scaled up to involve the entire county in 2007. HIV exposed infants (HEI) receive testing when presented to immunization clinic at 4-6 weeks or thereafter till 18 months of age. The system of sample and result transportation is through public transport, expedited mail service (EMS) depending on the availability of these services. This has also been practical in many resource poor setting sub-counties of Kericho through a chain of interaction between lower Health facilities, districts and specialized zonal PCR laboratory (Ciaranello et al., 2012).

Materials and Methods:

Study Design: This was a cross-sectional study using mixed methodology design conducted in Sigowet Sub-County Hospital between January 2019 and March 2019.

Study site: Sigowet Sub-County Hospital is a government health -facility located in Sigowet Sub-Location, Kebedeti Location, Sigowet Division, Belgut Constituency in Kericho County. The hospital has a range of services such as: general outpatient department, curative inpatient services, family planning, preventive services, voluntary testing and counseling, antiretroviral therapy among others.

Study population: 199 HIV-exposed infants and children aged between 6 weeks, 18 months and 5years born live to HIV-infected mothers enrolled to HIV care in Sigowet Sub-County Hospital.

Selection criteria:

Inclusion criteria: All HIV-exposed infants who are 18 months of age and above and their mothers tested or known HIV positive.

Exclusion Criteria: Infants who come in for a second HIV DNA- PCR test, older than 72 weeks of age, with no test results (including that of their respective mothers) registered in the HIV DNA- PCR register, and those whose mothers did not consent (orally).

Variables:

HIV status of the baby (positive or negative) was the main outcome variables. HIV status was determined using results from the 1st PCR and 2nd PCR tests as well as rapid HIV test at 18 months of age. The independent variables were categorized as maternal and infants factors. Maternal factors includes: Demographic factors, Enabling factors and Need factors. Infant factors included age of enrolment at baby care point and baby feeding options. Breastfeeding information will be available on the routine data collection tool.

Sampling procedure:

The study adopted a non-probability sampling technique where purposive sampling was employed to select respondents at a time until the total sample size was reached. Purposive sampling is a sampling technique that allows a researcher to use samples that have the required information with respect to the objectives of his or her study. Secondary data from these client's records was entered in a separate developed data-capturing form or questionnaire.

Sample size determination:

The sample size was determined by a standard formula used by Fisher et al., 1998.

$$n = \frac{Z^2 p(1 - p)}{d^2}$$

Where: 'n' = desired sample size (if the target population is >10,000)

'Z' = standard normal deviate at required confidence level usually set at 95% giving 'Z' statistical value of 1.96.

'n' = proportion of the study population estimated to have the characteristic being measured at 50% (0.5).

'q' = (1-P).

'd' = level of statistical significance, usually set at 0.05.

However, 'p' in the target population was 0.5, 'Z' statistic was 1.96 and 'd' was set at 0.05 significance level to allow for a larger sample size and therefore a greater degree of accuracy desired was achieved.

The sample size thus was determined as follows:

$$N = \frac{Z^2 P(1 - p)}{d^2}$$
$$N = \frac{1.96^2 \times 0.5 \times 0.5}{0.05^2}$$
$$N = \frac{1.96 \times 1.96 \times 0.5 \times 0.5}{0.5 \times 0.5}$$

$$N = 384$$

If the study population is less than 10,000, the required sample size will be smaller. In such cases, the final sample is estimated (nf) using the formula:

$$Nf = \frac{\frac{n}{1+n}}{N}$$

Where: 'nf' = final sample size of the population.

'n' = the desired sample size when the population is >10,000.

'N' = the estimated study population.

The population of under five years for the hospital calculated at 15.8% of the catchment population is 3,762 (KNBS, 2009). However, since the study is planned to take three months, 415, which is the number of under five years who attended the facility during study period were used as the estimated study population, Health Facility Monthly Reports.

Therefore, N will be <10,000.

$$Nf = \frac{384}{1 + \frac{384}{415}}$$

$$Nf = 199$$

Therefore, the study collected data from 199 respondents who are the caregivers of children under five years.

Data analysis: Data were entered into MS Excel and then exported to Statistical Package for Social Science (SPSS) version 20.0 for analysis. Descriptive statistics were used to analyze data which involved presenting results inform of tables and graphs.

Correlation between dependable variables was assessed using Pearson Regression correlation where P-value less than 0.05 were considered to be statistically significant in all cases.

Ethical considerations:

Authority was sought from the Board of Graduate School, Jaramogi Oginga Odinga University of Science and Technology through School of Health Sciences. Approval and clearance was given by the Ethics Review Board Committee of University of Jaramogi Oginga Odinga Science and Technology. Further, the Sigowet Sub-County Health Management Team authorized the study to be undertaken within the facility. Informed consent of participants was obtained before participating in the study. Standard care was given to participants regardless of whether they consented or declined to participate in the study and subjects were not exposed to any risk by participating or declining to participate in the study. The records were coded to eliminate names and other personal identification of respondents throughout the study process to ensure anonymity. Privacy and confidentiality were keenly observed and maintained. No incentives were given to the study subjects.

Results:

In total, 199 parents, or guardian of the HIV-exposed infants were recruited in the study from Sigowet Sub-county Hospital. Table 4.1 summarizes baseline characteristics of the parents or guardians of HIV exposed

infants identified in Sigowet Sub-county. Among all the study participants, 198 (99.50%) were mothers whereas 1 (0.50%) were guardians. This is displayed in figure 4.1.

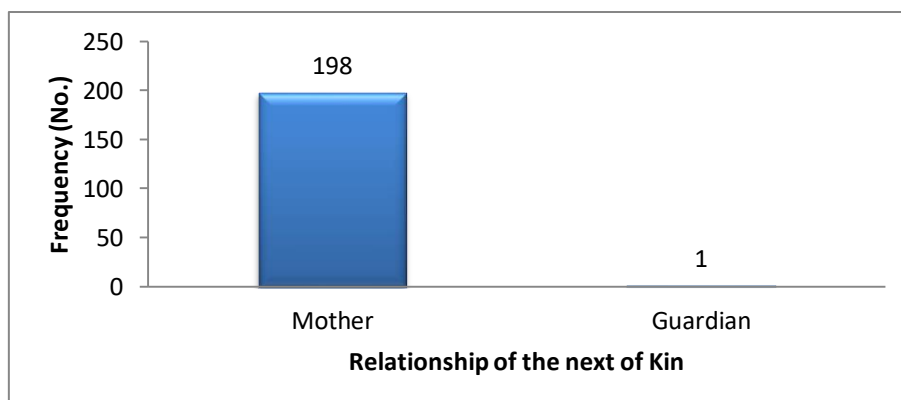


Figure 1: Relationship of the next of kin

Based on age groups, majority of the study participants 93 (46.73%) were aged between (18-26), 71 (35.68%) were aged (27-36) years while the rest 35 (17.59%) were aged (37-45) years as shown in figure 4.2.

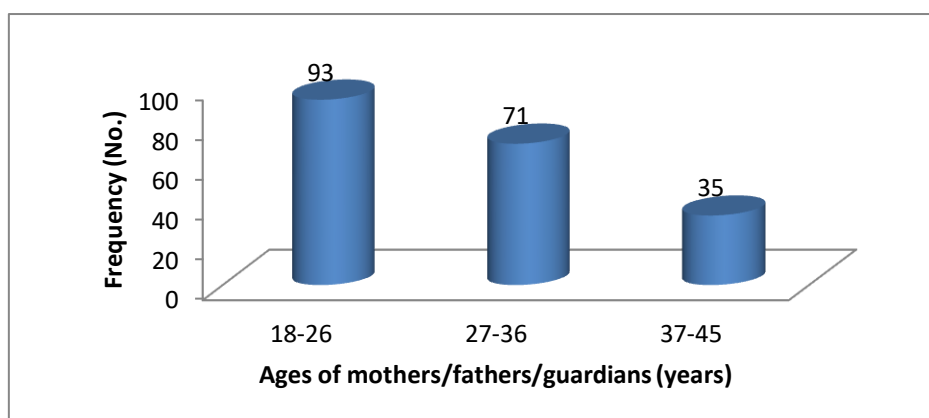
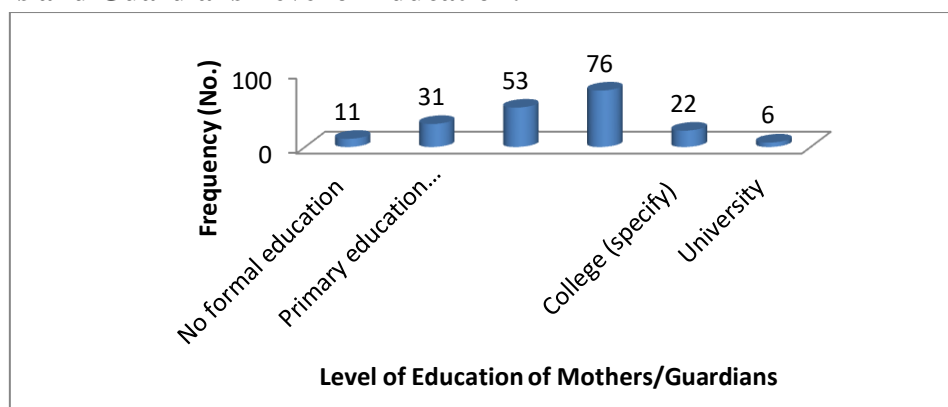


Figure 2: Mothers and Guardians Ages:

With regard to the level of education, the study findings showed that among the mothers and guardians of the infants diagnosed with HIV/AIDS, majority 76 (38.19%) had attained secondary education followed by 53 (26.63%) who had attained primary education. Furthermore, 31 (15.58%) had not completed primary education, 22 (11.06%) had college level of education, 11 (5.53%) had no formal education while the smallest proportion, 6 (3.02%) had university level of education, as displayed in figure 4.3.

Figure3: Mothers and Guardians Level of Education:



Based on the level of education of parents and guardians of infants diagnosed with HIV/AIDS, study findings showed that majority of the parents/guardians 107 (53.77%) were unemployed. Second to this were 62 (31.16%) parents/guardians who were self-employed while the rest, 30 (15.08%) parents, and guardians were in formal employment as is displayed in figure 4.4.

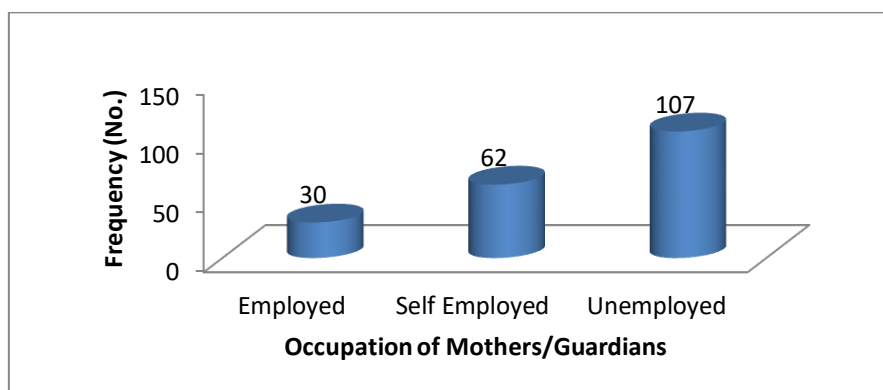


Figure 4: Parents and Guardians Occupation

Demographic baseline characteristics of the parents and guardians showed that among the study participants, majority 180 (90.45%) were married mothers, 18 (9.05%) were single mothers whereas 1 (0.50%) parents or guardians were cohabiting. This finding is shown in figure 5.

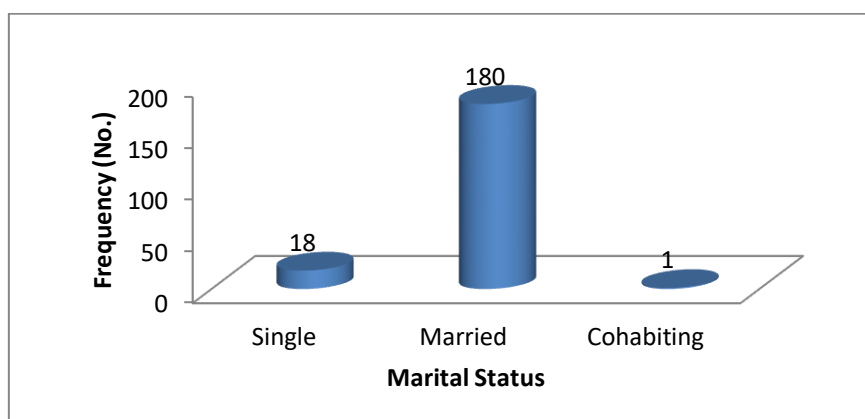


Figure 5: Parents or Guardians Marital Status

Last but not least, the study findings indicated that among the parents and guardians recruited in the study, a greater proportion, 158 (79.40%) had (1-4) children followed by 34 (17.09%) who had 5-8) children. However, the least proportion, 7 (3.52%) had 9-12) children as is displayed in figure 4.6.

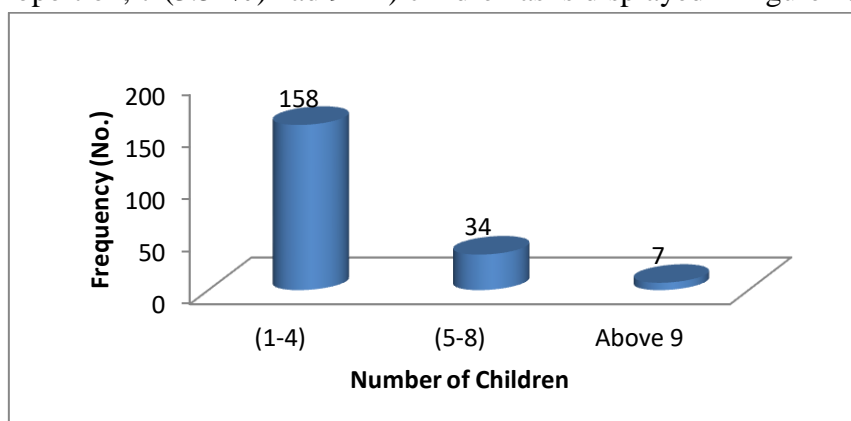


Figure 6: Number of Children

Based on the number of family members taken care of by the parents or guardians of the infants diagnosed with HIV/AIDS, findings indicated that majority, 130 (65.33%) had (4-6) family members, 36 (18.09%) had (7-9) family members, 21 (10.55%) had (1-3) family members, and 6 (3.02%) had (10-12) and (13-15) family members respectively, as it is shown in figure 4.7.

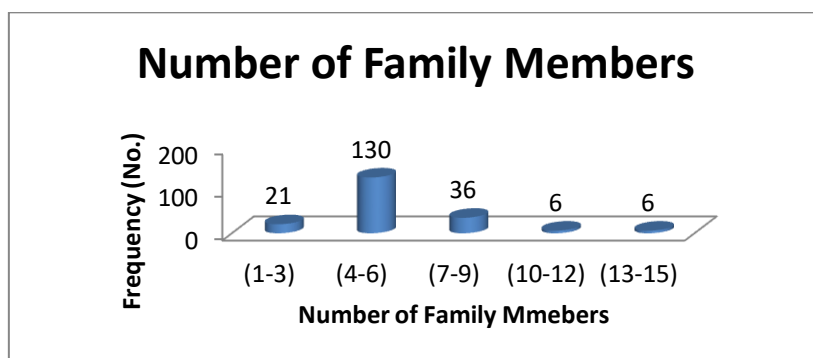


Figure 7: Number of Family Members

Table 1: Demographic Characteristics

Demographic Characteristics	Frequency	Percentage (%)
Relationship of Next of Kin		
Mother	198	99.50
Guardian	1	0.50
Age groups		
18-26	93	46.73
27-36	71	35.68
37-45	35	17.59
Level of Education of Mothers		
No formal education	11	5.53
Primary education not completed	31	15.58
Primary education completed	53	26.63
Secondary education	76	38.19
College (specify)	22	11.06
University	6	3.02
Occupation		
Employed	30	15.08
Self Employed	62	31.16
Unemployed	107	53.77
Marital Status		
Single	18	9.05
Married	180	90.45
Cohabiting	1	0.50
Number of Children		
(1-4)	158	79.40
(5-8)	34	17.09
(9-12)	7	3.52
Number of Family Members		
(1-3)	21	10.55
(4-6)	130	65.33
(7-9)	36	18.09
(10-12)	6	3.02
(13-15)	6	3.02

The first objective examined prevalence of HIV infection among exposed infants at 6 weeks, 18 months and 5 years in Sigowet Sub-county Hospital. Table 4.2 summarizes prevalence of HIV infection among exposed infants. The study determined that all the 199 parents/guardians took their babies for HIV test. Among the babies who received HIV test, majority 191 (95.98%) were HIV negative while the rest 8 (4.02%) were HIV positive. With regard to the reasons for not receiving HIV test results for the babies, majority 191 (95.98%) had no reason as to why they never received HIV test results for their babies. In addition, 7 (3.52%) indicated that fear was a factor that made them not to receive HIV test results for their babies while 1 (0.50%) cited long distance to the facility as a factor that deterred him/her obtain HIV test results for his/her baby. Lastly, it was determined that all the babies 199 (100.0%) whose parents/ guardians took for HIV test, were tested.

Table 2: Prevalence of HIV Infection among Exposed Infants

Parameters	Responses	Frequency	Percentage (%)
Received HIV test for the baby	Yes	199	100.00
	No	0	0.00
HIV result for the babies	Positive	8	4.02
	Negative	191	95.98
Reasons for not receiving HIV test results for babies	Fear	7	3.52
	Results delayed in previous visits	0	0.00
	Long distance to the facility	1	0.50
	None of the above	191	95.98
	Yes	199	100.00
Infants who received HIV testing	No	0	0.00

The second objective examined the enabling factors influencing the utilization of HIV diagnosis among exposed infants at 6 weeks, 18 months and 5 years in Sigowet Sub-county Hospital. The national government owns Sigowet Sub-county Hospital. Table 4.3 summarizes the enabling factors influencing the utilization of HIV diagnosis among exposed infants. Findings of the study showed that all the study participants, 199 (100.00%) cited that the distance from their residence to Sigowet Sub-County hospital was within 5 km. Secondly, 189 (94.97%) parents/guardians, cited that they only heard about infant HIV test from health facility staffs, 8 (4.02%) got the information from media (television and radio), while 2 (1.01%) got the information from magazines. With regard to the time when the parents and guardians about HIV testing for the infants, majority of the parents/guardians, 104 (52.26%) indicated that they first heard of this during delivery, 85 (42.71%) heard of HIV testing for infants before pregnancy whereas 10 (5.03%) heard about HIV testing infants from health facility staffs. All the parents/guardians who heard of HIV testing infants, 199 (100.00%) took their babies for HIV testing. Moreover, findings of the study showed that among the infants tested, 108 (54.27%) were male babies whereas 91 (45.73%) were female babies.

Table 3: Facility Enabling Factors Influencing the Utilization of HIV Diagnosis among Exposed Infants

Facility Related Factors	Responses	Frequency	Percent (%)
How far in kilometers from the health facility do you stay?	Within 5 km	199	100.00
	More than 5 km	0	0.00
Where did you get the information?	Television / radio (media)	8	4.02
	Magazine	2	1.01
	Health facility staff	189	94.97
When did you hear about HIV testing infants	Before Pregnancy	85	43
	During delivery	104	52
	Health Facility Staff	10	5
Did your infant receive HIV testing?	Yes	199	100
	No	0	0
Sex of the infant	Male	108	54.27
	Female	91	45.73

Based on individual related enabling factors, table 4.4 shows that majority of the tested infants 108 (54.27%) were male babies while the rest 91 (45.73%) were female babies. With regard to relation of the next of kin to HIV Exposed Infants, 193 (96.98%) were the infant mothers while 6 (3.02%) were the infants guardians. Lastly, majority of the next of kin to HIV Exposed Infants 180 (90.45%) were married, 18 (9.05%) were single while 1 (0.50%) was cohabiting.

Table 4: Individual Related Enabling Factors

Individual Factors	Responses	Frequency	Percent (%)
Sex of the infant	Male	108	54.27
	Female	91	45.73
Relation of next of Kin to HEI	Mother	193	96.98
	Father	0	0.00
	Guardian	6	3.02
Marital Status	Single	18	9.05
	Married	180	90.45
	Cohabiting	1	0.50

Table 5 summarizes individual factors of the next of kin to HIV Exposed Infants. To begin with the level of education, findings of the study indicated that majority 76 (38.29%) parents/guardians had attained secondary level of education followed by 53 (26.63%) parents/guardians who had completed primary level education and 31 (15.58%) parents/guardians who never completed primary level of education. Moreover, findings showed that 22 (11.06%) parents/guardians had attained college level of education while 11 (5.53%) had no formal education. The least number, 6 (3.02%) parents/guardians had attained university level of education. With regard to the occupation of the parents/guardians, majority 107 (53.77%) were unemployed, 62 (31.16%) were self-employed whereas 30 (15.08%) had formal employment. Furthermore, findings indicated that 159 (79.40%) parents/guardians had (1-4) children, 34 (17.09%) had (5-8) children while 7 (3.52%) had more than 9 children. Last but not least, the study established that parents/guardians were using different infant feeding modes. Findings showed that a greater proportion 194 (97.49%) were exclusively breastfeeding for 6 months. However, 3 (1.51%) were using mixed feeding while 2 (1.01%)

were using replacement feeding modes. Finally and with regard to having ever heard of HIV testing in infants a bigger proportion, 104 (52.26%) indicated that they had never heard of that before while 10 (5.03%) did not even know of HIV testing in infants. However, only 85 (42.71%) confirmed that they had ever heard of HIV testing in infants.

Table 5: Individual Factors

Individual Factors	Responses	Frequency	Percent (%)
Level of education	No formal education	11	5.53
	Primary education not completed	31	15.58
	Primary education completed	53	26.63
	Secondary education	76	38.19
	College (specify)	22	11.06
	University	6	3.02
Occupation of the parents	Employed	30	15.08
	Self Employed	62	31.16
	Unemployed	107	53.77
How many children do you have	(1-4)	158	79.40
	(5-8)	34	17.09
	Above 9	7	3.52
Mode of infant feeding	Exclusive breastfeeding for 6 months	194	97.49
	Replacement feeding	2	1.01
	Mixed feeding	3	1.51
Have you ever heard of HIV testing in infants	Yes	85	42.71
	No	104	52.26
	Do not Know	10	5.03

Third objective Need Factors Influencing the Utilization of HIV Diagnosis among Exposed Infants at 6 weeks, 18 months and 5years in Sigowet Sub-county Hospital. Table 4.6 gives a summary of the need factors influencing the utilization of HIV diagnosis among exposed infants. From the findings, it was established that 107 (53.77%) mothers to the HIV Exposed Infants only knew that they were HIV positive during pregnancy. However, 81 (40.70%) mothers knew they were HIV positive before pregnancy whereas 11 (5.53%) mothers knew that they were HIV positive after pregnancy. Furthermore, majority of the mothers 155 (77.89%) had only disclosed their HIV status to their husbands, 37 (18.59%) never disclosed their HIV status to anybody while 7 (3.52%) mothers disclosed their HIV status to their mothers/relatives. In addition, the findings showed that of all the mothers/guardians, 199 (100.00%) were enrolled to care. Lastly, it was determined that 192 (96.48%) mother/guardians were not attached to any social group of People Living with HIV AIDS (PLWHA). However, 1 (0.50%) mothers/guardians were attached to psychosocial support group while 6 (3.02%) were attached to the social group of PLWHA in the community.

Table 6: Need Factors Influencing the Utilization of HIV Diagnosis among Exposed Infants

Need Factors	Responses	Frequency	Percentage (%)
When was mother known to be HIV positive?	Before pregnancy	81	40.70
	During pregnancy	107	53.77
	After pregnancy	11	5.53
To whom have you disclosed your	Husband	155	77.89

HIV status?	Mother/relative	7	3.52
	None	37	18.59
Is mother enrolled to care?	Yes	199	100
	No	0	0
Which social group of PLWHA are you attached to?	Community	6	3.02
	Psychosocial support groups	1	0.50
	None	192	96.48

Table 7 summarizes correlation analyses for Individual Demographic Characteristics of mothers and guardians of HIV Infection among Exposed Infants. Correlation test of the individual demographic characteristics indicates that there was a positive correlation between Relationship of next of kin to HEI and Age of mother/Father/Guardian, Level of education, Marital status and number of children mothers had, $P=0.02$, $P=0.04$, $P=0.02$ and $P=0.01$ respectively. There was also a significant correlation between Age of mother/Father/Guardian and the number of children, $P=0.58$ as well as the number of children and family members, $P=0.92$.

Table7: Correlation Analysis for Individual Demographic Characteristics

	Relationship of next of kin to HEL	Age of mother/Father/Guardian	Level of education of mother/Guardian	Occupation of the mother /Father/Guardian	Marital status of the mother	How many children do you have?	How many members are you in your family?
Relationship of next of kin to HEI	1						
Age of mother/Father/Guardian	0.02	1					
Level of education of mother/Guardian	0.04	-0.14	1				
Occupation of the mother /Father/Guardian	-0.04	0.00	-0.54	1			
Marital status of the mother	0.02	0.23	-0.04	0.11	1		
How many children do you have?	0.01	0.58	-0.37	0.18	0.15	1	
How many members are you in your family?	0.00	0.56	-0.34	0.17	0.19	0.92	1

Table 8 summarizes correlation analyses for Factors Enhancing Prevalence of HIV Infection among Exposed Infants. There was a significant correlation between the reason for not receiving infants HIV test results and infant HIV status $P=0.28$.

Table 8: Correlation Analysis for Factors Enhancing Prevalence of HIV Infection among Exposed Infants

	Why have you not received HIV test results for your baby?	What is the HIV test result of your baby?
Why have you not received HIV test results for your baby?	1.00	
What is the HIV test result of your baby?	0.28	1.00

Table 9 summarizes correlation analyses of Facility Enabling Factors influencing the utilization of HIV Diagnosis among Exposed Infants. Correlation test of the Facility Enabling Factors indicates that there was a positive correlation between sex of the infant to the mother/guardian heard about HIV testing in infants and where they got the information, $P=0.09$ and $P=0.11$ respectively.

Table 9: Correlation Analysis of Facility Enabling Factors Influencing the Utilization of HIV Diagnosis among Exposed Infants

	Sex of the infant	When did you hear about HIV testing in infants?	Where did you get the information?
Sex of the infant	1.00		
When did you hear about HIV testing in infants?	0.09	1.00	
Where did you get the information?	0.11	0.00	1.00

4.5.4. Correlation Analysis of Individual Related Enabling Factors

Table 10 summarizes correlation analyses of the Individual Related Enabling Factors influencing the Utilization of HIV Diagnosis among Exposed Infants.

Correlation test of the individual related enabling factors indicates that there was a positive correlation between Relationship of next of kin to HEI, to Marital status of the mother and Sex of the infant, $P=0.02$ and $P=0.08$ respectively.

Table 9: Correlation Analysis of Individual Related Enabling Factors

	Relationship of next of kin to HEL	Marital status of the mother	Sex of the infant
Relationship of next of kin to HEL	1.00		

Marital status of the mother	0.02	1.00	
Sex of the infant	0.08	-0.01	1.00

Table 11 summarizes correlation analyses of the Individual Factors influencing the Utilization of HIV Diagnosis among Exposed Infants. Correlation test of the individual factors shows that there was a positive correlation between Mode of the infant feeding to Level of education of mother /Guardian and Occupation of the mother /Father/Guardian, $P=0.04$ and $P=0.02$ respectively. Moreover, Occupation of the mother /Father/Guardian and number of children also had positive correlation, $P=0.18$.

Table 10: Correlation Analysis of the Individual Factors

	Level of education of mother /Guardian	Occupation of the mother /Father/Guardian	How many children do you have?	Mode of the infant feeding
Level of education of mother /Guardian	1.00			
Occupation of the mother /Father/Guardian	-0.54	1.00		
How many children do you have?	-0.37	0.18	1.00	
Mode of the infant feeding	0.04	0.02	-0.07	1.00

Table 12 summarizes correlation analyses of the need factors influencing the Utilization of HIV Diagnosis among Exposed Infants. In correlation analysis of the Need Factors Influencing the Utilization of HIV Diagnosis among Exposed Infants, the time of mother awareness to her HIV status positively correlated to the time of HIV status disclosure and social support group attached to, $P=0.30$ and $P=0.01$ respectively. To whom the mothers disclosed their HIV status also correlated to the social support group of PLWHA attached to, $P=0.02$.

Table 11: Need Factors Influencing the Utilization of HIV Diagnosis among Exposed Infants

	When was the mother known to be HIV positive?	To whom have you disclosed your HIV status?	Which social groups of PLWHA are you attached to?
When was the mother known to be HIV positive?	1.00		
To whom have you disclosed your HIV status?	0.30	1.00	
Which social groups of PLWHA are you attached to?	0.01	0.02	1.00

Discussion:

The study examined the magnitude of HIV testing and infection, and factors associated with utilization of EID using the available DBS HIV-1 DNA PCR method among HIV-exposed infants in Sigowet Sub-County Hospital. It also established the prevalence of HIV infection, the enabling factors influencing the utilization of HIV diagnosis and the need factors influencing the utilization of HIV diagnosis among exposed infants at 6weeks, 18 months and 5years in Sigowet Sub-county Hospital. The study established that majority 198 (99.50%) of the recruited study participants were mothers whereas 1 (0.50%) was a guardian, out of which 93 (46.73%) were aged between (18-26). This finding showed that nearly all the infants were exposed to HIV infection through mother-child virus transmission. This concurred with the study conducted by (UNAIDS, 2015) which indicated that the virus can be transmitted during pregnancy, labor and delivery (prenatal transmission) or through breastfeeding. The study findings showed that most infants who were exposed were those below eighteen months. HIV diagnosis among exposed infants provides critical opportunity to strengthen follow up, early identification of HIV exposed and infected infants, early linkage to care and treatment, provide information to families of uninfected infants. This was supported by study in Malawi which showed that early exclusive breast feeding reduces the risk of post natal HIV transmission and increase HIV free survival (UNAIDS 2015). Findings of the study also revealed that majority of mothers and guardians who took their infants for HIV test, 76 (38.19%) and 107 (53.77%) only had secondary level of education and unemployed respectively. This was in support of the study conducted in Malawi by (Loannidis et al., 1999) which showed that less educated mothers and those with no formal employment were less likely to attend HEI follow up clinic for infant diagnosis of HIV. This study advocates further research to reduce false-positive results that could lead to false diagnosis and unnecessary treatment, and that caution should be exercised in interpreting the results of quantitative PCR with low viral load. The study revealed that the prevalence of HIV infection among exposed infants is low since among the 199 babies who received HIV test, majority 191 (95.98%) were HIV negative while the rest 8 (4.02%) were HIV positive. Moreover, 191 (95.98%) mothers/guardians had no reason unto why they never received HIV test results for their babies. This finding contradicted the outcome of the study in 2014 by (MOH, 2012) which showed that access to infants HIV services was affected by low health facility deliveries, and the prevalence could also be higher among those who miss their PCR results. These findings were similar with the study in Uganda where disclosure was more difficult in HIV-positive mothers owing to the threat it posed family stability (MOH, 2012). Similarly, the result of the study contradicted study conducted by (Connoret al., 2004) on critical analysis of the factors influencing prevalence among exposed infants despite increasing availability of PMTCT services. According to (Connoret al., (2004), without treatment, when a mother has HIV infection, the risk of infection transmission to her child is reported to be 20-40%. This underscores the importance of the ongoing campaigns to improve the utilization of HIV diagnosis and its associated factors among exposed infants. The second objective examined the enabling factors influencing the utilization of HIV diagnosis among exposed infants and the study determined that the distance from their residence to the facility, information from health facility staffs, and media such as television and radio influenced their utilization of HIV diagnosis among the exposed infants. This was in support of the findings of the study carried out by (Cook et al., 2011) which indicated that independent sources of maternal income, larger household size, greater distance and mothers on ART influences mothers/caregivers to complete the routine HIV testing. In the management of HIV diagnosis among exposed infants circuit, focal points should be designated in the community and locations as well as in the main hospital to ensure input management and follow-up to assist in therapeutic education and improve in HIV diagnosis among the exposed infants to complete routine testing. Finding of the study showed that majority of the tested infants 108 (54.27%) were male babies while the rest 91 (45.73%) were female babies. The study also determined 76 (38.29%) parents/guardians had attained secondary level of education while 107 (53.77%) were unemployed thus

recording high unemployment rate. The finding concurred with (Jones et al., 2005) study which indicated that high unemployment rate and poor paternal support may deny the mother necessary resources to attend clinic visits. Due to unemployment, clients may not have ability to pay for transport costs, thus the mother/caregiver might not complete the routine HIV testing amongst their infants. It is important that all positive mothers are required to attend at least four post natal visits during which they receive routine HIV testing with same day results including infant testing. During each visit, mothers are supported to disclose their HIV status. However, it is surprising that some attendants 37(18.5%) did not exposed their HIV status to their spouse hence reducing testing of HEIs by DNA-PCR per EID guideline suggesting the need to continuously support HIV-positive mothers in understanding the number, schedule, and importance of infant diagnosis. The study also established that parents/guardians were using different infant feeding modes. Findings showed that a greater proportion 194 (97.49%) mothers/guardians were exclusively breastfeeding for 6 months and 104 (52.26%) mothers/guardians indicated that they had never heard of HIV testing in infants and were embracing taking their infants for testing. This finding concurred with the study conducted by (UNICEF, 2010) which indicated that knowledge of virological testing is the diagnostic way for exposed children under 18 months of age as antibody testing will reflect a false positive result since maternal HIV antibodies usually persist during this period. This study emphasized the importance of maternal knowledge of HIV transmission during pregnancy, labor or delivery, and breastfeeding as a critical catalyst for HIV infant diagnosis services utilization.

Conclusion:

The study established that majority of 198(99.50%) of the study participants were mothers whereas 1(0.50%) was a guardian, out of which 93(46.73%) were aged between (18-26). This finding showed that nearly all the infants were exposed to HIV infection through mother-child virus transmission. MCH services in Sigowet –Soin County has the potential of improvement as 99.5% of women understood the importance of infant diagnosis and a substantial proportion did not need permission to know HIV status of their infants. It was also revealed that majority of mothers and guardians who took their infants for HIV tests, 76 (38.1%) had secondary level of education while 107 (53.77%) were unemployed, these among other factors show that women were more likely to be housewives than on employment and other income generating activities hence, women empowerment through education, improving MCH follow-up status and male involvement is more likely important in improving HIV services among exposed infants. The study revealed that the prevalence of HIV infection among exposed infants is low since among the 199 babies who received HIV test, majority 191 (95.98%) were HIV negative while the rest 8(4.02%) were HIV positive. However, 191 (95.98%) mothers/guardians had no reason unto why they never received HIV test results for their babies. This study indicates and confirms the importance of ANC in enhancing use of maternal, new born and child health interventions, and the role of HIV serostatus disclosure in a cute HIV care. Distance from participant's residence to the facility, information from health facility staffs, and media such as television and radio influenced utilization of HIV diagnosis among the exposed infants. In improving utilization of HEI services and ensuring HIV- free infant survival, health providers facing similar challenges should focus attention on empowering mothers/caregivers of HEIs on understanding the transmission and prevention of MTCT of HIV. Finding from the study showed that majority of the tested infants 108(54.27%) were male babies while the rest 91(45.73%) were female babies. Study further determined 76(38.29%) parents/guardians had attained secondary level of education while 107 (53.77%) were unemployed thus recording high unemployment rate. Without timely use of EID, the opportunity for early HIV diagnosis and ART initiation are missed out. Early infant diagnosis of HIV provides critical opportunity to strengthen follow-up of HIV exposed children, early identification of HIV exposed and infected infants, early linkage

to prevention for the exposed and care and treatment aiding an evaluation of PMTCT. This suggests the need for intensification of more sensitization and education by all stakeholders in the program so as to develop and execute a common plan of action in order to address these challenges. On the need factors, Findings of the study indicated that 107(53.77%) mothers to the HIV exposed infants only knew that they were HIV positive during pregnancy and 155(77.89%) had only disclosed their HIV status to their husbands. Another finding showed that of all the mothers/guardians, 199(100.0%) were enrolled to care while 192(96.48%) mother/guardians were not attached to any social group of People Living with HIV/AIDS (PLWHA). With some HIV positive mothers still having undisclosed HIV status, health workers in EID programs should strengthen efforts in helping these mothers in disclosing their HIV status someone they can confide in. This will assure them access to emotional, psychological, social, and medical support without hindrance.

Recommendations:

- a) In order to increase use of utilization of HIV diagnosis among the exposed infants, improvement in maternal knowledge of EID is needed particularly on the importance of HIV testing in infants, the frequency, and schedule during ANC.
- b) As MTCT rates continue to decline, EID may move towards targeted birth testing to enable early ART, although improved linkage between the EID services and HIV care teams is needed to ensure that all HIV-infected infants are followed and ART initiated immediately after diagnosis.
- c) Community mobilization through community conversation to improve the perceived impact is more likely to have a potential to influence, improve and promote PMTCT services with a goal towards free HIV generation.
- d) Measures to address the issue of non-users of provider-initiated counseling and testing clinics within the existing implementation framework as more than 50% mothers/guardians indicated that they had never heard of HIV testing of infants and were embracing taking their infants for testing.
- e) There is need to empower our health sectors in the financing of health programs, the creation of an emergency fund, the simplification of administrative and technical procedures are essential to achieve this goal.

Acknowledgements:

The Medical staff of Sigowet sub-County Hospital for their role and support offered during my field work more so Dr. Langat who participated in data collection. Need to acknowledge the institution who gave ethical approval for the study

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