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Factors Associated with Timely Immunization of HIV-Exposed Infants Attending the HIV/AIDS Clinic in Fort Portal Regional Referral Hospital

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ABSTRACT

Immunization is the process of giving a vaccine to a person to protect them against disease. Immunization has brought sound health to many HIV-infected children in the world, reduced the agony experienced by parents during child rearing, and reduced the mortality rate among children. This study assesses the factors associated with the timely immunization of HIV-exposed infants attending the HIV/AIDS clinic at Fort Portal Regional Referral Hospital. The specific objectives were to establish the pattern of timely immunization and determine the association between socio-economic and demographic factors and the timely immunization of HIV-exposed infants. A cross-sectional study design was used to determine quantitative measures with questionnaires in which the researcher used the interview method during data collection to facilitate the administration of questionnaires. The study showed that the prevalence of timely immunized HIV-exposed infants was 57.8%, also infants below 10 months were more likely to be timely immunized (p-value, 0.0378) than those more than 12 months of age. The study also found out that being employed 55/103 at a p-value of 0.03, and nearness to the health facility, <5km and at a p-value of 0.042, (88/103) were significant in children being timely immunized, while maternal education level, (p-value, 0.355) and religion (p-value, 0.185) were insignificant in determining whether an HIV infant gets timely immunized or not. The timely immunization prevalence is still below the 85% recommendation by WHO. Therefore, the government should do more sensitization regarding the immunization of HIV-exposed infants, health workers should do community outreaches to provide services closer to those unable to attain services from the health facility.

Keywords: HIV, Immunization, HIV-positive, Health facility, HIV-Exposed Infants.

INTRODUCTION

Immunization is a procedure that follows the process of delivering a vaccine to a person to protect them against disease. Conventionally it is the acquisition of immunity (protection) by immunization [1, 2]. It is similar to the immunity a person gets from a disease, but instead of getting the disease, you get a vaccine. Most vaccines are given by injection, some by mouth or through spraying into the nose; immunizations are also called vaccinations, needles, jabs, or shots. Vaccines contain the same germ that causes disease. But the germs have been killed or weakened so that they do not cause disease [3, 4]. The body is generally tricked into thinking that it has been infected with the disease therefore the body makes antibodies that will kill the germs that enter the body in disease form in the future. Immunization is an effective public health intervention to reduce morbidity and mortality among HIV-infected infants [5]. It is an important means of controlling diseases and has been considered the most cost-effective health intervention [6]. HIV is increasingly affecting the health and welfare of children and undermining hard-won gains in child survival in some of the highly affected countries. Recent estimates from UNAIDS suggest that, globally, about 2 million children younger than 15 years of age have HIV, 89% of whom live in sub-Saharan Africa [7]. Sub-Saharan Africa (SSA) has the highest prevalence of HIV-infected children globally [8-10]. A study by Kharsany and

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Karim [11] confirmed this as more than 70% of HIV-infected children lie in Sub-Saharan Africa. The study further attributed some of the reasons for this too high number of new HIV infections due to mother-to-child transmission during birth, low knowledge of the care of HIV-exposed children, and limited access to EMTCT services [11]. The Expanded Program on Immunizations (EPI) of the World Health Organization (WHO), in collaboration with UNICEF, recommends a narrow and accelerated immunization schedule for HIV-infected children [12]. A report released by the advisory committee on vaccines and immunization of the Uganda National Academy of Science showed that with 52 percent national immunization coverage, Uganda has the lowest number of fully immunized children in East Africa against the 89 percent target of the global immunization vision and strategy. This makes Uganda the country with the highest infant mortality rate in the region [13].

The current immunization coverage for HIV-exposed children in Africa is 67%, the acceptable minimum coverage of 80% is yet to be reached. According to WHO [14], some of the major contributing factors to poor immunization coverage for HIV-exposed children were parental HIV-associated stigma and poor sensitization of parents prior to delivery [14]. Immunization is an easy way to reduce vaccine-preventable childhood diseases. HIV-exposed children are at increased need for immunization against vaccine-preventable diseases (VPD) for they are more likely to acquire preventable disease due to their compromised immunity. To ensure an effective immune response to vaccines by HIV-exposed children and vaccine safety, early immunization of these children is mandatory [15, 16]. In Uganda, despite the efforts made by the Ministry of Health to end the surge of HIV transmission to children there still exists a gap in vertical transmission from mother to child [17]. This calls for timely immunization of these children to prevent immunization failure and complications resulting from the activation of live attenuated vaccines. Many children born to HIV-positive mothers are not fully immunized by the age of 12 months [18]. Ideally, childhood immunization coverage should be more than 80% of the target population in order to bring the desired objectives. Uganda stands at 52% national immunization coverage [13]. This means a high mortality rate for children, especially for HIV-exposed children. Most of the studies reviewed here indicated that there is low immunization coverage for HIV-exposed children and failure to meet their timely immunization schedule, particularly in developing countries. This research is intended to establish the factors associated with the timely immunization of HIV-exposed exposed infants attending the HIV/AIDS clinic at Fort Portal Regional Referral Hospital.

METHODOLOGY

Area of Study

The study was carried out at Fort portal regional referral hospital. The hospital is a public hospital, funded by the Uganda MoH built in the Kabarole District, Uganda.

Study design

A cross-sectional study design was used to determine quantitative measures with questionnaires. The researcher used the interview method during data collection to facilitate the administration of questionnaires. This design was preferred because it allows rapid data collection which saved time.

Study Population

The target population consisted of all children born to HIV-positive mothers between 1 to 12 months of age attending the HIV/AIDS clinic at Fort portal regional referral hospital. This age group was targeted because WHO recommends a timely and accelerated immunization schedule for HIV-exposed children which means an HIV-exposed child was expected to have received all the recommended vaccines on time by 12 months of age.

Sample procedure

The sample size for this study was derived from the total population of HIV-exposed children between 1 to 12 months of age attending HIV/AIDS clinic at Fort portal regional referral hospital which stands at 340. To determine the sample size; Small Sample Techniques by Krejcie (University of Minnesota) and Morgan (Texas A. & M. University) were used. From Table 1 of the Small Sample Technique, the sample size for a population of 340 is 181. Therefore, the sample size for this study is 181. The respondents were enrolled in a consecutive pattern as they come to the clinic until the sample size is complete.

Selection criteria

All children born to HIV-positive mothers between 1 to 12 months of age who are attending the HIV/AIDS clinic at Fort portal regional referral hospital were eligible for the study. The children who met the inclusion criteria but were not accompanied by their primary caregiver and those accompanied by a minor were not selected.

Data collection instruments

This study used questionnaires as the main tool for collecting data. The researcher helped facilitate the administration of questionnaires.

Quality control

To control the quality of the study, the researcher collected most of the data himself. The research assistants

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informed on effective data collection. To reduce errors and determine the validity and reliability of tools, the questions were pre-tested on five respondents from the target population. The data were analyzed and interpreted to check whether the respondents understood the questions well. Any necessary changes were made to the wording of the questions following the pre-test prior to the actual data collection activity.

Data analysis and presentation

Data was entered and analyzed using SPSS version 16.0. The data from the questionnaires were coded for easy entry and analysis. Cross tabs were used to test whether there is an association between the pattern of timely immunization and socio-economic and demographic factors. To test whether the association between the independent variables and the timeliness of immunization is statistically significant chi-square test was used. Significant tests such as chi-square P≤0.05 was also used.

Ethical considerations

Informed consent to participate in research was obtained from caregivers of the selected children.. The researcher provided the respondents with information on the purpose of the study, the expected duration of the interview, and any risks and benefits. The privacy and confidentiality of the study participants were protected. The names of the participants were recorded for privacy reasons. An approval letter from Kampala International University Research and ethics committee (KIU-REC) for permission to carry out the research project was obtained.

RESULT

Data Analysis and Presentation

Social demographic characteristics of attendants.

Table 1; shows the social demographic characteristics of caregivers, N=181

Variable	Frequency	Percentage
Age (years)		
18 - 29	**36**	19.88
30 - 39	89	49.17
40 years and above	56	30.9
Sex		
Females	152	84.0
Males	29	16.0
Education		
No formal education	25	13.8
Primary education	100	55.4
Post-primary education	56	30.8

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Religion		
Christian	126	69.6
Muslim	55	30.4
Marital status		
Married	151	83.1
Single	30	16.9

From the table above regarding the social demographic characteristics of the participants, 36(19.88%) were between 18 to 29 years of age, the majority 89(49.17%) were between 30 to 39 years, and at least 56(30.9%) were forty years and above. Regarding gender, the majority of participants 152(84.0%) were females while 29(16.0%) were males. More so, about educational level, the majority 100(55.4%) had obtained at least a primary level of education, 25(13.8%) had obtained no formal schooling while 56(30.8%) had obtained at least a secondary level of education. As far as religion was concerned, the majority of the participants 126(69.6%) were Christians while 55(30.4) were Muslims, and concerning marital status, 151(83.1%) were married while 30(16.9%) were single.

Table 2: showing age and place of delivery for the children under study. N=181

Variable	Frequency	Percentage
Age (months)		
0-11	101	55.97
12-59	80	44.02
The place from where the baby was delivered		
Health facility	119	65.0
Home	51	28.2
Traditional birth attendant	11	6.8

From Table 2 above, the majority of the children involved in the study 101(55.97%) were between 0 to 11 months of age, while 80(44.02%) of the children were between 12 to 59 months of age. Regarding the place where the child was delivered from, the majority of children 119(65.0%) were born in hospitals, 51(28.2%) were born at home, while at least 11(6.8%) of the children were born with the assistance of traditional birth attendants.

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Child's immunization status as per age

Table 3: Shows immunization status as per the age of the child.

Variable	**Frequency**	**Percentage**
Fully immunized	105	58.0
Partially immunized	69	38.0
Not immunized	07	4.0

From Table 3, above regarding the timely immunization of HIV exposure the majority of the children 105(58.0) were timely immunized, 69(38.0%) of the children were partially immunized as per WHO immunization schedule compared to age, while at least 7(4.0%) of the children were not yet immunized.

Association between child demographics and timely immunization status

Table 4: shows an association between child demographics and immunization status.

Variable	Timely immunized; n=104		Untimely immunized; n=77		p-value
	Frequency	Percentage	Frequency	Percentage	
Age					
0-11 months	65	62.2	27		0.038
12-59 months	39	37.8	50	35.0	
				65.0	
Place of delivery					
Health facility	74	71.3	57	74.4	0.974
Not health facility	30	28.7	20	25.6	

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From Table 4 above, regarding the association between immunization status of HIV-exposed infants with age, having an age below 12 months was significant to be timely immunized in HIV-exposed infants while having an age of above 11 months was a predisposing factor to being untimely immunized at p-value 0.038, this was correlative to majority 65(62.2%) of children who were immunized and were below 12 months and yet the majority of those who had had untimely immunization 50(65.0%) were above 11 months. From the same study, a place of delivery was not significant as to whether an HIV-exposed infant would be timely immunized or not at a p-value of 0.974 this was reflected in the majority of those timely immunized being born from hospitals, yet even in those with untimely immunization the majority were born from health facilities.

Association between social demographic factors and timely immunization.

Table 5: Shows an association between social demographic characteristics and timely immunization.

Variable	Timely immunized, n=104		Untimely immunized n=77		p-value
	Frequency	Percentage	Frequency	Percentage	
Education level					
Primary	70	66.0	52	67.5	0.355
Post-primary	34	33.9	25	33.5	
Occupation					
Unemployed	48	46.1	45	58.9	0.028
Employed	56	53.9	32	41.1	
Religion					
Christian	71	68.8	56	72.8	0.185
Muslim	33	31.2	21	27.2	
Distance from health facility					
Less than 5km	87		35	45.5	0.042

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5km or more	17	83.9	42	54.5

16.1

Regarding the association between social demographics and immunization schedule, maternal education was not significant (p-value=0.355) to whether the child is timely immunized or not, this was seen in the majority 70(66.0%) of the timely immunized infants being of mothers of primary education as well majority 52(67.5%) of those untimely immunized being of primary level of education. From the study also, children of mothers who were employed were more likely to be timely immunized at 56(53.9%); p-value 0.028 than those of unemployed mothers at 48(46.1%). This was also seen with the majority of the children of unemployed mothers being untimely immunized at 45(58.9%). More so, regarding religion, the majority of the children who were timely immunized were from Christian mothers at 71(68.8%) and so were those who were untimely immunized at 56(72.8%); the least of those who were timely immunized were Muslims at 33(31.2%) and so were those who were untimely immunized at 21(27.2%), this shows that religion was not a significant factor at (p-value 0.185) as to whether a child is timely immunized or not. From Table 4, it was found out that being nearer to a health facility with immunization services in less than 5 km distance was a significant factor in having a child timely immunized, this was observed with the majority of the children who were timely immunized 87(83.9%) coming within a 5 km radius distance into the nearest health facility while those who were untimely immunized majority 37(54.4) coming from a distance above 5km, this shows nearness to a health facility (less than 5 km), was a protective factor (p-value=0.042) for the HIV infant to be timely immunized.

DISCUSSION

Social demographic characteristics of attendants.

From the study regarding the social demographic characteristics of the participants, 37(19.88%) were between 18 to 29 years of age, the majority 89(49.17%) were between 30 to 39 years, and at least 56(30.9%) were forty years and above, more so the majority of participants 152(84.0%) were females while 29(16.0%) were males, additionally 100(55.4%) had obtained at least a primary level of education, 25(13.8%) had obtained no formal schooling while 56(30.8%) had obtained at least a secondary level of education, education usually affects one's perception towards immunization and affects one's immunization seeking behavior, a review from other studies by Joseph et al, 2014 had also shown that parents of low level of education were less likely to be up-to-date with newer vaccines and hence their children were less likely to be vaccinated with these vaccines. As far as religion was concerned, the majority of the participants 126(69.6%) were Christians while 55(30.4) were Muslims, and concerning marital status, 151(83.1%) were married while 30(16.9%) were single. Also, the majority of the children involved in study 101(55.97%) were between 0 to 11 months of age, while 80(44.02%) of the children were between 12 to 59 months of age. Children's age has a correlative impact on immunization because a schedule has to be followed for a particular age. In comparison, a study by Sensarma *et al.* [19] carried out in India found that more than one-fourth of children of HIV-infected mothers living in Kolkata city are not completely immunized by 12 months of age. Regarding the place where the child was delivered from, the majority of children 119(65.0%) were born in hospitals, 51(28.2%) were born from home, and at least 11(6.8%) of the children were born with the assistance of traditional birth attendants. The place of delivery enables the mother to be health educated about the immunization schedule requirements. A comparison with a study by Basel *et al.* [20] conducted in Nepal among HIV-exposed infants showed that children of lower socio-economic status were more likely to have late vaccination and higher dropout rates.

Child's immunization status as per age.

From the study, regarding the timely immunization of HIV exposure, the majority of the children 105(58.0) were timely immunized, 69(38.0%) of the children were partially immunized as per WHO immunization schedule compared to age, while at least 7(4.0%) of the children were not yet immunized. This study shows the majority of the children had been immunized although the percentage falls short of WHO standard [14].

Association between child demographics and timely immunization status

Regarding the association between immunization status of HIV-exposed infants with age, having an age below 12 months was significant to be timely immunized in HIV-exposed infants while having an age of above 11 months was a predisposing factor to being untimely immunized at a p-value 0.038, this was correlative to majority 65(62.2%) of children who were immunized and were below 12 months and yet the majority of those who had had untimely immunization 50(65.0%) were above 11 months, this could be because by 11 months most of the mothers are accustomed to the various dates of immunization since they are close to each other than those after 11 months of age, a comparison with other studies shows a correlation between this study and a study by Sensarma *et al.* [19] who found out that more than one-fourth of children of HIV-infected mothers living in Kolkata city are not

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completely immunized by 12 months of age. From the same study, a place of delivery was not significant as to whether an HIV-exposed infant would be timely immunized or not at a p-value of 0.974. This was reflected in the majority, 74(71.3%) of those timely immunized being born from hospitals, yet even in those with untimely immunization the majority 57(74.4%) were born from health facilities. This study shows that the majority of the HIV-exposed children 74(71.3%) were timely immunized but it still didn't reach the WHO [14] baseline requirement of 85%. According to Sensarma *et al.* [19] deteriorating socioeconomic status, tightening of the time schedule of caregivers due to illness in the family, stigma, discrimination, and lack of awareness about immunization prove to be major barriers to immunization of the HIV-exposed children.

Association between social demographic factors and timely immunization.

Regarding the association between social demographics and immunization schedule, maternal education was not significant (p-value=0.355) to whether the child is timely immunized or not, this was seen in the majority 70(66.0%) of the timely immunized infants being of mothers of primary education as well majority 52(67.5%) of the untimely immunized being of primary level of education. Education provides people with vast information regarding immunization. However, this study shows a discrepancy from a study by Malina *et al.* [21], in which a study conducted in Kenya among HIV-positive, showed maternal education as one of the factors that was significantly associated with timely immunization. Another study by Hu *et al.* [22] in China showed that increasing the education level of the parents, especially mothers can improve untimely immunization coverage among HIV-exposed children. From, the study also, children of mothers who were employed were more likely to be timely immunized at 56(53.9%); p-value 0.028 than those of unemployed mothers at 48(46.1%). This was also seen with the majority of the children of unemployed mothers being untimely immunized at 45(58.9%), this could be because employed mothers have the income to cater for any costs involved in immunization requirements, when this study is compared with other studies, Mother's occupation and that of her partner are important in the attainment of timely childhood immunization. A study by Bbaale [23], showed that Children whose parents held white-collar jobs were more advantaged to have timely immunization as compared to those in agriculture, blue-collar jobs, and services/salesman. A study by Streefland *et al.* [24] in 2013 showed that untimely immunization was common among poor populations and in peripheral areas mainly due to the inability to afford transportation to bring the child to immunization clinics. More so, regarding religion, the majority of the children who were timely immunized were from Christian mothers at 71(68.8%) and so were those who were untimely immunized at 56(72.8%); the least of those who were timely immunized were Muslims at 33(31.2%) and so were those who were untimely immunized at 17(16.1%). This shows that religion was not a significant factor as to whether a child is timely immunized or not. The majority being Christians could be because the community is more dominated by Christians and not because of immunization significance. This study result is different from a WHO report from a polio-endemic region in Kenya which stated that only a total of 16% of children were adequately vaccinated in that region; the main reason being that the community was predominantly of Muslim background and believed that polio drops were used as a tool for causing sterility in the children and had been shunned by community leaders. This led to a substantial rise in Polio cases in that area [21-25]. From this study, it was found out that being nearer to a health facility with immunization services in less than 5 km distance was a significant factor in having a child timely immunized. This was observed with the majority of the children who were timely immunized 87(83.9%) coming within a 5 km radius distance into the nearest health facility while those who were untimely immunized majority 35(45.5) coming from a distance of above 5km. This shows nearness to a health facility (less than 5 km), was a protective factor for the HIV infant to be timely immunized. This could mean being nearer the health facility involves fewer costs for one to take a child for immunization. Breiman *et al.* [25] in their study showed that distance of vaccination from health centre also affects the vaccination uptake, especially, in the context of developing countries.

CONCLUSION

The study concludes that the prevalence of timely immunized HIV-exposed infants was 59.8% which is below the 85% recommendation by WHO. The study concludes that infants below 11 months were more likely to be timely immunized than those more than 12 months of age. The study also concludes that being employed and nearness to the health facility, <5km were significant in children to be timely immunized, while maternal education level, and religion were insignificant in determining whether an HIV infant gets timely immunized or not. It is recommended that the government should do more sensitization regarding the immunization of HIV-exposed infants.

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