Dietary management of diarrhea among children aged 0-59 months in Makadara-Viwandani informal settlement, Nairobi city county, Kenya

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ABSTRACT

Diarrhea is the world's second biggest cause of death among children below the age of five years, causing approximately 1.5 million deaths annually. In Kenya, it is the third leading cause of illness and death, with a case fatality rate of up to 21% and accounting for around 9% of deaths among children under five years. This study determined the dietary management of diarrhea among children aged 0–59 months in Makadara-Viwandani informal settlement, Nairobi City County, Kenya. A descriptive analytic study design was used, involving 159 caregivers with children aged 0–59 months. Caregivers were selected through cluster sampling at village level and simple random sampling at household level. Data were collected using a pre-tested semi-structured questionnaire, focus group discussions, and anthropometric measurements conducted according to WHO Child Growth Standards (2016). Quantitative data were analyzed using the Statistical Package for Social Sciences (SPSS), with chi-square tests used to assess relationships between dependent and independent variables. Qualitative data were analyzed using thematic content analysis, while nutritional status was expressed as Z-scores using a -2 SD cut-off. The results showed that the prevalence of underweight was 10.7%, stunting 10.1%, and wasting 6.3%. Malnutrition among children under five was significantly associated with diarrhea, with children experiencing diarrhea being 1.8 times more likely to be malnourished than those without diarrhea. Caregivers demonstrated good knowledge of oral rehydration solution use during diarrheal episodes, adhering to recommended administration of 10 mL and 20 mL oral rehydration solution for under-fives. The findings indicate that strengthening appropriate dietary management during diarrheal episodes can contribute to improved nutritional outcomes among children under five. The study recommends that healthcare professionals, together with Community Health Volunteers (CHVs), organize and conduct community-based training for caregivers to improve feeding practices of children under five during diarrheal episodes.

Keywords: Caregivers, Diarrhea, Dietary Management, Feeding Practices, Informal Settlements, Malnutrition, Oral Rehydration Solution, Under-Five Children, Nairobi City County, Kenya

I. INTRODUCTION

The passage of more than three loose or liquid stools per day is termed as diarrhea (World Health Organization, 2018). Diarrhea causes one in every five deaths among children every year, with 760,000 children being less than five years (Brown, 1994). Global, nearly 1.7 billion episodes of diarrhea are reported every year with five million episodes occurring among children under five years (Aluisio, 2015). Diarrhea kills more children than the combined effects of measles, malaria, and Acquire Immune Deficiency Syndrome (AIDS). Diarrhea-related illnesses and death in children below the age of five remain to be a major public health concern in low-income countries, particularly in Sub-Saharan Africa (Walker et al, 2013). The majority of young children who are exclusively given nonhuman milks are able to continue to ingest these products. However, individuals with more severe diarrhea and dehydration may have a slightly higher risk of problems and, as a result, should be closely monitored or have their diet changed (Ugboko et al. 2020). During diarrhea, breastfed infants should continue to feed. Despite the importance of food management during diarrhea, complete dietary recovery is required after the sickness (Brown, 1994).The risk of death and diarrheal morbidity is increased by malnutrition and low socioeconomic level. World health organization recommends continued feeding as a first line management of diarrhea although many caregivers restrict some foods or change feeding patterns when their children have diarrhea and this can make a child become malnourished (Carter et al., 2015). Feeding during diarrhea should be increased in terms of frequency, quality and quantity to replace the nutrients lost (Bado et al., 2016). In Kenya, caregivers perceive food restriction as a way of managing diarrhea among the children (O'Reilly et al., 2018). Most of

the caregivers in the informal settlements, where diarrhea is high usually discontinue normal feeding because they associate the severity and duration of the diarrhea to the type and the quantity of foods a child takes (Mberu et al., 2024). The majority of cases of childhood diarrhea could be treated at home by continuing to feed the child during and after the diarrhea episode. Because of the increased nutrient needs caused by diarrhea and decreased nutrient absorption in the intestine, children should eat more (Njeru et al., 2017).

1.1 Statement of the problem

In the urban settings of Kenya, the under-five diarrhea is estimated at 13% (KNBS, 2010). In Nairobi province diarrhea levels are at 26% which is way above the general estimation of the urban population. The rate of diarrhea in the urban slum is high, which is 33% among children 0 to 59 months old according to the Kenya Demographic Health Survey (KNBS, 2010). The UNICEF 2017 reported that Makadara-Viwandani slums had the second largest cases of diarrhea, with a prevalence of 11% mortality rate. The informal settlement usually suffers from insufficient food supply, in ability to obtain food required from the market, poor hygiene and sanitation, insufficient water supply, open disposal of fecal waste, and a lot of uncollected garbage (Lata, 2016).

Children below five years are the most affected by diarrhea (Njeru et al., 2017). Continued feeding is not taken as a form of first line treatment during childhood diarrhea by caregivers because they perceive food to be harmful. Food restriction during diarrhea is perceived as a way of management of diarrhea among their children (Bado et al., 2016). This is an indicator of lack of information among caregivers on the correct ways of managing diarrhea among their children (Lata, 2016). The majority of caregivers have omitted to incorporate the best timing of meal introduction during diarrhea in their dietary management of children with diarrhea (Bado et al., 2016). During illness, children should be fed constantly with their regular diets, including exclusive breastfeeding, but only around half of caregivers do so (Bado et al., 2016). Many caregivers do not consider dietary modifications to be a key component in the management of diarrhea. On account of that, the aim of this study is to close the gap in nutrition integration in the treatment of diarrhea.

1.2 Research Objectives

Specific objectives

i. To identify the demographic and socioeconomic characteristics that influence diarrhea nutrition management in children aged 0-59 months in the Makadara-Viwandani informal community.
ii. To determine the feeding practices and use of zinc and ORS in the dietary management of diarrhea in children aged 0-59 months in the Makadara-Viwandani informal settlement
iii. To determine the frequency of diarrhea and nutritional status of children aged 0-59 months in the Makadara-Viwandani informal settlement.

1.3 Null Hypotheses

$H0_1$: There is no significant association between caregivers' demographic and socioeconomic characteristics and the dietary management of diarrhea among children aged 0–59 months in the Makadara-Viwandani informal settlement.

$H0_2$: There is no significant association between the nutritional status of children aged 0–59 months and the occurrence of diarrhea in the Makadara-Viwandani informal settlement.

$H0_3$: There is no significant association between caregivers' feeding practices, including the use of zinc and ORS, and the occurrence of diarrhea among children aged 0–59 months in the Makadara-Viwandani informal settlement.

II. LITERATURE REVIEW

2.1 Demographic and Socioeconomic Characteristics Influencing Diarrhea Nutrition Management

Claudine et al. (2021), in Rwanda, found that socioeconomic factors significantly influence childhood diarrhea. Children from low-income households were more likely to develop diarrhea (OR=1.64), while maternal education strongly affected risk levels (OR=5.163 for poorly educated mothers). The study concluded that caregiver education and household economic status play a key role in diarrhea prevention and management.

Manetu et al. (2025) in Kenya reported that maternal education level, employment status, and child age were significantly associated with diarrhea prevalence. Children aged 7–36 months were at higher risk, while children of employed caregivers showed different exposure patterns due to care arrangements. The study emphasized that caregiver socioeconomic conditions directly influence child health outcomes.

Ireri et al. (2020), in Kiandutu informal settlement, Kenya, found that malnutrition among children aged 6–59 months was significantly associated with household decision-making, breastfeeding practices, and caregiver socioeconomic status. The study highlighted that informal settlements face compounded risks due to poverty, poor housing, and limited access to nutrition information.

2.2 Feeding Practices and Use of Zinc and ORS in Diarrhea Management

George et al. (2025) emphasized that zinc supplementation and oral rehydration solution (ORS) are essential in managing childhood diarrhea in Africa. However, their study highlighted barriers such as limited availability, affordability, and low caregiver awareness, which reduce effective utilization.

Muhande et al. (2024) in Kakamega County, Kenya, found suboptimal use of ORS and zinc despite their effectiveness. The study showed that factors such as caregiver knowledge, vaccination status, and child age influenced uptake, affecting overall diarrhea management outcomes.

Alam et al. (2023) in Bangladesh reported that only 39.24% of children received zinc alongside ORS during diarrhea episodes. The study confirmed that zinc use reduces severity of diarrhea and dehydration, but utilization remains low due to gaps in caregiver knowledge and healthcare access.

2.3 Frequency of Diarrhea and Nutritional Status of Children Aged 0–59 Months

Kantri et al. (2022) found a 21.2% prevalence of diarrhea among children aged 0–59 months and identified that nutritional status is closely linked with diarrheal disease occurrence. However, statistical association varied, suggesting other contributing environmental and hygiene factors.

Ireri et al. (2020) reported high levels of undernutrition in informal settlements, with 18.8% underweight and 34.7% stunting. Diarrhea was significantly associated with wasting and undernutrition, highlighting the bidirectional relationship between infection and malnutrition.

Lamberti et al. (2012) in a systematic review found that 35.2% of diarrhea episodes in children under five are moderate to severe, with dehydration occurring in most severe cases. The study emphasized that diarrhea contributes significantly to malnutrition due to reduced nutrient absorption and poor feeding during illness.

2.4 Conceptual Framework

The conceptual framework of this study illustrates the relationship between caregivers' demographic and socioeconomic characteristics, feeding practices, and the dietary management of diarrhea among children aged 0–59 months in Makadara-Viwandani informal settlement. The independent variables include caregiver age, education level, employment status, household income, and household size, which influence decision-making on child feeding during diarrheal episodes. Feeding practices such as breastfeeding, complementary feeding, and the use of oral rehydration solution (ORS) and zinc are key factors that directly affect child recovery and nutritional outcomes. These relationships are further influenced by intervening variables, including caregiver knowledge, access to health services, cultural beliefs, hygiene and sanitation practices, and availability of ORS and zinc. The dependent variable is dietary management of diarrhea, reflected in feeding adequacy, utilization of ORS and zinc, and nutritional status outcomes such as underweight, stunting, and wasting. Overall, the framework suggests that socioeconomic conditions and feeding practices, mediated by contextual factors, determine how effectively diarrhea is managed and the resulting nutritional status of under-five children in the study area.

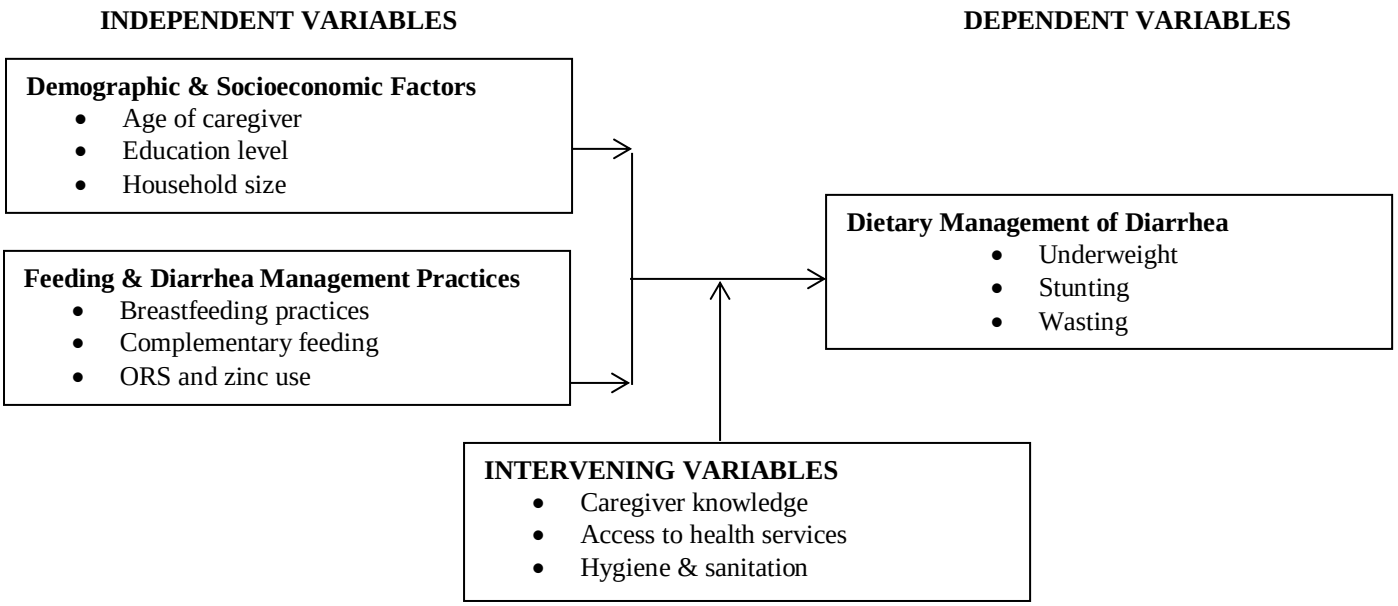

Figure 1

Conceptual Framework on Dietary Management of Diarrhea (UNICEF, 2013)

III. METHODOLOGY

3.1 Research Design

Through dietary assessment and caregiver interviews, a descriptive cross-sectional study design and analytical design was adapted to work out the dietary management of diarrhea in children under the age of five years. By interviewing all of the caregivers who were chosen for the study, the researcher was able to gather vital information about the child.

3.2 Location of the Study

This research took place in the Makadara sub-county of Viwandani. Viwandani is a slum (informal settlement) located in Nairobi, Kenya. It is a Makadara Constituency electoral ward that borders the Nairobi Industrial Area. Viwandani is an informal neighborhood in Nairobi's cosmopolitan district that attracts individuals from many walks of life. Viwandani is a more transient neighborhood that attracts a younger, more mobile population looking for work in the neighboring industry. With a size of around 1.97km2, it is Nairobi City County's second largest informal settlement. It is located in Nairobi's eastern suburbs, around 7 kilometers from the city's core business center. There are over 290 residential units per acre, with a typical family size of four persons. It is estimated that there are more than 5,481 households in the region.

3.3 Study Population

The study target population was caregivers with children aged 0-59 months in a household in Viwandani informal settlement, Makadara in Nairobi City County. Households where a caregiver has more than one child aged five years or below were treated the same as that with households where a caregiver has only one child below five years.

3.3.1 Inclusion Criteria

The study participant's inclusion criteria were;
Caregivers who have at least one or more children who are less than five years.
A child who has had an episode of diarrhea
A resident of Viwandani for a period of 6 months and agreed to take part in the study.

3.3.2 Exclusion Criteria

Those who fell in the criteria below were not included;
a) Caregivers of children with other infections were left out because it could have affected food intake and thus the child's dietary condition.

3.4 Sampling

3.4.1 Sampling Technique

The caregivers' populations in Makadara-Viwandani villages were cluster sampled according to streets organization, roads and lee ways. At household level simple random sampling was done to ensure each household had an equal opportunity of being selected. Caregivers with children below five years had equal chances of being selected as participants. Random sampling ensured that each household was selected independently. Each village was given a unique number, which were placed in a dish and thoroughly mixed. Numbers were chosen by a research assistant who was blindfolded. The researcher chose the first volunteer from the population at random. This address were first to be visited, and every fourth house was visited for an interview thereafter. If no child less than five years met the inclusion criterion, the household was skipped and the next one chosen.

3.4.2 Sample Size Determination

In this research, Fisher et al., (1998) was used to the determine sample size.

$$n = \frac{Z^2 pq}{d^2}$$

Where
n= sample size desired.
Z= standard normal deviate at 95% confidence level (1.96)
P= 11%- prevalence of diarrhea (UNICEF -2018)
q=1-P (1-11)
d= accuracy degree (0.05)

$$\frac{1.96^2 \times 0.11 \times 0.89}{}$$

$$\frac{2}{0.05}$$
= 150
A 10% was added to the questionnaires
150+15= 165

3.5 Data Collection Instruments

3.5.1 Questionnaire

A semi-structured questionnaire which was pre-tested and pre-coded was used to obtain quantitative data from community caregivers. The survey was written entirely in English. With sections one and two, the questionnaire included both open ended and closed ended questions. The socio-demographic features of the participants were examined.

3.5.2 Focus Group Discussions Guide

To collect qualitative data on feeding practices during and after diarrhea, oral rehydration therapy, and zinc supplementation, focus group discussions (FGDs) were held to collect the data. A discussion guide for small groups was used. Participants in the focus groups were caregivers of children below age of five. Each focus group had 6–10 participants who were chosen at random.

3.5.3 Anthropometry

For growth monitoring, anthropometric measurements were taken using conventional methods in accordance with WHO Child Growth Standards (CGS) (WHO, 2016). It was measured in the following way: Weight: The children's weight was measured in light wear on a digital scale to the closest 0.1 kilogram. Height: Using a panel with a fixed head and movable foot piece, this was measured to the nearest 0.1 cm. MUAC: A straight left arm (in right-handed youngsters) or a straight right arm was used to measure the mid-upper-arm circumference (MUAC) (in left-handed children)

3.6 Pretesting of the Questionnaires

This took place in Mathare north area 4, a densely inhabited slum with structures that are nearly identical to those found in Makadara Viwandani slums. The pre-test was evaluated research techniques and instruments. The research instruments were evaluated to see if they can produce information that can answer research questions. The appropriate changes to research instruments were done. This research was guarantee that the items accurately assess the study's variables and give credible results.

3.6.1 Validity

The validity of the research instruments was determined by ensuring that the questionnaire and checklist accurately reflect the information needed to respond to the research questions. In addition, supervisors, public health specialists, and Kenyatta University's ethics committee assessed the instruments.

3.6.2 Reliability

The reliability of research instruments was achieved by ensuring that data from the pre-test study was used to test for reliability using Cronbach's alpha. The Cronbach alpha had a +.80 reliability, and the instrument had an excellent internal consistency.

3.7 Data Collection Techniques

Questionnaire: A questionnaire was used to administer face to face interviews which were conducted using semi structured oral questioning of caregivers. The filing of the questionnaires was done at the households.

Focused group discussion: were held at selected halls in the area. All participants consented to the study. A total of 6-10 participants were recruited at a time. Eight (8) focused group discussions were held as a representation for this study.

Key Informant Interviews (KII)

There was a qualitative, in-depth of 20 people selected for their immediate knowledge about diarrhea and nutrition in Viwandani community. These people were Sub-county nutritionist, Community Health Volunteers, the area Community health Assistant, and the health records information personnel

Anthropometric Measurements for height weight and arm circumference. The research assistants guided the caregiver while taking weight, height and MUAC of the children.

3.8 Data Analysis

The SPSS software version 25 was used to conduct the analysis. To test the relationships between the variables, the Chi square was used. The level of confidence was set at 0.05 (95%) as is typical for most descriptive studies (Dahiru,

2018). Tables and charts were utilized to illustrate the results, while descriptive statistics such as percentages and frequencies were utilized to describe the data.

Thematic content analyses were used to categorize and interpret the qualitative data acquired from focus-group talks. Data on dietary status was compared to Child Growth Standards and given as Z scores with a - 2 SD cut-off point (WHO, 2016). The anthropometry of youngsters was examined using ENA for Smart software, which is a computer-based program that identified youngsters that are wasting, underweight, or stunted.

IV. FINDINGS & DISCUSSION

4.1 Caregivers Socio Demographic Characteristics

A total of 165 questionnaires were administered using simple random sampling technique to all caregivers with children aged 0-59 months at Makadara Viwandani informal settlements and 159 of them voluntarily agreed to participate in the study with 96.3% response rate. Therefore, the responses from 159 study subject were analyzed and reported as follows:

Table 1

Caregivers Socio Demographic Characteristics

Socio demographic Variables	Frequency	Percentage (%)
Age in years		
18 - 20 years	19	11.9%
21 - 30 years	83	52.2%
31 - 40 years	52	32.7%
41years & above	5	3.2%
Total	**159**	**100**
Gender		
Female	150	94.3%
Male	9	5.7%
Total	**159**	**100**
Marital Status		
Single	41	25.8%
Married	82	51.6%
Widowed	7	4.4%
Separated	29	18.2%
Total	**159**	**100**
Education Level		
Primary	41	25.8%
Secondary	86	54.1%
College	26	16.4%
University	6	3.7%
Total	**159**	**100**
Caregiver Type		
Mother	121	76.1%
Father	3	1.9%
Sister/Brother	10	6.3%
Grandmother	21	13.2%
Others	4	2.5%
Total	**159**	**100**
Religious affiliations		
Christian	142	89.3%
Muslim	13	8.2%
Others	4	2.5%
Total	**159**	**100**
Occupations		
Housewife	108	67.9%
Employed	23	14.5%
Self-employed	28	17.6%
Total	**159**	**100**
Household monthly income		
100-10000 Ksh	50	31.4%
11000-20000 Ksh	82	51.6%
21000-40000 Ksh	25	15.7%
41000-50000 Ksh	2	1.3%
51000 Ksh & above	0	0%
Total	**159**	**100**

The findings showed that most caregivers were aged 21–30 years (52.2%), followed by those aged 31–40 years (32.7%). The majority were female (94.3%), married (51.6%), had attained secondary education (54.1%), and were mothers (76.1%). Most caregivers were Christians (89.3%), housewives (67.9%), and reported a monthly household income of KSh 11,000–20,000 (51.6%).

These findings are consistent with previous studies conducted in informal settlements, which report that childcare responsibilities are predominantly undertaken by women of reproductive age. Similarly, maternal education and household socioeconomic status have been shown to influence childcare practices and health-seeking behaviour among caregivers (Manetu et al., 2025; Ireri et al., 2020; Claudine et al., 2021).

4.2 Child Socio Demographic Characteristics

The study sought to find out the children socio demographic characteristics then analyzed and presented as shown below.

Table 2

Child Socio Demographic Characteristics

Socio demographic Variables	Frequency	Percentage (%)
Age in months		
0-12 months	7	4.4%
13-24 months	58	36.5%
25-36 months	49	30.8%
37-48 months	19	11.9%
49-59 months	26	16.4%
Total	**159**	**100**
Sex of child		
Female	86	54.1%
Male	73	45.9%
Total	**159**	**100**
Child birth Number		
1-2	69	43.4%
3-4	82	51.6%
5 & above	8	5.0%
Total	**159**	**100**
Child excusive breastfeed		
Yes	66	41.5%
No	93	58.5%
Total	**159**	**100**
Child complementary feeding start		
Below 6 months old	88	55.3%
At 6 months old	71	44.7%
Total	**159**	**100**

Table 2 presents the socio-demographic characteristics of the children. Most children were aged 13–24 months (36.5%) and 25–36 months (30.8%), while 54.1% were female. More than half of the children (51.6%) were of birth order 3–4. The findings further showed that 58.5% of the children were not exclusively breastfed, and 55.3% had been introduced to complementary feeding before six months of age.

These findings agree with previous studies which reported that children aged 7–36 months are more vulnerable to diarrheal diseases because of increased mobility and weaning practices. Early introduction of complementary foods and failure to exclusively breastfeed have also been identified as important risk factors for childhood diarrhea and poor nutritional outcomes (Manetu et al., 2025; Ireri et al., 2020; Claudine et al., 2021).

4.3 Caregiver Diarrhea Awareness

Figure 1 presents caregivers' awareness of diarrhea among under-fives.

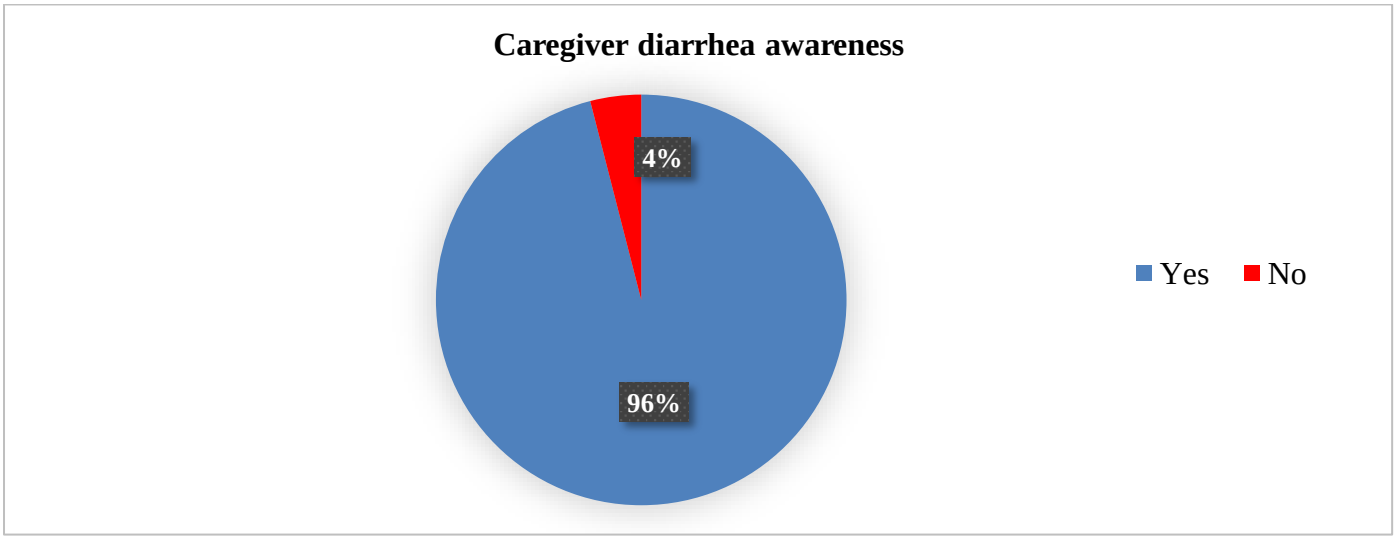

Figure 1
Caregiver Diarrhea Awareness

The findings showed that 153 (96.2%) caregivers were aware of diarrhea among under-fives, while only six (3.8%) reported no awareness. The high level of awareness is consistent with previous studies showing that caregivers who have previously managed diarrheal episodes are more likely to recognize the condition and seek appropriate care. Similar findings have been reported in low- and middle-income settings where repeated exposure to childhood illness and health education improves caregiver awareness (Ogunyinka et al., 2023; Marew et al., 2025).

4.3.1 Knowledge on Causes of Diarrhea among Under-Fives

Caregiver knowledge of the causes of diarrhea is presented in Table 3.

Table 3
Causes of Diarrhea among Under-Fives

Causes of diarrhea variables	Frequency	Percentage (%)
Bacteria/Germs	73	45.9%
Poor hygiene and sanitation	17	10.7%
Poor personal hygiene	22	13.8%
Use of unsafe cooking/drinking water	35	22.0%
No exclusive breastfeeding	3	1.9%
Malnutrition	9	5.7%
Total	**159**	**100**

The results in Table 3 suggest most caregivers identified bacteria or germs (45.9%) as the major cause of diarrhea, followed by unsafe cooking or drinking water (22.0%), poor personal hygiene (13.8%), and poor hygiene and sanitation (10.7%). Few caregivers identified lack of exclusive breastfeeding (1.9%) and malnutrition (5.7%) as contributing factors.

The findings indicate good awareness of the infectious causes of diarrhea, although important knowledge gaps remain regarding nutritional and preventive factors. Similar studies have reported that caregivers commonly recognize germs as the cause of diarrhea but have limited understanding of specific transmission pathways and preventive practices (Ndou et al., 2021; Stark & Stones, 2019).

4.3.2 Caregiver Knowledge on Under-Fives Diarrhea Treatment

Knowledge of diarrhea treatment is presented in Table 4.

Table 4
Knowledge on Under-Fives Diarrhea Cure

Knowledge on under-fives diarrhea cure	Frequency	Percentage (%)
Oral rehydration solution + Zinc	112	70.4%
Improved/balanced nutrition	39	24.5%
Fruits fluids	15	9.4%
Others	7	4.4%
Total	**159**	**100**

The majority of caregivers (70.4%) correctly identified oral rehydration solution (ORS) together with zinc as the recommended treatment for childhood diarrhea. However, 24.5% reported improved nutrition and 9.4% identified homemade fruit fluids as treatment options.

These findings suggest generally good knowledge of recommended diarrhea treatment, although misconceptions regarding supportive feeding as a cure still exist. Similar findings have been reported in previous studies, which show improved awareness of ORS but persistent misconceptions regarding home remedies (Aghsaeifard et al., 2022).

4.3.3 Caregivers Management of Under-Fives Diarrhea

Caregivers' management practices during diarrhea episodes are presented in Table 5.

Table 5

Management of the Under-Fives Diarrhea

Management on under-fives diarrhea	Frequency	Percentage (%)
Oral rehydration solution + Zinc	112	70.4%
Improved/balanced nutrition	39	24.5%
Fruits fluids	15	9.4%
Others	7	4.4%
Total	**159**	**100**

Most caregivers (70.4%) reported using ORS together with zinc to manage diarrhea, while 24.5% relied on improved nutrition and 9.4% used homemade fruit fluids.

The findings indicate that most caregivers adopted appropriate management practices in line with current recommendations. However, reliance on nutrition and home remedies alone among some caregivers highlights the need for continued health education on appropriate diarrhea management (Duguma et al., 2024; Kukeba et al., 2021).

4.3.4 Zinc Importance During Under-Five Diarrhea Episodes

Caregivers' knowledge of the importance of zinc during diarrhea episodes is presented in Table 6.

Table 6

Zinc Important During Under-Five Diarrhea Episodes

Zinc important during diarrhea episodes	Frequency	Percentage (%)
Reduces diarrhea duration	78	49.2%
Micronutrient for protein synthesis	57	35.8%
Prevents diarrhea	19	11.9%
Others	5	3.1%
Total	**159**	**100**

The study findings in the table 6 above indicated that nearly half of the caregivers (49.2%) reported that zinc reduces the duration of diarrhea, while 35.8% associated zinc with reduced severity and 11.9% believed it prevents diarrhea.

These findings are consistent with recommendations that zinc supplementation reduces the duration and severity of acute childhood diarrhea when administered alongside ORS. The World Health Organization and UNICEF recommend zinc supplementation for 10–14 days during diarrheal episodes to improve treatment outcomes (WHO/UNICEF, 2013).

4.4.5 Awareness on oral rehydration solution mixing

The caregivers were asked to air out their awareness on oral rehydration solution mixing for under-five with diarrhea cases, then analyzed and presented as shown.

Table 7

Awareness on ORS Mixing for Under-Five with Diarrhea

Awareness on ORS mixing	Frequency	Percentage (%)
1 ORS Sachet in 1 liter of water	147	92.5%
1 ORS Sachet in 1 half liter of water	12	7.5%
I don't know	0	0%
Total	**159**	**100**

The study findings in the table 7 above indicated that most caregivers (92.5%) correctly reported that one ORS sachet should be mixed with one litre of clean water, while 7.5% reported an incorrect preparation method.

The high level of correct ORS preparation demonstrates good caregiver knowledge and is consistent with findings from previous studies showing improved ORS preparation practices following community health education and IMCI interventions. Correct preparation remains essential for effective management of childhood diarrhea (WHO/UNICEF, 2013).

4.4 Caregivers Dietary Management of Under-Fives Diarrhea

4.4.1 Caregivers Immediate Treatment for Under-Fives Diarrhea

The caregivers were asked to state their immediate treatment during under-five diarrhea cases, their results analyzed and presented as shown.

Table 8

Caregivers Immediate Treatment for Under-Fives Diarrhea

Immediate treatment for under-fives diarrhea	Frequency	Percentage (%)
ORS and Zinc	78	49 %
Oral rehydration solution only	50	31.5%
Zinc only	10	6.3 %
Feeding	21	13.2%
Nothing at all	0	0%
Total	**159**	**100**

The study findings in the table 8 above indicated that that 49.0% of caregivers reported giving ORS together with zinc as the first treatment during diarrhea episodes, while 31.5% administered ORS only. A smaller proportion used zinc alone (6.3%) or provided fluids and soft foods (13.2%), and none reported taking no action.

These findings indicate that most caregivers initiate appropriate treatment using ORS and zinc, consistent with current recommendations for the management of childhood diarrhea (George et al., 2025). However, the use of ORS or zinc alone by some caregivers suggests the need for continued health education on the recommended combined therapy (Pradhan et al. 2025).

4.4.2 Caregiver Immediate Facility to take Under-Fives in Case of Diarrhea

The caregivers were asked to air out their immediate facility they can take under-fives in case of diarrhea, then analyzed and presented as shown.

Table 9

Caregiver Immediate Facility to take Under-Fives in Case of Diarrhea

Facility to take under-fives in case of diarrhea	Frequency	Percentage (%)
Nowhere treats it at home	33	20.8%
Hospital	71	44.7%
Pharmacy/Clinic/chemist	52	32.7%
Herbalists	3	1.9%
Total	**159**	**100**

The study findings in the table 9 above indicated that most caregivers (44.7%) reported taking their children to hospital during diarrhea episodes, while 32.7% sought treatment from pharmacies or clinics. Approximately one-fifth (20.8%) managed diarrhea at home, and only 1.9% reported seeking treatment from herbalists. Focus group discussions revealed that caregivers with three or more children were more likely to manage uncomplicated diarrhea at home using homemade oral rehydration solution because of their previous experience.

The findings suggest that formal health facilities remain the preferred source of care, although home management is common among experienced caregivers. Similar patterns have been reported in low-resource settings where caregiver experience influences treatment-seeking behavior (Coe et al., 2021).

4.5 Caregiver on Breastfeeding Practices During Diarrhea

The caregivers were asked to air out their knowledge on breastfeeding practices during under-five diarrhea cases, then analyzed and presented as shown.

Table 10

Breastfeeding Practices During Diarrhea

Breastfeeding practices during diarrhea	Frequency	Percentage (%)
Breastfeeding should continue during diarrhea	146	91.8%
Breastfeeding should be done less frequently during diarrhea	13	8.2%
Breastfeeding should be stopped during diarrhea	0	0%
Total	**159**	**100**

The study findings in the table 10 above indicated that majority of caregivers (91.8%) reported that breastfeeding should continue during diarrhea, while 8.2% believed breastfeeding should be reduced. None reported stopping breastfeeding completely.

These findings demonstrate good caregiver knowledge of recommended infant feeding practices during diarrhea and are consistent with WHO recommendations advocating continued breastfeeding throughout diarrheal illness to prevent dehydration and support recovery (WHO/UNICEF, 2013).

4.6 Caregivers Under-Fives Feeding Practices During Diarrhea Cases

The caregivers were asked give opinion on knowledge of under-fives feeding practices during diarrhea cases, then analyzed and presented as shown.

Table 11

Caregivers Under-Fives Feeding Practices During Diarrhea Cases

Under-fives feeding practices during diarrhea case	Frequency	Percentage (%)
Under-fives given food during diarrhea case		
All the times	126	79.2%
Sometimes	33	20.8%
Not at all	0	0%
Total	**159**	**100**
Food intake frequency during diarrhea per day		
Once	0	0%
Twice	3	1.9%
Thrice	57	35.8%
Four times & above	111	69.8%
Total	**159**	**100**
Types of foods given during diarrhea		
Energy foods (Porridge, ugali, potatoes, arrow roots)	72	45.3%
Green leafy vegetables (cabbage, Sukuma, spinach)	53	33.3%
Fruits/fruit juices (watermelon, avocado & oranges)	19	11.9%
Protein foods (meat, milk, eggs, pulses & soups)	9	5.7%
Other food types	6	3.8%
Total	**159**	**100**
Restricts foods to under-fives during diarrhea		
Yes	91	57.2%
No	68	42.8%
Total	**159**	**100**
Amount of food given during diarrhea		
Same food as before diarrhea	25	15.7%
More food during diarrhea	117	73.6%
Less food during diarrhea	17	10.7%
Total	**159**	**100**

The study shown in the Table 11 above is that most caregivers (79.2%) reported that children should continue receiving food during diarrhea, while 69.8% indicated that children should be fed four or more times per day. Energy-rich foods such as porridge, ugali, potatoes and arrow roots were the most commonly recommended foods (45.3%), followed by green leafy vegetables (33.3%) and fruits or fruit juices (11.9%).

More than half of the caregivers (57.2%) reported restricting certain foods, mainly protein-rich foods, during diarrhea, although focus group discussions indicated that some caregivers provided meat soups instead. The majority (73.6%) also reported increasing the amount of food offered during illness to replace nutrients and energy lost during diarrhea.

The findings indicate generally appropriate feeding practices during diarrheal episodes, particularly continued feeding and increased meal frequency. However, the practice of restricting certain foods reflects persistent

misconceptions that may compromise nutritional recovery. Similar findings have been reported in previous studies, highlighting the need for continued nutrition education to discourage unnecessary food restrictions while promoting adequate dietary intake during childhood diarrhea (Gaffey et al., 2013).

4.7 General Under-Fives Nutritional Status

4.7.1 Children Weight for Height Indicators

The anthropometric measurements were taken to find out under-fives nutritional status using weight for height indicators, then analyzed and presented as shown.

Table 12

Children Weight for Height Indicators

Under-fives nutritional status								
Children Variables	**Normal**		**Mild(<-1)**		**Moderate (<-2)**		**Severe (<-3)**	
	N	**(%)**	**N**	**(%)**	**N**	**(%)**	**N**	**(%)**
Sex								
Male	54	34.0%	13	8.2%	5	3.1%	2	0.6%
Female	49	30.8%	33	20.8%	3	1.9%	0	0%
Total	**103**	**65.4**	**46**	**29**	**8**	**5**	**2**	**1.2**
Age in months								
0-12	5	3.1%	2	1.2%	0	0%	0	0%
13-24	38	23.9%	19	11.9%	0	0%	0	0%
25-36	36	22.6%	10	6.4%	3	1.9%	0	0%
37-48	10	6.4%	6	3.8%	2	1.2%	1	0.6%
49-59	14	8.8%	9	5.7%	3	1.9%	0	0%
Total	**103**	**64.8**	**46**	**29**	**8**	**5**	**2**	**1.2**

The study findings in the table 12 above indicated that 64.8% of the children had normal weight-for-height, while 29.0% were mildly wasted, 5.0% were moderately wasted, and 1.2% were severely wasted. Mild and moderate wasting was more common among female children than males, with the highest prevalence observed among children aged 13–36 months.

These findings indicate that although most children had normal nutritional status, wasting remains a public health concern among under-fives in the study area. Similar findings have been reported in informal settlements where recurrent infections and inadequate feeding practices contribute to acute malnutrition (De Vita et al., 2019).

Table 13

Children Height for Age Indicators

Under-fives nutritional status								
Children Variables	**Normal**		**Mild(<-1)**		**Moderate (<-2)**		**Severe (<-3)**	
	N	**(%)**	**N**	**(%)**	**N**	**(%)**	**N**	**(%)**
Sex								
Male	42	26.4%	21	13.2%	7	4.4%	3	1.9%
Female	64	40.3%	16	10.1%	4	2.5%	2	1.2%
Total	**106**	**66.7**	**37**	**23.3**	**11**	**6.9**	**5**	**3.1**
Age in months								
0-12	7	4.4%	0	0%	0	0%	0	0%
13-24	54	34.0%	4	2.5%	0	0%	0	0%
25-36	31	19.5%5.0	16	10.1%	1	0.6%	1	0.6%
37-48	8	%	6	3.8%	4	2.5%	1	0.6%
49-59	6	3.8%	11	6.9%	6	3.8%	3	1.9%
Total	**106**	**66.7**	**37**	**23.3**	**11**	**6.9**	**5**	**3.1**

The study findings in the table 13 above indicated that 66.7% of the children had normal height-for-age, while 23.3% were mildly stunted, 6.9% moderately stunted, and 3.1% severely stunted. Stunting was more prevalent among children aged 25–59 months than younger children.

The findings suggest that chronic undernutrition remains prevalent despite the majority of children exhibiting normal growth. Similar trends have been documented in comparable low-resource settings where prolonged inadequate dietary intake and recurrent childhood illnesses contribute to stunting (Nemati et al., 2025).

Table 14

Children Weight for Age Indicators

Under-fives nutritional status								
Children Variables	**Normal**		**Mild(<-1)**		**Moderate (<-2)**		**Severe (<-3)**	
	N	**(%)**	**N**	**(%)**	**N**	**(%)**	**N**	**(%)**
Sex								
Male	50	31.4%	14	8.8%	7	4.4%	2	1.3%
Female	61	38.4%	17	10.7%	5	3.1%	3	1.9%
Total	**111**	**69.8**	**31**	**19.5**	**12**	**7.5**	**5**	**3.2**
Age in months								
0-12	6	3.8%	1	0.6%	0	0%	0	0%
13-24	49	30.8%	9	5.7%	0	0%	0	0%
25-36	34	21.4%	7	4.4%	5	3.1%	3	1.9%
37-48	9	5.7%	6	3.8%	4	2.5%	0	0%
49-59	13	8.2%	8	5%	3	1.9%	2	1.3%
Total	**111**	**69.8**	**31**	**19.5**	**12**	**7.5**	**5**	**3.2**

The study findings in the table 14 above showed that 69.8% of children had normal weight-for-age, while 19.5% were mildly underweight, 7.5% moderately underweight, and 3.2% severely underweight. Underweight was more common among children aged 25–59 months.

These findings indicate that undernutrition remains a concern among a considerable proportion of under-fives, underscoring the need for interventions targeting both disease prevention and improved child feeding practices (Nesa et al., 2026).

4.8 Nutritional Status of Under-Fives who had Diarrhea Two Weeks Prior Survey

The anthropometric measurements were taken to find out nutritional status of under-fives who had diarrhea two weeks prior survey, analyzed and presented as shown.

Table 15

Nutritional Status of Under-Fives with Diarrhea Two Weeks Prior Survey

Under-fives nutritional status (n=77)								
Children Variables	**Normal**		**Mild(<-1)**		**Moderate (<-2)**		**Severe (<-3)**	
	N	**(%)**	**N**	**(%)**	**N**	**(%)**	**N**	**(%)**
Sex								
Male	23	29.8%	10	13.0%	2	2.6%	3	3.9%
Female	26	33.8%	8	10.4%	4	5.2%	1	1.3%
Total	**49**	**63.6**	**18**	**23.4**	**6**	**7.8**	**4**	**5.2**
Age in months								
0-12	5	6.5%	2	2.6%	0	0%	0	0%
13-24	15	19.4%	6	7.8%	0	0%	0	0%
25-36	12	15.6%	4	5.2%	3	3.9%	2	2.6%
37-48	7	9.1%	3	3.9%	1	1.3%	1	1.3%
49-59	10	13.0%	3	3.9%	2	2.6%	1	1.3%
Total	**49**	**63.6**	**18**	**23.4**	**6**	**7.8**	**4**	**5.2**

The study findings in the table 15 above indicated that the nutritional status of children who experienced diarrhea during the two weeks preceding the survey is presented in Table 15.

Among the 77 children who had diarrhea, 63.6% had normal nutritional status, while 23.4% were mildly malnourished, 7.8% moderately malnourished, and 5.2% severely malnourished. Mild and moderate malnutrition was more common among children aged 13–36 months.

These findings suggest that children who recently experienced diarrhea were more likely to exhibit poor nutritional status, reflecting the well-established interaction between diarrheal disease and malnutrition reported in previous studies (Nemati et al., 2025.

4.9 Association between Malnutrition and Diarrhea among Under-Fives

The study sought to find out the relationships between malnutrition and diarrhea occurrence among under-fives

Table 16

Chi-Square Test for Association between Malnutrition and Diarrhea Occurrence among Under-Fives

Nutritional status	With diarrhoea	Without diarrhoea	Total	X^2	df	p-value (at 0.05)
Severe<-3SD	4	2	6	6.845	3	7.81
Moderate<2SD	6	4	10			
Mild<-1SD	18	11	29			
Normal	49	65	114			
Total	77	82	159			

The Chi-square test showed no statistically significant association between malnutrition and diarrhea among under-fives ($\chi^2 = 6.845$, df = 3, $p > 0.05$). Therefore, the null hypothesis was not rejected.

Although the association was not statistically significant, the findings suggest that diarrhea and malnutrition remain closely related conditions that may influence each other through recurrent illness and inadequate dietary intake, as reported in previous studies.

4.10 Prevalence Ratio of Malnutrition to Diarrhea among Under-Fives with and without Diarrhea

The study sought to find out the prevalence ratio (used when outcome occurs over short time duration) between malnutrition and diarrhea occurrence among under-fives.

Table 17

Prevalence Ratio of Malnutrition to Diarrhea among Under-Fives with and without Diarrhea

Prevalence ratio of malnutrition to diarrhea among under-fives			
	Severely & moderately malnourished (<-2SD)	**Normal nutritional status** (≥-2SD)	**Total**
Children with diarrhea	10	67	77
Children without diarrhea	6	76	82
Total	**16**	**143**	**159**

Prevalence ratio = (a/a+b) / (c/c+d)
= (10/77) / (6/82)
= (0.130/0.073)
= 1.8

The prevalence ratio of 1.8 indicates that children who experienced diarrhea were 1.8 times more likely to be malnourished than children who did not experience diarrhea. Although the association was not statistically significant, the magnitude of the prevalence ratio suggests a clinically important relationship between diarrhea and poor nutritional status.

4.11 Association between Caregiver Socio Demographic Factors and Dietary Management Practices of Under-Fives Diarrhea

The study sought to find out the association between caregiver socio demographic factors and dietary management practices of under-fives diarrhea

Table 17

Association between Caregiver Socio Demographic Factors and Dietary Management Practices of Under-Fives Diarrhea

Demographic variables	**ORS,ZINC & foodgivingduring diarrhoea** (25-59 months)	**ORS,zinc& continued breast feeding during diarrhoea(**0-24 months)	**Statistical significance**		
			X^2	**df**	**P**
Caregiver age	**Yes No**	**Yes No**			
18-20 years	7 12	14 05			
21-30 years	48 35	52 31	13.987	3	0.0004
31-40 years	31 21	33 19			
≥41 years	2 03	04 01			
Marital status	**Yes No**	**Yes No**			
Single	17 24	19 22			
Married	47 35	51 31	16.832	3	0.534
Widowed	2 05	4 03			
Separated	8 21	16 13			

No. of Children	**Yes**	**No**	**Yes**	**No**		
1-2	41	18	47	22	15.732	2	0.003
3-4	48	34	49	33			
≥5	06	02	07	01			
Occupation	**Yes**	**No**	**Yes**	**No**		
Housewife	96	12	99	09	11.853	2	0.002
Self-employed	17	11	09	19			
Employed	15	08	13	10			
Religion	**Yes**	**No**	**Yes**	**No**		
Christian	107	35	99	33	18.853	2	0.763
Muslim	05	08	04	09			
Others	01	03	00	04			
Education level	**Yes**	**No**	**Yes**	**No**		
Primary	17	24	15	26	16.963		
Secondary	55	31	52	34		3	0.005
College	19	07	23	03			
University	4	02	1	05			

The study results in table 17 above indicated that Caregiver occupation (p = 0.002), age (p = 0.004), education level (p = 0.005), and number of children (p = 0.003) were significantly associated with appropriate dietary management practices during childhood diarrhea. In contrast, marital status and religion were not significantly associated with dietary management practices.

These findings suggest that caregiver experience, education, and socioeconomic characteristics influence adherence to recommended dietary management practices during diarrhea. Similar findings have been reported in previous studies, which identified maternal education and household socioeconomic status as important determinants of appropriate childhood feeding and healthcare practices (Gemede et al., 2025).

V. CONCLUSION & RECOMMENDATIONS

5.1 Conclusion

The study revealed that during the observation period at Makadara Viwandani, malnutrition among children under five years old was prevalent, with 10.7% classified as underweight, 10.1% as stunted, and 6.3% as wasted. The findings also highlighted that socio-demographic factors such as the age and education level of caregivers, the number of children in the household, and the caregivers' occupation were significantly linked to how dietary management practices for diarrhea in young children were implemented. Caregivers demonstrated a strong understanding of the use of oral rehydration solutions for managing diarrhea in young children. Most adhered to the recommended dosages of 10 mL and 20 mL of oral rehydration solution. Additionally, they showed a reasonable level of knowledge regarding breastfeeding and feeding practices during diarrhea episodes. Importantly, the study found a significant association between malnutrition and diarrhea. Children who experienced diarrhea were 1.8 times more likely to be malnourished compared to those who did not have diarrhea.

5.2 Recommendations

The study recommended that the ministry of health in the Nairobi City County should in-cooperate integrated dietary programs in the management of diarrhea. Exclusive breastfeeding and continued breastfeeding to a period of three (3) years, as a nutritional requirement should be emphasized. Health care professionals should organize trainings for caregivers in each community unit aiming on improvement of feeding practices of under-fives during diarrheal episodes. Ministry of Public Health and sanitation should conduct mobilization and sensitization programs within informal settlements on ORS and zinc supplements as under-five diarrhea first-line treatment. Effective facility screening to be done for all under-five with diarrhea episodes to check for malnutrition order to prevent deterioration of their nutritional status. The Sub County health services should ensure efficient information, education and communication ways to build the caregivers capacity on diarrhea episodes and its management among their under-fives when three's on outbreak.

Declaration of Interest

The authors declare that they do not have any known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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