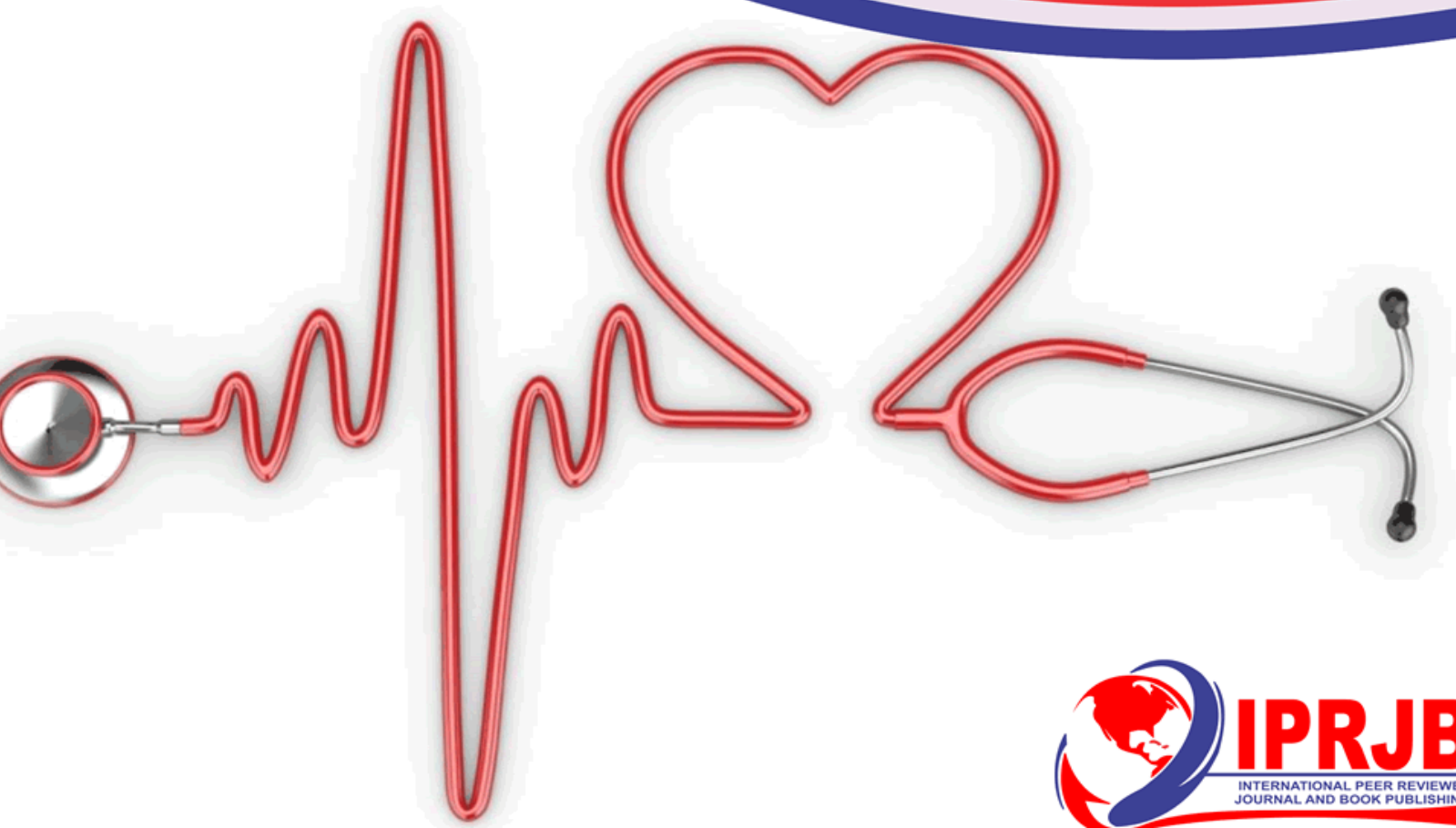


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FACTORS ASSOCIATED WITH ACUTE DIARRHOEA AMONG ROTAVIRUS VACCINATED CHILDREN AGED 11-23 MONTHS IN KISUMU EAST SUB-COUNTY

Jane Achieng' Ochogo, Mr. John Arudo and Mr. Gregory Sakwa



**FACTORS ASSOCIATED WITH ACUTE DIARRHOEA AMONG ROTAVIRUS
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COUNTY**

^{1*}Jane Achieng' Ochogo

Graduate Student: School of Nursing, Midwifery and paramedical sciences Masinde
Muliro University of science and Technology, Kenya corresponding authors
Email: ochogojane@yahoo.com

²Mr. John Arudo

Dean School of Nursing, Midwifery and Paramedical sciences: Masinde Muliro
University of Science and Technology, Kenya

³Mr. Gregory Sakwa

Lecturer, Nursing Department of community health and Extension, school of Nursing,
Midwifery and Paramedical sciences

Abstract

Purpose: To investigate the relationship between behavioral factors and acute diarrhea among rotavirus vaccinated children aged 11-23 months in Kisumu East sub-County

Materials and Methods: An observational cross-sectional sample design was used to carry out a study in Kisumu East Sub-County. Data was collected by trained field workers and community health volunteers who were residents of the 3 identified sub locations in Kisumu East Sub-County that was Nyalenda A, Manyatta B and Kolwa Central which included Nyalunya and Kasule. For quantitative results Multivariate logistic regression analysis was used to determine association between behavioral factors and acute diarrhea among rotavirus vaccinated aged 11-23 months in Kisumu East Sub-County. Data on Participants regarding behavioral factors influencing acute diarrhea among rotavirus vaccinated children aged 11-23 months in Kisumu East Sub-County, were collected with structured questions using Stata version 14 computer software. Data entry analysis was performed. Logistic regression analysis was conducted and the odds ratio was used in Kisumu East Sub-County to assess the relationship between behavioral factors and acute diarrhea among rotavirus vaccinated children aged 11-23 months. The multivariate analysis considered all variables with P values <0.05 was used to establish statistical significance.

Findings: Bivariate analysis on behavioral factors and caregiver practices influencing diarrhea in children. Having soap for hand washing (OR: 2.0; 95% CI: 1.2 -3.4 p = 0.008), having piped water as the main source of drinking water (OR: 2.6, 95% CI: 1.5 – 4.6; p = 0.0006), using pit without slab where child's feaces are disposed were all associated with increased likelihood of cases of diarrhea among children (OR: 2.6; 95% CI: 1.2 -5.4; p= 0.01). It is worth noting that respondents who had pot without tap for water storage were upto 14.5 times more likely to have reported their children having diarrhea, the result however not statistically significant (p = 0.09). The chances of children presenting with diarrhea in the past 14 days prior to the survey was likely in the following situations: Washed hands after handling child's feaces, napkins or diapers, (OR: 0.6; 95% CI: 0.4 -1.0; p= 0.030) or washing hands after visiting toilet/before preparing food or drink/before meals/after handling child's feaces, napkins or diapers (OR: 0.4; 95% CI: 0.2 – 0.9; p= 0.02). Equally, of caregivers whose main source of water was lake (OR: 0.3 95% CI: 0.1- 1.0; p= 0.04) , those who were using filtration or not treating their water to make it safe (OR: 0.2; 95% CI; 0.1 -0.8 p= 0.01), or respondents who were using flush toilet to dispose the child's feaces (OR: 0.2 ; 95% CI: 0.3- 0.9; p=0.02) , all with statistically significant results.

Unique contribution to theory practices and policy: Socio-economic factors, environmental and behavioral factors and knowledge factors all influence acute diarrhea among rotavirus vaccinated children aged 11-23 months in Kisumu East sub-County. The relevant stakeholders should enlighten and educate the parents/guardians of the children on the factors associated with diarrhea among rotavirus vaccinated children aged 11-23 months in Kisumu East sub-County.

Key words: Diarrhea, vaccine, Immunization

1.0 INTRODUCTION

Globally more than half a million children die of rotavirus infection every year and about two million are hospitalized worldwide. Around 82% of these deaths occur in children in the poorest countries (WHO, 2022, Parashar *et al.*, 2003). Acute diarrhea is a leading killer in Kenya among children under 5 years of age. Contributing to 9% of deaths. Infection with rotavirus contributed to 27% of diarrhea illnesses under the age of five hospitalized in Kenya. Approximately 90% of all children are infected with rotavirus by the age of 2 years in studies conducted in Kenya. As a result of rotavirus diarrhea, 132 hospitalizations and 21,800 clinics visits per 100,000 children under 5 years of age are the result of recent studies (Agutu *et al.*, 2017). Despite the accelerated implementation of rotavirus vaccination, cases of acute diarrhoea reported through the health facilities have increased.

Vaccination coverage in Kisumu was 64.4% which is lower than the majority of the countries (Odhiambo *et al.*, 2012). According to revised figures from India from 2011 to 2013, over 78,000 children die each year from rotavirus gastroenteritis, with roughly 59,000 under the age of two (John *et al.*, 2014). Rotavirus was shown to be responsible for 46 percent of 4668 Korean children hospitalized with acute gastroenteritis. Children aged 6 to 24 months had the highest rate of rotavirus gastroenteritis, accounting for 84 percent of all cases (Seo & Sim, 2000). It is against this backdrop that the study aims to investigate factors associated with acute diarrhoea among rotavirus vaccinated children aged 11-23 months in Kisumu East Sub-County.

1.1 Problem Statement

Diarrhea is a leading killer among children under 5 years of age in Kenya, contributing to 9% of deaths and we are now well alert of how gastroenteritis leads to the advance of extreme stunting, malnutrition, reduced productivity, cognitive dysfunctions and achievements of adults. In 2007, 1431 of every 100,000 infants and 478 of every 100,000 children under 5 die hospitalized with rotavirus diarrhoea in Kenya. Approximately 4,500 children under 5 years of age die of rotavirus every year. Rotavirus infections contributes to 27% of under-fives diarrhea diseases who are hospitalized in Kenya. Recent study findings show 68 deaths, 132 hospitalizations, 21,800 clinical visits per 100,000 children under 5 years of age are due to Rotavirus diarrhea (Agutu *et al.*, 2017).

Vaccination coverage in Kisumu County was 64.4 percent, which is lower than the majority of counties (Odhiambo *et al.*, 2012). Due to the potential of severe rotavirus outbreaks, this region would substantially benefit from the rotavirus vaccination. However, due to the region's poor vaccination coverage, the rotavirus burden is mainly unclear. Despite the introduction of the rotavirus vaccine into Kenya's national vaccination schedule in July 2014, this is still the case (Otieno *et al.*, 2020). This conclusion was based on our earlier results from the Kisumu East Sub-demographic County's health information systems (DHIS), which revealed that there were 15,685

diarrhea cases recorded for children under the age of five. We therefore conducted a study to explore the link between behavioral variables and acute diarrhea among rotavirus vaccinated infants aged 11-23 months in Kisumu East sub-County in order to inform future policy choices.

1.2 Specific objective

To examine the associated factors with acute diarrhea among rotavirus vaccinated children aged 11–23 months in Kisumu East Sub- County.

1.3 Research Question

What are the associated factors with acute diarrhea among rotavirus vaccinated children aged 11–23 months in Kisumu East Sub- County?

2.0 LITERATURE REVIEW

The main factors that influence acute diarrhea among Rotavirus vaccinated children include: socio-economic factors, environmental and behavioral factors, among others. From past literature these factors play a major role in occurrence of diseases in terms of their indirect link with access to healthcare facilities, quality of life, adequate water, use of different hygiene methods, through awareness and behavior related to disease prevention. In terms of reporting the disease, gender of the child plays a significant role in healthcare seeking behavior, making the choice of service provider and amount of cash spent on health seeking where male children were more likely to receive treatment than female children (Drossman, 2016). Children from households with mothers trained at secondary or higher education levels were less likely to suffer from diarrhea compared to children from mothers with lower education levels. Mothers with higher education have greater awareness of diarrhea preventive steps (Budhathoki *et al.*, 2016). The result of a previous study conducted in Ethiopia found out that Children whose household roof material thatched had two times higher odds of diarrhea than children whose household roof material is corrugated iron (Getachew *et al.*, 2018). Mothers' knowledge about diarrhea depends on several factors such as educational status, and prior experience of managing the diarrhea in children. Previous studies show that familiarity with the term or use of oral rehydration salt (ORS) for management of diarrhea, there were knowledge gaps as regards its correct preparation and administration (Jha *et al.*, 2006). Association between diarrhea prevalence in children and food hygiene practices has also been suggested in various studies that were done in developing countries like Vietnam, Bangladesh, Nicaragua but the findings were not conclusive enough (Luby, 2011; Takanashi, 2009). The outcomes of the study established a baseline against which the relationship between behavioral factors and acute diarrhea in rotavirus-vaccinated children aged 11 to 23 months in Kisumu East sub-County could be examined, and stakeholders could be advised about areas where they may improve.

2.1 Research Gap

The reviewed studies outline high prevalence of diarrhea globally. Despite the advent of rotavirus vaccine in 2014, the incidence of diarrhea in Kenya is still high. Majority of the studies done in Kenya and other sections of the globe focused on the general causes of diarrhea among children aged under 5-years. This research narrows aims to investigate factors associated with acute diarrhea among Rotavirus vaccinated children aged 11-23 months in order to come up with effective measures and insight to reduce diarrheal diseases in under-five children.

3.0 METHODOLOGY

3.1 Study Design: An observational cross-sectional sample design was used to carry out a study in Kisumu East Sub-County. A mix approach for gathering data using both qualitative and quantitative methods was introduced.

3.2 Study site: This study was carried in Kisumu East Sub-County, Kisumu County, the Sub- County lies within longitude 34° 10E and 35° 20E and latitude 0° 50S. It has 115,502 households and it covers an area of 559.2km² with a population density of 847 persons per square kilometer. The sub county has a total of 473,649 as per 2009 census and of this population 237,973 are female and 235,676 male. The region has a poverty index of 60% the highest in a Kenyan city. Farming and fishing are the main economic activities to the sub county. According to Kenya demographic health information 2014, the prevalence of diarrhea infection in Kisumu is 15.5% which is slightly higher as compared to other countries within Kenya (National Bureau Statistics, 2015). In Kisumu County only 30% of the region is considered open defecation free area (Njuguna, 2016).

3.3 Target population: The target persons were mothers with children aged 11-23 months or the immediate care givers in Kisumu East Sub County. Kisumu East Sub-County was made up of 5 wards which include Manyatta B, Nyalenda A, Kolwa East, Kajulu and Kolwa central.

3.4 Exclusion and Inclusion criteria

Mothers with children age 11-23 months or the immediate care givers of the child who consent to take part in the research were included.

3.5 Exclusion Criteria

Mothers with mental problems

Mothers with children with dysentery

3.6 Sampling Method

3.6.1 Sampling Method

The survey used a multi-stage cluster sampling method. The first stage of sampling was the random selection of wards in the region. The second sampling stage involved the selection of sub-locations while the third stage was sampling of villages from the sub-

locations followed by random selections of the households. All the households in each village with children aged 11- 23 months were listed with the help of community health volunteers in the randomly sampled villages. Within the selected household the reference child was aged 11 -23 months. Ballot method was used in the selection of a respondent in household that had more than one respondent with a child within the required age group.

A total of 30 villages out of the 64 (46%) in the randomly selected three wards (3 out of 5 wards) were randomly selected using probability proportionate to size (PPS) such that wards with more villages had a higher chance of having more villages in the sample. Overall, three villages were selected in Manyatta B, 8 in Nyalenda A and 19 in Kolwa central.

3.6.2 Primary Sampling unit

The allocated number of Villages (PSUs) within a sub location was randomly carefully chosen from the households with progenies aged 11-23 months. Using the list of households with children aged 11-23 months, the researcher adopted systematic sampling method in the selection of the households with index children. The sampling interval was obtained by dividing the overall number of households in the selected 30 villages and the total sample size (7391/341) to get the k th number. The first household was selected using the lottery method among the 22 households, while the rest households, were selected going by the 22nd interval.

A team of research assistants (RA) visited each ward. Each RA then visited the sampled village in that ward. Household with children aged 11-23 months were purposively selected and the caregivers interviewed.

3.7 Data Analysis

3.7.1 Quantitative analysis

To ensure data quality, there was close supervision of the research assistants by the principal investigator. The research assistants were trained on correct use of the research instruments to enhance accuracy. In the multivariate analysis, all variables with p values < 0.05 during the univariate analysis were considered as factors to diarrhea occurrence among rotavirus vaccinated children.

3.7.2 Qualitative Analysis

To analyze qualitative data, content analysis was employed. There were manual field interviews in notebooks. Then, interpretive summaries were drawn of each interview using Focus Group Discussions (FDGs)

4.0 FINDINGS

4.1 Bivariate analysis on behavioral factors influencing acute diarrhea among rotavirus vaccinated children.

Questions were asked to caregivers about behavioral factors associated with acute diarrhoea in children and responses reported in Table 1. Those having soap for hand washing (OR: 2.0; 95% CI: 1.2-3.4; P= 0.008), having piped water as the main source of drinking water (OR: 2.6; 95% CI: 1.5-4.6; P=0.0006), using pit without slab where child`s feaces are disposed were all associated with increased likelihood of cases of diarrhoea among their children (OR: 2.6; 95% CI: 1.4-5.4; P= 0.01).

The chances of children presenting with diarrhoea in the past 14 days prior to the survey was likely in the following situations: Washed hands after handling child`s feaces, napkins or diapers (OR: 0.6; 95% CI: 0.4-1.0; P= 0.03) OR washing hands after visiting toilet/before preparing food or drink/before meals or after handling child`s feaces, napkins or diapers (OR: 0.4; 95% CI: 0.2-0.9; P= 0.02).

Equally, children of caregivers whose main source of water was lake (OR: 0.3; 95% CI: 0.1-1.0; 0.04) those were using filtration or not treating their water to make it safe (OR: 0.2; 95% CI: 0.1-0.8; P= 0.01) , or respondents who were using flush toilet to dispose the child`s feaces (OR: 0.5; 95% CI: 0.3 -0.9; P=0.02), all with statistically significant results.

Table 1: Bivariate analysis on behavioral factors influencing Acute diarrhoea in children

Characteristic	No. (%) of cases with diarrhoea (n=115)	No. (%) of cases without diarrhoea (n=173)	OR (95% CI)	P value
<i>When washes hands</i>				
After visiting toilet	93 (80.9)	144 (83.2)	0.9 (0.5 – 1.6)	0.6
Before preparing food or drink	40 (34.8)	60 (34.7)	1.0 (0.6 – 1.6)	0.99
Before meals	52 (45.2)	95 (54.9)	0.7 (0.4 – 1.1)	0.1
After handling the child's feaces, napkins, diapers	51 (44.4)	99 (57.2)	0.6 (0.4 – 1.0)	0.03
Others (combination of the above options above)	9 (7.8)	30 (17.3)	0.4 (0.2 – 0.9)	0.02
<i>Availability for handwashing place</i>				
Yes	66 (57.4)	96 (55.5)	1.1 (0.7 – 1.7)	0.8
Has soap for handwashing	86 (74.8)	103 (59.5)	2.0 (1.2 – 3.4)	0.008
<i>Main source of drinking water</i>				
Lake	3 (2.6)	15 (8.7)	0.3 (0.1 – 1.0)	0.04
Piped water	94 (81.7)	109 (63.0)	2.6 (1.5 – 4.6)	0.0006
Pond or river	9 (7.8)	20 (11.6)	0.6 (0.3 – 1.5)	0.3
<i>What is done to make drinking water safe</i>				
Boils	55 (47.8)	88 (50.9)	0.9 (0.6 – 1.4)	0.6
Filtration/No treatment	3 (2.6)	18 (10.4)	0.2 (0.1 – 0.8)	0.01
<i>Water storage</i>				
Jerrican without lid	17 (14.8)	38 (22.0)	0.6 (0.3 – 1.2)	0.1
Pot without tap	7 (6.1)	3 (1.7)	3.7 (0.9 – 14.5)	0.09
Pot with tap	48 (41.7)	62 (35.8)	1.3 (0.8 – 2.1)	0.3
<i>Has functional toilet</i>				
Yes	83 (72.2)	114 (65.9)	1.3 (0.8 – 2.2)	0.3
<i>Who use the toilet</i>				
Household members	62 (53.9)	99 (57.2)	0.9 (0.5 – 1.4)	0.6
<i>Where child's feaces are disposed</i>				
Pit with slab	71 (61.7)	102 (59.0)	1.1 (0.7 – 1.8)	0.6
Pit without slab	20 (17.4)	13 (7.5)	2.6 (1.2 – 5.4)	0.01
Flush toilet	24 (20.9)	58 (33.5)	0.5 (0.3 – 0.9)	0.02
<i>Disposal of household waste</i>				
Compost pit	104 (90.4)	161 (93.1)	0.7 (0.3 – 1.7)	0.4
Burning	11 (9.6)	12 (6.9)	1.4 (0.6 – 3.3)	0.4

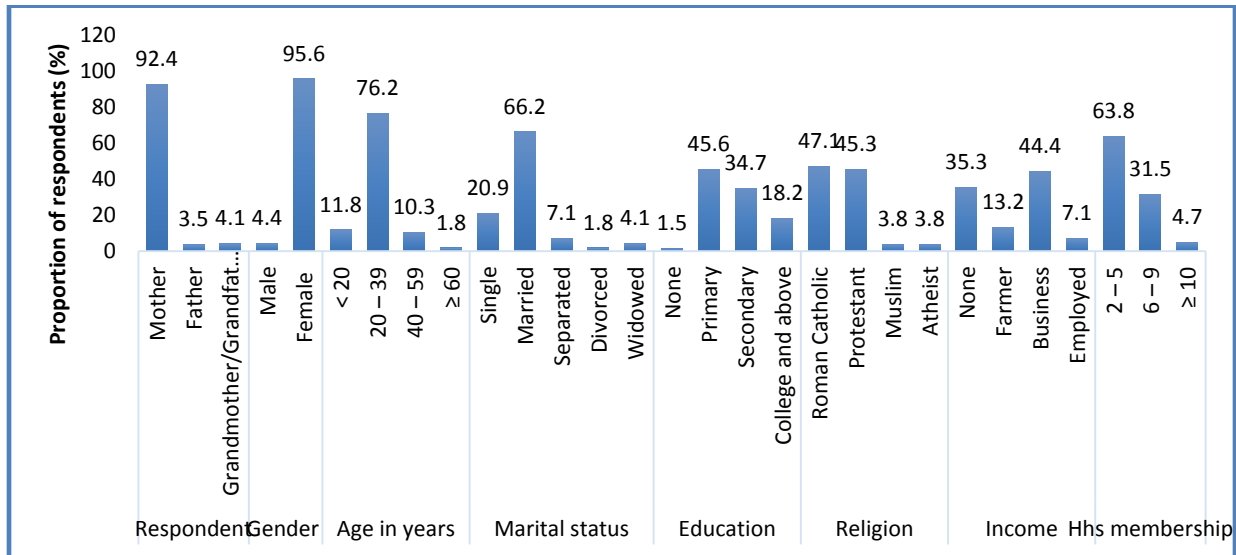


Figure 1: Socio-demographic characteristics of respondents

4.2 Discussions

The study results showed that those having soap for hand washing ($p=0.0008$), having piped water as he main source of drinking water ($p=0.0006$), using pit without slab where child`s feaces were disposed ($p=0.01$), were all associated with increased likelihood of cases of diarrhea. The probable explanation to these results could be that caregivers were less likely practicing diarrhea prevention. The results concur with the study conducted in Nigeria by Oloruntoba *et al.*, (2014) who found out that the risk factors of diarrhea was significantly higher among children whose mothers did not wash hands with soap before cooking food, after visiting the toilet and before feeding their children. The above findings were supported by a respondent (RS) in FGD Manyatta B.... "As a community we must maintain cleanliness all the times. We must not throw garbage such as pumbers in the streams because this will contaminate the water and this can cause diarrhea", respondent (R6) Nyalenda A.... " You must ensure you wash your hands before handling food for the baby and we should practice washing hands every time so that it would be a routine."

5.0 CONCLUSION AND RECOMMENDATION

5.1 Conclusion

The study results showed statistically significant relationship between behavioral factors with acute diarrhoea among rotavirus vaccinated children aged 11-23 months in Kisumu East Sub-County. Those who were using filtration or not treating water to make it safe for drinking were statistically significantly associated with acute diarrhea among their children. The results also showed that those respondents having soap for hand washing,

using pit without slab where child`s feaces are disposed were all associated with increased likelihood of cases of diarrhea among their children.

5.2 Recommendations

There is great need to substantially increase the enhancing protective incentives such as urban sanitation awareness programs with emphasis on accelerating National access to improved sanitation and hand washing facilities with a goal of promoting good hygiene behaviors.

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