International Digital Organization for Scientific Research ISSN: 2579-0811
IDOSR JOURNAL OF BIOCHEMISTRY, BIOTECHNOLOGY AND ALLIED FIELDS 8(3): 87-100, 2023.
https://doi.org/10.59298/IDOSR/JBBAF/23/18.5796

HIV Sero-Status and Risk Factors of Sero-Positivity of HIV Exposed Children Below Two Years of Age at Mityana General Hospital in Mityana District, Uganda

Lubuye Denis Senyonga

Faculty of Clinical Medicine and Dentistry Kampala International University Western Campus Uganda.

ABSTRACT

The aim of this study was to identify the factors linked to HIV serostatus and the risks of HIV positivity among children under two years old exposed to HIV at Mityana General Hospital in Mityana district, Uganda. This was a cross-sectional descriptive survey utilizing quantitative data from administered questionnaires and routine service data obtained from the mother's HIV care card and the exposed infant clinical chart. Data analysis was performed using Epi Info version 7.2.4 for entry and Stata version 16 for analysis. Descriptive statistics characterized both infant and mother traits. Logistic regression was employed to determine the factors associated with HIV serostatus. Among the 102 mother–infant pairs recruited, most mothers were between 25–34 years old (53/102, 52.0%), married (67/102, 65.7%), had attained at least primary education (49/102, 48.1%), and were involved in farming for their livelihood (89/102, 87.3%). The HIV prevalence among the infants stood at 8.8%. In the bivariate analysis, factors such as place of delivery (OR = 4.6, 95% CI: 1.340-9.413, p = 0.003), normal delivery (OR = 4.7, 95% CI:0.682-5.522, p= <0.001), poor adherence to ART (OR=3.11, 95% CI: 0.983-8.344, p=0.026), and the mothers' level of education (OR=6.2, 95% CI: 3.00-14.476, p= <0.001) were associated with HIV-positive outcomes in infants below two years old. This study underscores that 8.8% of children under 2 years attending Mityana General Hospital are HIV-infected due to exposure from their mothers. Factors contributing to this burden include maternal non-adherence to ART, delivery in facilities lacking PMTCT protocols, maternal education levels, and the absence of prophylaxis administration to exposed infants, collectively propagating HIV transmission among these infants.
Keywords: Pediatric HIV, Mother-to-child transmission, HIV serostatus, Infants below 2 years.

INTRODUCTION

Children infected with Human Immunodeficiency Virus (HIV) as infants, when their immune systems are still immature, can experience very rapid, uninhibited viral multiplication and disease progression. Early immune depletion occurs when the CD4 cell count drops and the viral load increases [1, 2]. HIV is a virus that attacks cells that help the body fight infection, making a person more vulnerable to other infections and diseases [3, 4]. It is spread by contact with certain bodily fluids of a person with HIV, most commonly during unprotected sex, or through sharing injection drug equipment [5, 6]. Acquired Immune Deficiency Syndrome (AIDS) was first clinically reported in 1981 in the United States and the following year The New York Times published an alarming article about the new immune system disorder, which, by that time, had affected 335 people, killing 136 of them [7]. Between 1981 and 1983, there were 5,660 AIDS cases in the US compared to only 17 for the entire of Africa, suggesting that the US was the epicenter and origin of HIV and AIDS [8]. AIDS has since then become a global epidemic with evidence of the number of people living withHIV globally rising from 37.2 million people in 2017 to 37.9 million people in 2018 [9]. The statistics further indicate that Eastern and Southern Africa are the most affected by the epidemic with an estimated 20.6 million people living with HIV as of 2018 [10]. Worldwide, an estimated 180,000 new pediatric infections occurred in 2017 (UNAIDS, 2018), with East and South Africa contributing to 59% of all pediatric HIV infections globally, and in Uganda alone, 5.3% of infants were exposed to HIV [11]. Despite the recommendation of WHO that mother-to-child transmission (MTCT) of HIV should be prevented using lifelong treatment with antiretroviral (ARVs) for all pregnant HIV-infected women, exclusive breastfeeding during the first 6 months, and unrestricted duration of breastfeeding [12]. Despite the tremendous contribution of preventive mother-to-child transmission (PMTCT) programs in the 21 global priority countries, 3 out of 10 pregnant women living with HIV did not receive ARVs to prevent MTCT of HIV, and 4 out 10 HIV-positive women or their infants did not receive ARVs during breastfeeding to prevent MTCT of HIV in 2013 [13]. In 2018 alone, figures from WHO indicate that an estimated 100,000 pregnant women living with HIV in Uganda needed antiretroviral for preventing mother-to-child transmission but only 94,800 of those pregnant women received antiretroviral (excluding single dose Nevirapine) for preventing mother-to-child transmission accounting for 93% [14]. Uganda has made remarkable progress towards the elimination of vertical transmission of HIV [15]. However, some bottlenecks remain in ensuring wider access to and utilization of services across the PMTCT cascade and there are still several challenges in scaling up PMTCT services in the Uganda public healthcare sector [16]. These relate to coverage at different steps of the PMTCT cascade, and the quality of PMTCT services rendered at the health facilities [17]. Pediatric cases of HIV are becoming a growing problem in Uganda where MTCT is still a concern as HIV progresses much faster in children than it does in adults and if a positive infant is left untreated for 2 years, they face a 50% mortality rate [18]. Unless these children are promptly commenced on lifelong antiretroviral treatment (ART), HIV-positive infants invariably record their highest mortality in the first three months of life [19]. There is no data concerning serostatus of HIV-exposed infants at Mityana General Hospital in Mityana District and children are continuing to die despite PMTCT and eMTCT implementation in all districts of Uganda. Thus, this study was designed to determine the prevalence of HIV seropositivity and associated factors among exposed childrenbelow 2 years of age attending care at Mityana General Hospital in Mityana District.

METHODOLOGY

Study Design

This was a cross-sectional study that was conducted at Mityana General Hospital in Mityana District involving HIV-positive mothers and exposed infants aged 2 years and below coming from surrounding communities serviced by the hospital. A cross-sectional study research design was used because the method enables data collection from a relatively large number of different categories of respondents at a particular time with the exposure and outcome being measured at the same time and there is no need to follow up with the study participants.

Area of Study

Mityana is approximately 70 kilometres (43 mi), by road, west of Kampala, Uganda's capital and largest city. This is approximately 80.5 kilometres (50 mi), by road, east of Mubende, along the *Kampala–Mityana–Mubende–Fort Portal Road*. Mityana is about halfway between Kampala and Mubende, along an all-weather tarmac highway that links Uganda's capital with the city of Fort Portal in the Western Region. The geographical coordinates of Mityana are 0°23'58.0"N, 32°02'36.0"E (Latitude:0.399444, Longitude:32.043333). The average elevation of the town is 1,209 meters (3,967 ft) above mean sea level. (https://en.wikipedia.org/wiki/Mityana .... Accessed on the 20th of April 2021).

Study Population

The study focused HIV HIV-exposed children below 2 years of age and their mothers attending care at Mityana General Hospital in Mityana District.

Target Population

The study targeted children below 2 years exposed to HIV and their mothers living in Mityana and neighboring districts.

Inclusion Criteria

HIV seropositive mothers (18 years of age and above) with children aged 2 years and below whose HIV status is already known and who can give consent will participate in the study.

Exclusion Criteria

- HIV seropositive mothers with children aged 2 years and below whose HIV status is notknown.
- HIV seropositive mothers with children aged 2 years and below that are less than 18 years without emancipated minor status because of ethical issues of consent.
- Exposed infants who were critically ill and infants whose parents were unwilling to give their consent were excluded from the study.

Sample size Calculation

Sample size is the mathematical process of deciding how many subjects should be studied before a study begins. The formula by Charan & and Biswas [20] was used to calculate the sample size for the study.

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

Where;

n = Minimum sample size

Z = The table value for standard normal deviation corresponding to 95% significance level (=1.96)

P = Prevalence of characteristic being estimatedd = Margin of error, set at 0.05

The sample size of this study was calculated using the estimated proportion of 6.5 % or 0.065 based on a study done in rural parts of Western Uganda by Kahungu et al. [11] who found that 6.5% of HIV-exposed children were HIV positive.

$$n = \frac{(1.96)^2\, 0.065\, (1-0.065)}{(0.05)^2}$$

$$n = \frac{3.8416 \; x \; 0.065 \; x \; 0.935}{0.0025}$$

$$n = 93$$

Data was collected from 102 infant-mother pairs, 10% more than the calculated sample size which was a consideration for any missing data.

Sampling Techniques

A non-probability convenient consecutive sampling technique was used to recruit the study participants whereby HIV seropositive mothers bringing in HIV-exposed children below 2 years of age that met the inclusion criteria after consent were enrolled into the study. The convenience sampling technique is mostly used in clinical studies and with this sampling technique, the researcher recruits participants who are easily accessible in a clinical setting [21].

Data Collection Methods

Data was collected from the study participants by the principal investigator and his research assistants. HIV-positive mothers with children below 2 years accessing any services at Mityana General Hospital who met the study criteria were recruited into the study by seeking their informed consent after thoroughly explaining to them the benefits of the research and how it will be carriedout. Consenting HIV-positive mothers who already know their children's HIV status were administered with questionnaires. The questionnaires sought to determine the risk factors responsible for the HIV serostatus of the children involved in the research. All respondents were given ample time to fill in the questions. Assistance was given to any respondents who found difficulty in the interpretation of scientific terminologies. A record review tool was developed to collect relevant data from the Early Infant Diagnosis of HIV register to determine the prevalence of HIV among HIV-exposed children.

Data Collection

Questionnaires were the main data collection tools. A self-administered structured close-ended questionnaire constructed in line with the objectives of the study and informed by a literature review was used in this study. An interviewer-administered questionnaire was appropriate to ensure that questionnaires were answered accurately. The questionnaire was divided into 4 sections as follows: Section A, which was to capture the socio-demographic characteristics, Section B was to capture the prevalence of HIV seropositivity among the HIV exposed children, Section C addressed the infant risk factors of HIV seropositivity among the study participants then Section D dealt with the maternal risk factors of HIV seropositivity.

Pretesting of data collection tool.

In this study, the questionnaire was pre-tested for its content and face validity which involved HIV-exposed children receiving care from the ART clinic of Kampala International University Teaching Hospital, after approval from the faculty of clinical medicine and dentistry. Data collected during the pre-test study was excluded from the main study. The responses from the pilot study were used to improve the clarity, reliability, and relevance of the questionnaire.

Validity of instruments

Leung [22] proclaims that validity typically implies the use of suitable tools, processes, and data.In this study, the validity of the instrument was used to measure the degree to which the items were representative of the specific areas covered by the study. Before the instruments were administered to data collectors, they were first examined by colleagues taking a similar program as the researcher's. They were then scrutinized by the supervisor to ensure that the terms used in the questionnaire and interview were precisely defined and properly understood. Validity was established by the researcher by revealing areas causing confusion and ambiguity and led to reshaping of the questions to be more understandable by the respondents and to gather uniform responses across various respondents. The content Validity Index was calculated based on judgment by at least two knowledgeable people (Judges). When the result was 0.7 and above, the instrument was deemed valid for use.

Reliability of data collection tool

During the pre-test, the sequence of the question and time of data collection was considered accordingly. Data obtained from a pre-determined questionnaire was used to determine the Cronbach's coefficient alpha. An index of more than 0.8 was considered to indicate that the items in the questionnaire are reproducible and consistent. After realizing that instruments produced similar results, the researcher inferred that the instruments were reliable for use and were later used to carry out the study.

Data Quality Control

The principal investigator and research assistants ensured that only participants who met the inclusion criteria were allowed to fill out the questionnaire after obtaining informed consent from them. The questionnaire was pretested in a similar population at Kampala International University Teaching Hospital in Western Uganda to ensure clarity of questions. Wrongly stated questions were corrected. Questionnaires were checked for completeness upon being returned to the principal investigator or his research assistants. Assistance was sought from the researcher's supervisor at every stage of development of this study where necessary. Research assistants were trained on the research protocol and data collection tools before the start of data collection. After data collection, each completed tool was checked for completeness, accuracy, and consistency, and incomplete tools were given back to the research assistant for completion concerning the routine patient records. Where information was not available on any of the source documents, it was reported as not documented.

Data Analysis

Quantitative data was entered in Epi Info version 7.2.4 and analyzed using Stata version 16. Descriptive statistics was used to describe infant and mother characteristics. The measures included proportions for categorical variables, percentiles, and ranges for continuous variables like age. Age for both infant and mother were categorized before generating percentiles. The primary outcome variable was categorized as "0" for HIV-negative and "1" for HIV-positive. Prevalence among exposed infants was calculated as the number of HIV-positive infants divided by the total number of exposed who received their final HIV test results. Final infant HIV status was determined by either a PCR or rapid HIV test as appropriate to the infants' age and breast-feeding option. The HIV test was considered final if the PCR was done before 18 months of age but six weeks after cessation of breastfeeding or a rapid test was done at 18 months of age but at least six weeks after stopping breastfeeding. Data was modeled using logistic regression to evaluate factors associated with HIV serostatus among exposed children attending the hospital. At the bivariate level, HIV final status was analyzed against all the independent variables, and the resulting Odds ratios were used as measures of association. All independent variables with a P-value of <0.2 at the bivariate level were entered into a full logistic regression model. A multivariable logistic regression modeling strategy was used to evaluate confounding and develop a final model. Any variable with a P-value of <0.05 was considered statistically significant.

Ethical considerations

Ethical clearance was obtained from the Faculty of Clinical Medicine and Dentistry and the hospital administration of Mityana General Hospital. Informed consent was also sought from the studyparticipants.

RESULTS

Socio-demographic characteristics of mothers

Table 1: Characteristics of mothers

Variables	Frequency (N = 102)	Percentage %
Age in years 16–24	28	27.4
25 -34	53	52.0
35–44	21	20.6
Marital status		
Married	67	65.7
Separated/Divorced	8	7.8
Single	13	12.7
Widowed	5	4.9
Not documented	9	8.9
Use of ART before pregnancy		
Yes	26	25.5
No	76	74.5
WHO Stage at enrollment I	56	62.9
II	20	22.5
III	10	11.2
IV	3	3.4
CD4 at enrolment		
Average CD4 (52 Observations)	464	NA
Pregnancy status at ART start		
Pregnant	62	60.8
Lactating	16	15.7
None	16	15.7
Not documented	8	7.8
Level of education		
None	18	17.7
Primary	49	48.1
Secondary	28	27.2
Tertiary	7	7.0
Source of income Farmers	89	87.3
Business	3	3.2
Employed (private/self)	8	7.6
Civil servant	2	1.9

[a]N-less than 647 because of missing values during data collection

The study recruited 102 mother-infant pairs. The majority of the mothers 53/102 (52.0%) were aged between 25-34 years, married 67/102 (65.7%), had at least attained a primary education 49/102 (48.1%), and were farming as a source of livelihood 89/102 (87.3%). Those who were enrolled in ART before pregnancy were 26/102 (25.5%) while the majority of the subjects were pregnant when they were enrolled in ART 62/102 (60.8%). The majority of the mothers were enrolled on ART while at WHO stage I 56/102 (62.9%) and the average CD4 count of the mothers was 464 as shown in Table 1.

Table 2: Characteristics of infants

Variables	Frequency (N = 102)	Percentage %
Age at registration (in months)		
<1 month	14	13.7
1 – 6 months	44	43.1
7 – 12 months	21	20.6
13 – 18 months	17	16.7
19 - 24 months	6	5.9
Sex		
Female	56	54.9
Male	46	45.1
Place of delivery		
Health facility-Public & PNFP	76	77.5
Private clinics	21	20.6
Unknown	5	4.9
Mode of delivery		
Cesarean section	11	10.8
Normal vaginal delivery	78	76.5
Not documented	13	12.7

The majority of the infants were enrolled aged 1–6 months 44 (43.1%) while 14 (13.7%) were less than one month. The majority of the infants were female 56 (54.9%), most of them born in a public or nonprofit private health facility 76 (77.5%) by normal mode of delivery 78 (76.5%) as shown in Table 2.

Table 3: HIV prevalence among exposed infants

Variables	N=102	HIV+ve (n)	Prevalence %
Overall prevalence	102	09	8.8
Sex Female	56	6	10.7
Male	46	3	6.5
Place of delivery			
Health facility-Public & PNFP	76	5	6.6
Private clinics	21	2	9.5
Unknown	5	2	40.0
Mode of delivery			
Cesarean section	11	1	9.1
Normal vaginal delivery	78	4	5.12
Not documented	13	4	30.8
Marital status			
Married	67	8	11.9
Separated/Divorced	8	-	-
Single	13	1	7.7
Widowed	5	-	-
Not documented	9	-	-
Level of education			
None	18	2	11.1
Primary	49	6	12.2
Secondary	28	1	3.6
Tertiary	7	-	-
Source of income			
Farmers	89	8	8.9
Business	3	-	-
Employed (private/self)	8	1	12.5
Civil servant	2	-	-

All exposed infants had their HIV Status determined and of the 102 infants, 9 (8.8%) were HIV positive. By category, HIV prevalence was highest among female infants (10.7%), infants born from unknown/undocumented places (40.0%) through undocumented methods (30.8%), and married parents (11.9%) as shown in Table 3.

Bi and Multivariate analysis of maternal factors associated with HIV-positive serostatus

Table 4: Unadjusted and adjusted maternal factors associated with HIV-positive serostatus

Characteristics	N	+VE	Crude OR(95% CI)	P-value	Adjusted OR(95% CI)	P-value AOR
Place of delivery						
Health facility-Public & PNFP	76	5	1			
Private clinics	21	2	3.2 (1.080-6.500)	<0.001	1.9 (0.838-17.109)	0.045
Unknown	5	2	4.6 (1.340-9.413)	0.003		
Mode of delivery						
Cesarean section	11	1	1			
Normal vaginal delivery	78	4	4.7 (0.682-5.522)	<0.001	1.3 (0.500-8.116)	0.058
Not documented	13	4	2.6 (1.820-8.885)	0.0042		
WHO staging atenrollment						
I	56	4	1			
II	20	3	1.23(0.503-3.038)	0.578		
III	10	2	1.12(0.319-3.97)	0.594		
IV	3	0				
Duration of ART before delivery						
>6 months	155	1	1			
<6 months	192	8	5.7 (0.688 - 46.423)	0.107	4.1(0.471-35.775)	0.201
ART Adherence						
Good	367	1	1			
Fair	28	6	0.72 (0.092 - 5.585)	0.668		
Poor	28	2	3.11 (0.983-8.344)	0.026	4.5(0.411-49.398)	0.218
Appointments kept						
Yes	347	1	1			
No	106	7	1.7 (0.663 - 3.782)	0.812		
CD4[a]						
<350	38	2	1			
350 - 499	12	5	1.5 (0.131 - 12.808)	0.412		
>500 cells	25	3	2.8 (0.350 - 10.864)	0.346		
Level of education						
None	18	2	1		1	
Primary	49	6	6.2 (3.00- 14.476)	<0.001	2.1 (0.534 – 9.140)	0.154
Secondary	28	1	5.5 (2.112 - 14.001)	<0.001	1.3 (0.378 – 10.056)	0.116
Tertiary	7	-				
Source of income						
Employed (private/self)	8	1	1			
Farmers	89	8	5.3 (2.012 - 11.880)	<0.001	1.5 (0.518 – 9.657)	0.112
Business	3	-				
Civil servant	2	-				

At bivariate analysis, the place of delivery was associated with HIV-positive status. Mothers who delivered from undesignated health facilities were four times more likely to have an HIV-positive baby (OR = 4.6, 95% CI: 1.340-9.413, p = 0.003), while those who delivered at private clinics were thrice more likely to be HIV positive (OR = 3.2, 95% CI: 1.080-6.500, p = <0.001). Mothers who had a normal delivery were four times more likely to have an HIV-positive baby (OR = 4.7, 95% CI: 0.682-5.522, p= <0.001) while those who delivered by undocumented methods (probably part of those who attended undesignated facilities) were twice likely to end up with an HIV positive baby (OR=2.6, 95% CI: 1.820-8.885, p=0.004). Infants whose mothers had poor adherence to ART werethrice more likely to end up contracting HIV (OR=3.11, 95% CI: 0.983-8.344, p=0.026). Mother's level of education was associated with HIV-positive status; mothers with a primary level of education were six times more likely to have an HIV-positive baby (OR=6.2, 95% CI: 3.00- 14.476, p= <0.001) while those with secondary education were five times as likely (OR=5.5, 95% CI:2.112 - 14.001, p= <0.001). Mothers who practiced farming to earn an income were five times more likely to end up with an HIV-positive baby (OR=5.3, 95% CI: 2.012 - 11.880, p= <0.001) all as shown in Table 4.

Bi and Multivariate analysis of infants' factors associated with HIV-positive serostatus

Characteristics	Number	Positive Age at registration (in months)	Crude OR (95% CI)	P-value	Adjusted OR	(95% CI)	P-value
< 6 months	58	4	1		1		
7 - 12	21	2	6.5 (3.12 - 16.00)	0.002	2.5	(0.74 - 9.10)	0.162
13 - 18	17	3	4.2 (1.50 – 10.54)	0.001	3.1	(0.42 - 13.13)	0.105
18 – 24	6	-					
Infant ARVs for prophylaxis							
Received any form of ART at birth	48	2	1		1		
No ARVs at birth	29	3	7.1 (2.12 – 14.61)	0.001	4.0	(1.14 - 11.92)	0.003
Unknown	16	2	5.3 (2.67 - 11.45)	0.001	4.0	(0.88 - 2.58)	0.102
Not documented	9	2	9.1 (1.86 – 18.94)	0.002	7.0	(1.51–21.62)	0.075
Feeding methods at registration							
Exclusive breastfeeding	51	4	1		1		
Replacement feeding	11	-	5.1 (1.18 - 15.44)	0.106	3.2	(0.50 - 15.57)	0.065
Mixed feeding	5	3	7.0 (1.98 - 17.43)	0.002	3.6	(0.50 - 10.12)	0.102
Complimentary feeding	14	1	4.0 (0.68 - 15.21)	0.000	2.8	(0. 12 - 5.28)	0.214
No longer breastfeeding (NLB)	21	1	2.5 (1.52 - 13.91)	0.018	1.2	(0.05 - 1.82)	0.264

Table 5: Infants' factors associated with HIV-positive serostatus

Results of bivariate analysis of infants' factors associated with HIV status show that the infants' age at registration into mother-baby care point was associated with HIV-positive serostatus. Infants who were registered at 7-12 months of age were six times more likely to be HIV positive than those who registered early (OR = 6.5, 95% CI: 3.12– 16.00, p=0.002). Children who were registered at the age of 13 - 18 months were four times more likely to be HIV positive (OR = 4.2, 95% CI: 1.50 – 10.54, p=0.001). Children who did not receive any form of prophylaxis were seven times more likely to be HIV positive (OR=7.1, 95% CI: 2.12 – 14.61, p=0.001) than those who received prophylaxis. Children who were mixed-fed were seven times more likely to be HIV positive (OR = 7.0, 95% CI:1.98 – 17.43, p = 0.002) as shown in Table 5. Results of multivariate analysis of both maternal and infant factors associated with HIV status show that two factors remained statistically significant. Mothers who delivered at private clinicswere twice as likely to have an HIV-positive baby (AOR = 1.9, 95% CI: 0.838-17.109, p = 0.045). Infants who never received ARVs for prophylaxis at birth were four times more likely to test HIV positive (AOR = 4.0, 95% CI: 1.14–11.92, p = 0.003), all of this is displayed in Tables 4 and 5.

DISCUSSION

The Mityana Hospital is a public hospital that serves a large district of Uganda. It is a public hospital administered by the Ugandan Ministry of Health. There is one operating theatre. Wards are split into Female, Male, Obstetrics, and Pediatrics. This kind of health service provision by the hospital places it under the category that is covered by the country's PMTCT policy. However, despite the availability of PMTCT services in Uganda since 2000, the country is still challenged with a high burden of pediatric HIV. In this study, we have been able to establish that HIV prevalence among HIV-exposed infants under 2 years of age attending care at Mityana General Hospital was 8.8%. This finding is higher than the Uganda national prevalence estimate in the same category of children reported in a 2018 study of 6.8% [23]. Our finding is still higher than that of a very recent cross-sectional study across health centers in Uganda among exposed infants which reported a prevalence of 6.5% [11]. This variation in prevalence in this study from the recent studies in Uganda may be attributed to a greater impact of factors that are associated with HIV seropositivity among infants in the communities serviced. This understanding is corroborated by similar studies in Rwanda and Kenya that investigated similar objectives to our study [24, 25]. By category, HIV prevalence was highest among female infants (10.7%), and infants born from unknown/undocumented places (40.0%) through undocumented methods (30.8%). These findings are corroborated by findings from a study in Nigeria that established a similar pattern of prevalence among HIV-exposed infants, where, the females and those born in undesignated places were higher than the rest [26]. A study in Tanzania among the same category of infants showed that unprofessional procedures applied during delivery in undesignated delivery places which most times don't follow PMTCT protocols were associated with the HIV status of the infants [27]. At bivariate analysis, the study established that the place of delivery was associated with HIV-positive status. Mothers who delivered from undesignated health facilities were four times more likely to have an HIV-positive baby (OR = 4.6, 95% CI: 1.340-9.413, p = 0.003), while those who delivered at private clinics were thrice more likely to be HIV positive (OR = 3.2, 95% CI: 1.080- 6.500, p = <0.001). Mothers who had a normal delivery were four times more likely to have an HIV-positive baby (OR = 4.7, 95% CI: 0.682-5.522, p= <0.001). These findings are corroborated by a countrywide cross-sectional study in 2018 that reported that children delivered at private clinics were six times more likely to be HIV positive those delivered outside the health facility were seven times more likely to be HIV positive than those delivered in health facilities [11]. Mothers who had a normal delivery were four times more likely to have an HIV-positive baby (OR =4.7, 95% CI: 0.682-5.522, p= <0.001). This finding in our study contradicts the findings of 2 studies in Ethiopia that established an association of normal delivery with increased protection of infants from MTCT [28, 29]. Infants whose mothers had poor adherence to ART were thrice more likely to end up contracting HIV (OR=3.11, 95% CI: 0.983-8.344, p=0.026). This finding is corroborated by studies both in Uganda and Zimbabwe. In Uganda mothers who never kept clinic appointments which point to poor adherence were 2 times more likely to have a positive baby than those who kept appointments while in Zimbabwe mothers with poor ART adherence were 5 times more likely to end up with an HIV-positive child [11, 30]. Mother's level of education was associated with HIV-positive status; mothers with a primary level education were six times more likely to have an HIV-positive baby (OR=6.2, 95% CI: 3.00- 14.476, p= <0.001) while those with a secondary education were five times as likely (OR=5.5, 95% CI: 2.112

- 14.001, p= <0.001). The subject of education concerning HIV infection among infants is one that was interrogated in an East African review and was still significant, where the safety of children increased with an increase in the education status of their infected mothers [31]. The reason for such an association is that increased education helps a mother comprehend better the prospects of PMTCT and thus act to save the baby from risk [32]. Infants' age at registration into mother-baby care point was associated with HIV-positive serostatus. Babies who were registered at 7-12 months of age were six times more likely to be HIV positive than those who registered early (OR = 6.5, 95% CI: 3.12–16.00, p=0.002). Children who were registered at the age of 13 - 18 months were four times more likely to be HIV positive (OR = 4.2, 95% CI: 1.50– 10.54, p=0.001). This pattern is similar to that established in Ethiopia [33]. Children who did not receive any form of prophylaxis were seven times more likely to be HIV positive (OR=7.1, 95% CI: 2.12 – 14.61, p=0.001) than those who received prophylaxis. Children who were mixed-fed were seven times more likely to be HIV positive (OR = 7.0, 95% CI: 1.98 – 17.43, p = 0.002). This finding is in tandem with many other studies that have shown that negating prophylaxis administration to infants highly exposes them to HIV infection through their mothers [11, 23, 26, 34]. In the multivariate analysis of both maternal and infant factors associated with HIV status, two factors remained statistically significant. Mothers who delivered at private clinics were twice as likely to have an HIV-positive baby (AOR = 1.9, 95% CI: 0.838-17.109, p = 0.045). Infants who never received ARVs for prophylaxis at birth were four times more likely to test HIV positive (AOR = 4.0, 95% CI: 1.14–11.92, p = 0.003). We believe that the continued significance of multivariate analysisof these 2 factors is still justified by the interpretation advanced by Kahungu et al. [11] and Anígilájé et al. [34].

CONCLUSIONS

Our study has been able to show that 8.8% of children below 2 years old attending Mityana General Hospital are infected with HIV as a result of exposure from their infected mothers. This HIV burden among infants is being propagated by several factors that include non-adherence to ART regimen by mothers, delivery from facilities that don't apply PMTCT protocols that may reduce the risk for the baby, the education level of mothers and non-administration of prophylaxis to exposed infants.

Recommendations

We recommend a community-based survey among the whole community serviced by Mityana General Hospital to establish the extent of the HIV burden amongst infants in the community as our study could have missed a good percentage that wasn't enrolled and receiving care from the hospital. Our study has shown that level of education is significantly associated with HIV seropositivity at bivariate analysis, however when the model was adjusted, it showed that increased education was a protective factor against the contraction of HIV by infants from mothers. We, therefore, recommend the design of tailor-made education programs that canhelp mothers from across all spheres to appreciate PMTCT.

REFERENCES

1. Alum, E. U., Ugwu, O. P.C., Obeagu, E. I. and Okon, M. B. Curtailing HIV/AIDS Spread: Impact of Religious Leaders. *Newport International Journal of Research in Medical Sciences (NIJRMS),* 2023; 3(2): 28-31. https://nijournals.org/wp-content/uploads/2023/06/NIJRMS-32-28-31-2023-rm.pdf
2. Obeagu, E.I., Alum, E.U. and Obeagu, G.U. Factors Associated with Prevalence of HIV Among Youths: A Review of Africa Perspective. *Madonna University Journal of*

Medicine and Health Sciences, 2023; **3**(1): 13-18. https://madonnauniversity.edu.ng/journals/index.php/medicine
3. Alum, E. U., Obeagu, E. I., Ugwu, O. P.C., Aja, P. M. and Okon, M. B. HIV Infection and Cardiovascular diseases: The obnoxious Duos. *Newport International Journal of Research in Medical Sciences (NIJRMS)*, 2023; 3(2): 95-99. https://nijournals.org/wp-content/uploads/2023/07/NIJRMS-3-295-99-2023.pdf.
4. Alum, E. U., Obeagu, E. I., Ugwu, O. P. C., Samson, A. O., Adepoju, A. O., Amusa, M. O. Inclusion of nutritional counseling and mental health services in HIV/AIDS management: A paradigm shift. Medicine. 2023; 102:41(e35673). http://dx.doi.org/10.1097/MD.0000000000035673. PMID: 37832059; PMCID: PMC10578718.
5. Obeagu, E. I., Nwosu, D. C., Ugwu, O. P. C. and Alum, E. U. Adverse Drug Reactions in HIV/AIDS Patients on Highly Active Antiretro Viral Therapy: A Review of Prevalence. *Newport International Journal of Scientific and Experimental Sciences (NIJSES).* 2023; 4(1):43-47. https://doi.org/10.59298/NIJSES/2023/10.6.1000
6. Alum, E. U., Ugwu, O. P. C., Obeagu, E. I., Aja, P. M., Okon, M. B., Uti, D. E. Reducing HIV Infection Rate in Women: A Catalyst to reducing HIV Infection pervasiveness in Africa. International Journal of Innovative and Applied Research. 2023; 11(10):01-06. DOI: 10.58538/IJIAR/2048. http://dx.doi.org/10.58538/IJIAR/2048
7. CDC, C. for D. control and P. (2019). About HIV/AIDS.
8. Okuonzi, S. Origin of HIV/Aids - Thirty years of the untold story. New Vision, 2011.
9. UNAIDS. GLOBAL STATISTICS FactSheet_2015_UNAIDS. Global Statistics-2015; 2016; 8–13.
10. UNAIDS. UNAIDS Fact Sheet Report. 2019; 1–476.
11. Kahungu, M. M., Kiwanuka, J., Kaharuza, F., & Wanyenze, R. K. Factors associated with HIV positive sero-status among exposed infants attending care at health facilities: a cross sectional study in rural Uganda. BMC Public Health. 2018; 18(139), 1–11. https://doi.org/10.1186/s12889-018-5024-6.
12. WHO. (2016). Consolidated guidelines on the use of antiretroviral drugs for treating and preventing HIV infection: recommendations for a public health approach. World Health Organization.
13. UNAIDS. (2015). 2014 Progress Report on the Global Plan towards the elimination of new HIV infections among children by 2015 and keeping their mothers alive. Joint United Nations Programme on HIV/AIDS (UNAIDS).
14. WHO. Prevention of mother-to-child transmission Estimates by country. World Health Organization Global Health Observatory Data Repository, 2019.
15. UNAIDS. Prevention GAP report 2016.
16. UAC. (2018). UGANDA AIDS COUNTRY PROGRESS REPORT JULY 2017-JUNE 2018 Theme. "Enhancing HIV Mainstreaming towards ending AIDS as a Public Health threat in Uganda by 2030." Uganda AIDS Commission, JUNE.
17. Larsson, E. C., Thorson, A., Pariyo, G., Conrad, P., Arinaitwe, M., Kemigisa, M., Eriksen, J., Tomson, G., & Ekström, A. M. Opt-out HIV testing during antenatal care: experiences of pregnant women in rural Uganda. Health Policy and Planning. 2012; 27(1), 69–75.
18. WHO. Manual on Paediatric HIV Care and Treatment for District Hospitals (First, Issue Imci). World Health Organization, 2011.
19. Potty, R. S., Sinha, A., Sethumadhavan, R., Isac, S., &

Washington, R. Incidence, prevalence and associated factors of mother-to-child transmission of HIV, among children exposed to maternal HIV, in Belgaum district, Karnataka, India. BMC Public Health. 2019; 19(386),4–13.

20. Charan, J., & Biswas, T. Review Article How to Calculate Sample Size for Different Study designs in Medical Research? Indian Journal of Psychological Medicine. 2013; 35(2), 121–126. https://doi.org/10.4103/0253-7176.116232.
21. Setia, M. S. Methodology series module 5: Sampling strategies. Indian Journal of Dermatology. 2016; 61(5), 505.
22. Leung, L. Validity, reliability, and generalizability in qualitative research. Journal of Family Medicine and Primary Care. 2015; 4(3), 324.
23. Kiyaga, C., Urick, B., Fong, Y., Okiira, C., Nabukeera-Barungi, N., Nansera, D., Ochola, E., Nteziyaremye, J., Bigira, V., Ssewanyana, I., Olupot-Olupot, P., Peter, T., Ghadrshenas, A., & Vojnov, L. Where have all the children gone? High HIV prevalence in infants attending nutrition and inpatient entry points: Journal of the International AIDS Society. 2018; 21(2), 1–7. https://doi.org/10.1002/jia2.25089.
24. Mugwaneza, P., Wa Shema, N. U., Ruton, H., Rukundo, A., Lyambabaje, A., Bizimana, J. de D., Tsague, L., Wagner, C. M., Nyankesha, E., Muita, J., Mutabazi, V., Nyemazi, J. P., Nsanzimana, S., Karema, C., & Binagwaho, A. Under-two child mortality according to maternal HIV status in Rwanda: Assessing outcomes within the National PMTCT Program. PanAfrican Medical Journal. 2011; 9, 1–13. https://doi.org/10.4314/pamj.v9i1.71215.
25. Mwau, M., Bwana, P., Kithinji, L., Ogollah, F., Ochieng, S., Akinyi, C., Adhiambo, M., Ogumbo, F., Sirengo, M., & Boeke, C. Mother-to-child transmission of HIV in Kenya: A cross-ectional analysis of the national database over nine years. PLoS ONE. 2017; 12(8), 1–15. https://doi.org/10.1371/journal.pone.0183860.
26. Okechukwu, A. Burden of HIV Infection in Children with Severe Acute Malnutrition at the University of Abuja Teaching Hospital Gwagwalada, Nigeria. Journal of HIV for Clinical and Scientific Research. 2015; 2, 055–061. https://doi.org/10.17352/2455-3786.000015.
27. Gamell, A., Luwanda, L. B., Kalinjuma, A. V., Samson, L., Ntamatungiro, A. J., Weisser, M., Gingo, W., Tanner, M., Hatz, C., Letang, E., & Battegay, M. Prevention of mother-to-child transmission of HIV Option B+ cascade in rural Tanzania: The One Stop Clinic model. PLoS ONE. 2017; 12(7), 1–15. https://doi.org/10.1371/journal.pone.0181096.
28. Kassaw, M. W., Abebe, A. M., Abate, B. B., Getu, M. A., & Zemariam, A. B. Mother to child HIV transmission and association among exposed infants after option B+ guideline implementation in the Amhara regional state referral hospitals, Ethiopia. International Journal of Infectious Diseases. 2020. https://doi.org/10.1016/j.ijid.2020.03.006.
29. Tsehay, A. K. Factors associated with HIV-positive sero-status among exposed infants attending care at health facilities in Bahir Dar administration, Ethiopia: Evidence from medical records Factors associated with HIV-positive sero-status among exposed infants attend. Cogent Medicine. 2019; 6(1),1–9. https://doi.org/10.1080/2331205X.2019.1623754.
30. Ngwende, S., Gombe, N. T., Midzi, S., Tshimanga, M., & Shambira, G. Factors associated with HIV infection among children born to mothers on the prevention of mother to child

transmission programme at Chitungwiza Hospital, Zimbabwe, 2008. BMC Public Health. 2013; 13(1181), 1–8.
31. Belachew, A., Tewabe, T., & Malede, G. A. Prevalence of vertical HIV infection and its risk factors among HIV exposed infants in East Africa: a systematic review and meta-analysis. Tropical Medicine and Health. 2020; 48(1). https://doi.org/10.1186/s41182-020-00273-0.
32. Huan, Z., Chow, E. P. F., Zhao, Y., Yang, W., Maozhi, T., Li, L., Xue, T., Xi, L., Yi, Z., Ailing, W.,Lo, Y. R., & Lei, Z. Prevention of mother-to-child HIV transmission cascade in China: A systematic review and meta-analysis. Sexually Transmitted Infections. 2016; 92(2), 116–123. https://doi.org/10.1136/sextrans-2014-051877.
33. Desta, M. L., Saravanan, M., Hilekiros, H., Kahsay, A. G., Mohamed, N. F., Gezahegn, A. A., & Lopes, B. S. HIV prevalence and risk factors in infants born to HIV positive mothers, measured by dried blood spot real-time PCR assay in Tigray, Northern Ethiopia. BMC Pediatrics. 2019; 19(1), 1–8. https://doi.org/10.1186/s12887-019-1636-y.
34. Anígilájé, Emmanuel Adémólá, Dabit, O. J., Ageda, B., Hwande, S., & Bitto, T. T. AIDS & Clinical Research the Prevalence and Predictors of HIV Infection among Children of Mothers who Missed Prevention of Mother to Child Transmission of HIV Interventions in Makurdi, Nigeria. Journal of AIDS & Clinical Research. 2013; 4(11), 4–10. https://doi.org/10.4172/2155-6113.1000249.

CITE AS: Lubuye Denis Senyonga (2023). HIV Sero-Status and Risk Factors of Sero-Positivity of HIV Exposed Children Below Two Years of Age at Mityana General Hospital in Mityana District, Uganda. IDOSR JOURNAL OF BIOCHEMISTRY, BIOTECHNOLOGY AND ALLIED FIELDS 8(3): 87-100. https://doi.org/10.59298/IDOSR/JBBAF/23/18.5796