

## **Incidence and Determinants of Diarrheal Cases in Children Under Five Admitted at Kampala International University Teaching Hospital, Ishaka-Bushenyi District, Western Uganda**

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### **ABSTRACT**

Diarrhoea stands as a significant global public health issue, with the WHO reporting approximately 2.5 billion cases annually among children below five years old. This study aimed to ascertain the prevalence of diarrhoea and its influencing factors in children under five admitted to Kampala International University Teaching Hospital (KIU-TH). Employing a cross-sectional and descriptive approach, quantitative data was gathered through self-administered and investigator-led questionnaires, utilizing digital tools such as Google Sheets for data collection. A total of 238 mothers, randomly selected using convenience sampling, whose children were admitted at KIU-TH constituted the study's sample. The results, presented through 95% Confidence Intervals (C.I), Odd Ratios (OR), and P-values, were computed using Binary Logistic Regression with Pearson's correlation in SPSS Version 26, and graphically represented using Microsoft Excel Software. At the time of data collection, the prevalence of diarrhoea among children under five admitted at KIU-TH stood at 24.4% based on maternal responses. This high prevalence was found to be influenced by several factors, including the child's vaccination status, the early introduction of supplementary foods, premature weaning practices, and the child's age. Notably, exclusive breastfeeding practices were not adhered to, with mothers introducing other foods at a young age and initiating early weaning practices.

**Keywords:** Diarrhoea, Children under five years of age, Vaccination status, early weaning.

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### **INTRODUCTION**

Diarrhoea is one of the major public health concerns worldwide. The World Health Organization estimates that 2.5 billion cases of diarrhoea occur yearly among children under five years of age. The same report further indicates that nearly three-quarters of child deaths are due to diarrhoea [1]. In 2015, it was reported that 16,000 children under five die every day from mostly preventable causes such as pneumonia, diarrhea, and malaria. 80% of these cases are in Africa and South Asia (46% and 38% respectively) [2]. In Africa, a study done by the Center for Infectious Disease Research and Policy (CIDRAP) in 2015 showed that Nigeria had the most variance of disease rates among African countries, with estimates ranging from 1.6 deaths per 1000 children to 9.5 deaths per 1000 children and according to this study all the severe cases of diarrhea occurred in Ethiopia and democratic republic of Congo [3]. Uganda was ranked number 9 among

the countries with the highest number of diarrhea cases under five with 29,000 deaths due to diarrhea [2]. According to the annual Health Sector Performance Report AHSPR (2013), diarrhea is number six among the top ten causes of under-five years of morbidity and mortality in Uganda [4]. It accounts for 3.4% of under-five-year mortality. AH-SPR 2013 report further shows an increase in the trend from 1.84% in 2011 to 3.4% in 2013. Overall, these children experience an average of 3.2 episodes of diarrhea per child per year [4]. Demographic and Health Survey (UDHS 2011) conducted by the Uganda Bureau of Statistics (UBOS) indicates that in Uganda the prevalence was 20% in 2011 and 23% in 2016. This shows an increase in the trend of diarrhea cases in the country [5]. Globally, in 2015, 5.9 million children under the age of 5 years died, and the majority of these children were in the African region [6]. Most of these mortalities

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occurred as a consequence of diarrhea and acute respiratory infections [2]. Uganda is among the countries where the burden of childhood diarrhea is heavily concentrated (IVAC, 2014). The incidence varies greatly with seasons and children's age, highest in the rainy season and among children aged 6-11 months [5]. Some of the risk factors include nutrition, environmental pollution, population increase, and climate change [7, 8]. Poor sanitation, lack of access to clean water supply, and inadequate personal hygiene are responsible for 90% of diarrheal disease occurrence [9-12]. Diarrhea prevalence increases with age and peaks at 12-23 months (33%), then declines at older ages [13]. It is therefore necessary to identify

associated factors leading to the increase of diarrhea using Kampala International University Teaching Hospital. More so, there is no documented data about Ishaka, Bushenyi district that explains associated factors leading to an increase in the number of diarrhea cases in children under five years, which is also the same case at Kampala International University Teaching Hospital. These factors have not been well understood and this remains a problem. This study will help to identify maternal and child factors associated with the increasing cases of diarrhea among children under five years of age admitted at Kampala International University Teaching Hospital.

#### METHODOLOGY.

##### Study Design

The research design was cross-sectional and descriptive using quantitative and qualitative approaches. This design entails that the information or data gathered will represent the population and is to be obtained at only one point in time.

##### Area of Study

Kampala International University Teaching Hospital is located in Ishaka town which is a municipality in Bushenyi district. The population of Bushenyi Ishaka municipality is 41,219 (census 2014). It is found approximately 62 kilometers west of Mbarara town. Ishaka has a population of 16,646 where females are 8,840. KIU-TH has a bed capacity of 700, providing both outpatient and inpatient services.

##### Study Population.

All mothers with children under five years admitted at KIU-TH

##### Inclusion Criteria

Children under five years admitted at KIU-TH. Mothers to these children who have consented.

##### Exclusion Criteria

Mothers with children above five years admitted at KIU-TH.

##### Sample Size determination.

The sample size was determined using the Kish Leslie [14] and the prevalence (p) which was 23% of children with diarrhoea under five years as reported by UDHS (2016)

$$n = z^2 P (1 - p) / E^2 n = \text{sample size}$$

Z=1.96 - approximate 95% confidence level. P -prevalence (23%).

$$E=5\%(0.05), \text{ which is the margin of error. } n = 1.96^2 \times 0.23 (1-0.23) / 0.05^2$$

$$n = 272$$

n = 272 as the minimum sample size for this study.

##### Sampling Technique Procedure

A consecutive sampling technique was used, where every patient that meets the inclusion criteria was selected until I got to the required sample size. All mothers with children under five years who met the inclusion criteria were approached and invited to participate in the study.

##### Data Collection tools, methods, and management

This involved the distribution of structured and closed-ended questionnaires to the mothers to answer them. The questionnaire was designed into sections; Demographic section, maternal factors section, and child factors section. The questionnaire was developed in English and translated into Runyankole. The questionnaire was first pretested before the actual data collection to check whether the questions and responses were appropriate. The pretest was done on mothers with children above 5 years of age since these were among the selected mothers for the study. Data was further checked by the researcher and the supervisor from the field for completeness.

##### Data analysis

Data was entered using Microsoft Excel version 13 and was analyzed using STATA version 14.0. The information was summarized in the form of graphs, pie charts, narrations, and tables to give descriptive statistics as per the theme of the study in one way or another. The percentage of diarrhoea in children under 5 years admitted at KIU-TH was analyzed in

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terms of and percentage with a 95% confidence interval and information was summarized in the form of tables, pie charts, and narrations. The child factors associated with diarrhoea in children under 5 years admitted at KIU-TH were assessed using Binary logistic regression. Both bivariate and multivariate logistic regression analyses were carried out. The variables in the final multivariate model were significant when  $p \leq 0.05$ . The measure of association was reported as odds ratios (ORs) with corresponding 95% CI and p-value. To establish the child factors that are independently associated with diarrhoea in children under 5 years admitted at KIU-TH, a multivariate logistic regression was run with the factors having p-values less than 0.2. The maternal factors associated with diarrhoea in children under 5 years admitted at KIU-TH were assessed using Binary logistic regression. Both bivariate and multivariate logistic regression analyses were carried

out. The variables in the final multivariate model were significant when  $p \leq 0.05$ . The measure of association was reported as odds ratios (ORs) with corresponding 95% CI and p-value. To establish the maternal factors that are independently associated with diarrhoea in children under 5 years admitted at KIU-TH, a multivariate logistic regression was run with the factors having p-values less than 0.2.

#### Quality control.

To ensure quality control, questionnaires were pretested, assistants were trained and necessary adjustments were made.

#### Ethical consideration.

Voluntary recruitment was done and informed consent was signed. Informed consent from participants was obtained after fully explaining the details of the study to them in English and local languages like Runyankole. The participants were not forced to enroll themselves against their will.

## RESULTS

### Social-demographic characteristics of the study population

A total of 272 children from the age of 6 months to 4 years were studied with a response rate of 87.5%. Table 1 below shows the distribution of the study population by demographic characteristics. The results are based on the 238 respondents having a child's age, the status of vaccination, and the weaning

age of the child. The majority of the children with diarrhoea were 1 year of age (25%), this study also showed that children with incomplete vaccination had diarrhoea were 147(61.8%) and those who had completed vaccination were only 91(38.2%), the study also showed weaning age child below 1 year with diarrhoea was 174(73.1%) and those with weaning age above 1 year were only 64(26.9%).

**Table 1: Socio-demographic findings for child**

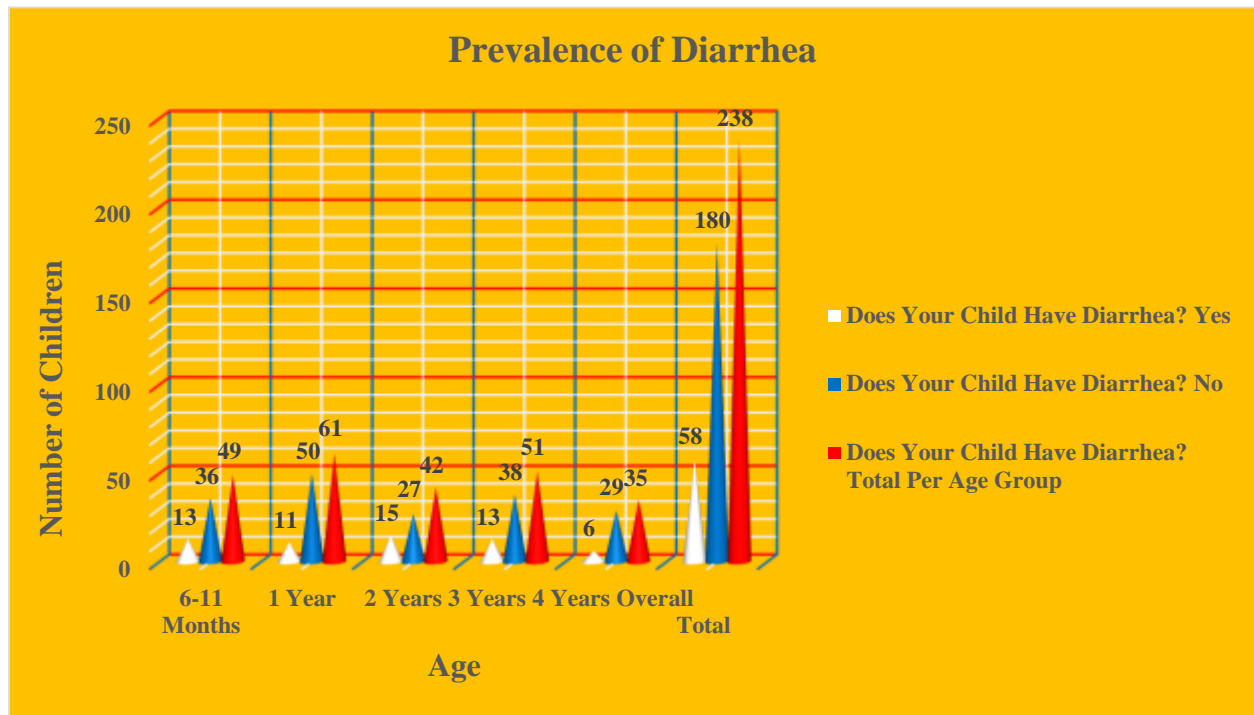
Variables	Frequency	Per cent
<b>Age</b>		
6-11months	49	20.6
1year	61	25.6
2years3years4years	42	17.6
	51	21.4
	35	14.7
<b>Vaccination</b>		
Complete	91	38,2
Incomplete	147	61.8
<b>Weaning age</b>		
<1year	174	73.1
>1year	64	26.9

**Table 2: Socio-demographic findings for mothers**

<b>Variables</b>	<b>Frequency</b>	<b>Percent</b>
<b>Age</b>		
Below 25 years	19	8
Above 25years	219	92
<b>Education</b>		
Primary	56	23.5
Secondary	54	22.7
Tertiary	81	34
University	47	19.7
<b>Exclusive breastfeeding</b>		
3-4months	159	66.8
5-6months	56	23,5
>6months	23	9.7

Table 2 above shows socio-demographic findings for mothers (age, education level and breastfeeding status) and this study showed that the majority of children with diarrhoea were from mothers above 25 years of age 219(92%), and those from mothers below 25 years were only 19(8%).mothers whose education level was

tertiary level had the highest number of children withdiarrhae81(34%), also showed that mothers who breastfed exclusively between 3-4months their children had the highest number of diarrhea159(66.8%) followed by those between 5- 6months 56(23.5%) then those above 6months were only 23(9.7%).



**Figure 1: Prevalence of Diarrhea in Children under the Age of Five as Studied at Kampala International University Teaching Hospital October 2021**

The figure shows that diarrhoea is more prevalent in children of 2 years who account for 15(25.8%) of the overall total (58) of children with diarrhoea. The figure further depicts that children of 3 years

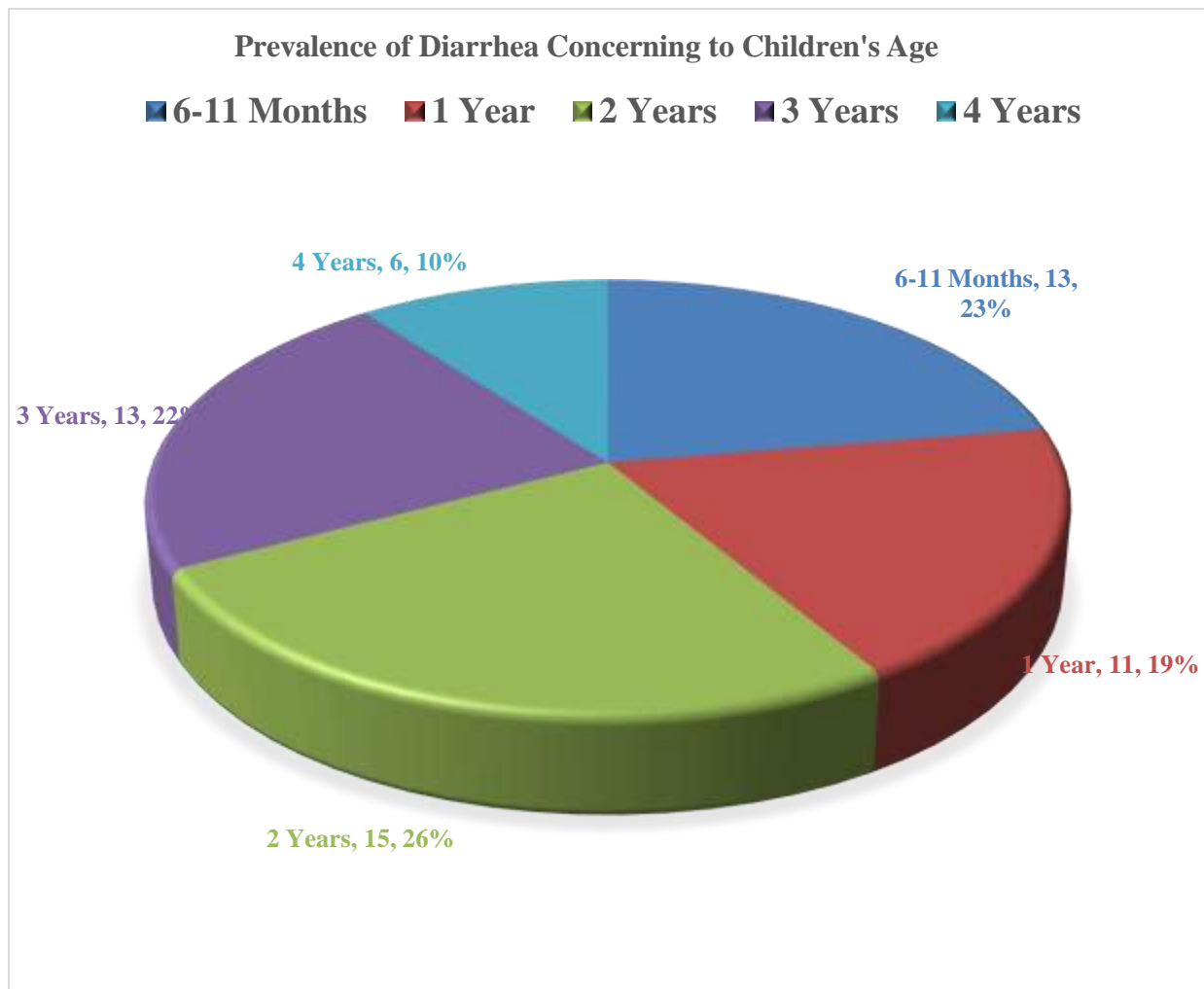
follow with 13(22.4%), then children of 6-11 months who account for 13(22.4%), children of 1 year 11(18.9%) and children of 4 years having the least prevalence of 6(10.5%).

**Table 3: Total Prevalence of Children with Diarrhea Under Five Years Admitted At KIU-TH**

Category	Diarrhoea	
	Yes	No
Percentage For Each Category	24.4%	76.6%

Table 3 above shows total percentage of children under five years admitted at

Kampala International University Teaching Hospital with diarrhea which is 24.4%.



**Figure 2: Percentage Prevalence of Diarrhea in Children under the Age of Five with respect to Age as Studied at Kampala International University Teaching Hospital October 2021**

Figure 2 above shows that diarrhea is more in children of 2 years who account for 26% of all the children who were reported to have diarrhea at the time of the study, children of 6-11 months follow in the trend with 23% and those of three years who are 22% of the total children with diarrhea.

Diarrhea is seen to be relatively lower in the children aged 4 years who accounted for 10% of all the children with diarrhea; comparative reference made to figure 4 gives a clear picture on the incidence of diarrhea among children under the age of five.

**Binary and multivariate logistic analysis for child factors****Table 4: Binary logistic analysis of child factors associated with children under five years to diarrhea**

		yes	no	OR(95%CI)	P-value
Age of the child	6-11months	13	36	1	0.545
	1 year	11	50	0.819	0.737
	2 years	15	27	0.627	0.401
	3years	13	38	0.462	0.177
	4years	6	29	0.535	0.259
Incomplete vaccination	yes	23	68	1	
	no	35	112	0.947	0.837

**Table 5: multivariate logistic analysis of child factors associated with children under five years of diarrhoea**

Predictors	Diarrhea		AOR	95% Confidence interval		P-Value
	Yes	No		Lower	Upper	
<b>Child's Age</b>						
<b>6-11 Months</b>	13	36	1			0.545
<b>1 Year</b>	11	50	0.819	0.256	2.624	0.737
<b>2 Years</b>	15	27	0.627	0.21	1.866	0.401
<b>3 Years</b>	13	38	0.462	0.151	1.418	0.177
<b>4 Years</b>	6	29	0.535	0.181	1.585	0.259
<b>Incomplete vaccination</b>						
<b>Yes</b>	23	68	1			
<b>NO</b>	35	112	0.947	0.566	1.586	0.837
<b>Weaning Age</b>						
<b>Below 1Year</b>	46	128	2.57			0.267
<b>Above 1 Year</b>	12	52	0.857	0.452	1.624	0.636

Table 5 shows the association of child factors with the incidence of diarrhoea; the odds of children getting diarrhoea are seen to decrease with age; there is a modest discrepancy in odds seen with the age of above 1 year however, this could be due to other factors; those with incomplete vaccination are observed to have higher odds of getting diarrhoea than those with complete vaccination; Children weaned at the age below 1 year are seen to have diarrhoea more than those weaned at

above 1 year; therefore, the odds of getting diarrhoea are seen to reduce with increasing weaning age of the child, the older the child the more unlikely they are to get diarrhoea.

**Maternal factors associated with diarrhoea in children under five years**

According to Table 6 below mother's education, age and exclusive breastfeeding had values with p-p-value < 0.2 thus were proceeded to the multivariate stage.

**Table 6: Binary logistic analysis of maternal factors associated with diarrhoea in children under five years**

Variables	Diarrhea		OR (95% CI)	P-value	
	yes	no			
Mother's education	primary	11	45	1	0.257
	secondary	17	37	1.333	0.539
	Tertiary university	16	65	0.511	0.107
		14	33	0.878	0.676
maternal age	>25years	11	08	1	0.796
	<25years	47	172	3.25	0.027
Exclusive breast feeding	3-4months	12	11	0.536	0.191
	5-6months	19	37	0.29	0.006
	>6months	27	132	0.444	0.008

**Table 7: Multivariate Analysis for Maternal Factors associated with diarrhoea in children under the age of five admitted at Kampala International University Teaching Hospital.**

Predictors	Diarrhea		AOR	95% Confidence Interval		P-Value
	Yes	No		Lower	Upper	
Mother's Education						
<b>Primary</b>	11	45	1			0.257
<b>Secondary</b>	17	37	1.333	0.532	3.342	0.539
<b>Tertiary</b>	16	65	0.511	0.226	1.157	0.107
<b>University</b>	14	33	0.878	0.477	1.617	0.676
Occupation						
<b>Casual Laborer</b>	19	50	1			0.83
<b>Self-Employed</b>	32	105	0.929	0.5	1.729	0.817
<b>Civil Servant</b>	7	25	0.772	0.331	1.799	0.549
Maternal age						
<b>Above 25 years</b>	11	8	1			0.796
<b>Below 25 years</b>	47	172	3.25	1.141	9.262	0.027
When do you normally Introduce Supplementary feeding to your children?						
<b>3-4 Months</b>	12	11	0.536	0.211	1.363	0.191
<b>5-6 Months</b>	19	37	0.29	0.12	0.7	0.006
<b>Above 6 months</b>	27	132	0.444	0.244	0.807	0.008

Table 7 shows the association of maternal factors with the incidence of diarrhoea in children. It is clearly shown that children of mothers with a lower education level (primary and secondary) had the highest odds of getting diarrhoea, however, the trend is seen to skew towards mothers who had attained university in which their children's odd ratio of getting diarrhoea is seen to be higher than that of mothers who went for tertiary institutions; Age of the

mothers is seen to show a counter-acted skewness from conventional acceptance where we observe that children from mothers above 25 years have the highest odds of getting diarrhoea whereas those who are from mothers below 25 years seem to do quite better; Supplementary food introduction at the age of 3-4 months is seen to show greater odds of causing diarrhoea in children under five; with a discrepancy seen with the age of 6 months.



## DISCUSSION

### Prevalence of Diarrhea

This study was a cross-sectional and descriptive study that focused on the determination of prevalence and factors influencing acute watery diarrhoea in children under the age of five admitted at Kampala International University Teaching Hospital- Ishaka, Bushenyi district, Western Uganda. The study showed that the overall prevalence of diarrhoea among children under five admitted at Kampala International University Teaching Hospital was 24.4% at the instant of data collection based on the responses given by the children's mothers. This prevalence was shown to be significantly associated with several factors including health service-seeking behavior, weaning age, breastfeeding practices, and initiation of supplementary feeding which showed the highest odds of influencing diarrhoea in children under the age of five. The significance of these variables was computed using Pearson's correlation of which health service-seeking behavior was significant with a value of 0.139\*(P=0.021); frequency of breastfeeding being significant with a value of 0.286\* (P=0.000); health service-seeking behavior was shown to be significant with a value of 0.131\*(P=0.021) with a 2 tailed test at 95% confidence level, P<0.05. It is widely recognized that diarrhoea is a major cause of morbidity and mortality among children, especially children in developing countries. Low socio-economic status, limited education, poor environmental sanitation, and low hygienic practices pose a serious threat to people's health, especially children's health. Risk factors for diarrhoea vary with the child's age, the pathogens involved, and the local environment [15, 16]. The prevalence of diarrhoea among children under five at KIU-TH was 24.4%. This is higher than the 23% diarrhoea prevalence in Uganda and the 24% prevalence in the northern region [5]. Other studies also reported diarrhoea prevalence above the national rate at 32% and 40.3% respectively [17]. The fact is that it is not common for all diarrhoea cases to be captured at health facilities; it will depend on community healthcare-seeking behavior. Other diarrhoea cases are managed at home or by traditional health attendants, the data will be missed in the

health records thus underestimating the magnitude of diarrhoea in the community. So, the observed prevalence might be the true prevalence of diarrhoea [18].

### Child Factors

The child factors with incidence of diarrhoea in this study showed that odds of children getting diarrhoea are seen to decrease with age; there is a modest discrepancy in odds seen with the age of above 1 year however, this could be due to other factors. Those with incomplete vaccination are observed to have higher odds of getting diarrhea than those with complete vaccination. Children weaned at the age of below 1 year are seen to have diarrhea more than those weaned at above 1 year; therefore, the odds of getting diarrhoea are seen to reduce with increasing age of weaning the child, the older the child the more unlikely they are to get diarrhea [19]. Similarly, the study done by Anne Node Muli [20] in Uganda showed that the weaning age of the child was significantly associated with diarrhoea, whereby the occurrence of diarrhoea decreased with the increasing weaning age of the child. This may be due to complications associated with early weaning like malnutrition that is accompanied by diarrhoea. Children from this study who completed vaccination had a lower odds ratio compared to those with incomplete vaccination. This is in line with the study done by Biering-Sørensen et al. [21] which also showed that children under five years who completed their vaccination had been few compared to those with incomplete vaccination. This may be because a child who has been taken for immunization has a higher chance of also receiving vaccines against diarrhea for instance the rotavirus and pneumococcal vaccines, where they are available. The age of the child is associated with diarrhea and from this study, the older the child the lower the risk of getting diarrhea. This is also in line with the study done by Anne Node Muli [20] in Uganda that showed that the age of the child was significantly associated with diarrhoea, whereby the occurrence of diarrhoea decreased with the increasing age of the child. This occurrence was highest in the age group 12-23 months. Other studies have shown that the highest incidence and deaths due to diarrhoea

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occur in children less than 2 years of age [22, 23]. From this study, this could be because as a child grows the immunity also matures reducing cases of diarrhoea as they grow also as they grow their sense of self-care for good hygiene improves reducing chances of getting diarrhoea.

#### **Maternal Factors**

The maternal factors in this study have been associated with the high prevalence was shown to be significantly associated with several factors including; breastfeeding practices and initiation of supplementary feeding which showed the highest odds of influencing diarrhoea in children under the age of five. The significance of these variables was computed using Pearson's correlation of health service-seeking behaviour being significant with a value of 0.139\*(P=0.021), and frequency of breastfeeding being significant with a value of 0.286\* (P=0.000). Also from this study about mother's age, children from mothers above 25 years with diarrhoea were greater than those from mothers below 25 years. The older the mother the less the probability of the under-five child having diarrhoea [24]. But in this study, it was the opposite. This was in line with a cross-sectional study conducted in Ghana to determine the risk factors associated with diarrhoea morbidity among under-five children [25].

The prevalence of diarrhoea among children under five admitted at Kampala International University Teaching Hospital, Bushenyi District is high (24.4%). Maternal factors attributed to this high prevalence are influenced by factors including health service-seeking behavior, the introduction of supplementary foods to children at early ages, weaning children at early ages, and frequency of breastfeeding per day. Mothers do not practice exclusive breastfeeding; however, they introduce their children to other foods at a very early age coupled with the early weaning of children. Child factors like age and weaning age also play a role but not so

These studies also are the opposite of studies the reason may be because at home these young mothers are still energetic and have fewer responsibilities so they go to hospitals to seek medical attention on time. According to the study also conducted by Bale [26] in Uganda found that diarrhoea occurrence in children under 5 years was associated with the mother's age the higher the maternal age the lower the prevalence of diarrhea in children below 5 years. It is clearly shown that children of mothers with a lower education level (primary and secondary) had the highest odds of getting diarrhoea, however, the trend is seen to skew towards mothers who had attained university in which their children's odd ratio of getting diarrhoea is seen to be higher than that of mothers who went for tertiary institutions. Compared to the study done by Hussein [24], the level of the mother's education was also positively associated with the occurrence of diarrhoea among children under five years of age where the higher the education of the mother the less the odds of the child experiencing diarrhoea episodes. From this study, the reason for this could be that mothers in a home with low education level have less knowledge about diarrhoea making their children under 5 years with higher numbers of diarrhea [27]-[29].

#### **CONCLUSION**

much like maternal factors.

#### **Recommendations**

Intensive health education and awareness campaigns on the importance of breastfeeding to children should be done to equip mothers with tactical knowledge. This will reduce the burden of diarrhoea in children under five. Breastfeeding health education services should be integrated into health facilities for all breastfeeding mothers and expectant mothers. More effort must be applied to spread awareness about proper health services by mothers to seek specialized healthcare from properly equipped health facilities with trained health workers.

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