




Issue no: 1 | Vol no: 4 | April 2024: 12-21

## Practices of diarrhoea disease prevention measures among caregivers in Nyalenda, Kisumu County

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### Article History

Received: 2024-02-29

Accepted: 2024-03-05

Published: 2024-04-24

### Cite this article in APA

Okeyo, F. A., Nyangechi, E., & Guyah, B. (2024). Practices of diarrhoea disease prevention measures among caregivers in Nyalenda, Kisumu County. *Editon Consortium Journal of Research in Medical and Health Sciences*, 4(1), 12-21. <https://doi.org/10.51317/ecjrmhs.v4i1.481>

### Abstract

This study aims to assess the practice of diarrhoea disease prevention measures among caregivers to enhance the effectiveness of prevention strategies. Diarrhoea disease poses a significant health risk, particularly among children, and caregivers play a crucial role in preventing its occurrence. However, the actual practice of diarrhoea disease prevention measures among caregivers is not well understood. Understanding the current practices and identifying areas for improvement can inform targeted interventions and educational programs to enhance the effectiveness of prevention strategies. This study employed a quasi-experimental design with mixed methods analysis. A sample of 302 households with caregivers of children aged 6-24 months. In-depth interviews and structured questionnaires were employed for data collection entered into SPSS. Descriptive analysis, multivariate logistic regression, independent samples t-test, and chi-square test, employed for data analysis. The findings revealed the level of adherence to preventive measures among caregivers and identified specific areas where improvements are needed. The study contributes to the understanding of caregivers' practices in preventing diarrhoea diseases and highlights the necessity for targeted interventions to improve adherence to preventive measures. By identifying specific areas for improvement, healthcare providers and policymakers can design educational programs and interventions that address the gaps in practice, ultimately reducing the incidence of diarrhoea diseases among children. The study recommends incorporating visual charts as an intervention strategy to improve caregivers' practice of diarrhoea disease prevention measures. Visual charts can effectively enhance adherence to preventive measures among caregivers, ultimately reducing the prevalence of diarrhoea in children.

**Key words:** Caregivers, diarrhoea, Nyalenda, practices, prevention measures.



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## INTRODUCTION

Diarrhoea disease is one of the primary causes of mortality in children, making it a significant public health concern (Chissaque et al., 2018; Mbutia, 2019). Diarrhoea is the passage of three or more loose stools per day or a more frequent passage of stool than usual (WHO, 2019). Diarrhoea is caused mainly by the ingestion of pathogens, especially in unsafe drinking water, contaminated food, use of unclean hands, unclean food preparation and storage environment, and dirty utensils (Hoffmann & Baral, 2019; Islam et al., 2020; Joshi et al., 2020a; Nisa et al., 2020).

Nyalenda is the largest informal settlement in Kisumu (Karanja, 2010; Nzenya, 2018). Poor sanitation, housing structures, waste disposal, drainage systems, waste management, dense population, and high poverty characterise the settlement area. Even though limited studies indicate the prevalence of diarrhoea disease in Nyalenda, the informal settlements in urban centres globally tend to harbour a prevalence of the disease as high as 34.3 per cent (French et al., 2021). The UN-Habitat (2022) estimated that approximately 60 per cent of the city's population lives in informal settlements, making the areas congested and with health insecurity. Interventions such as safe start trials in improving infant hygiene, increasing food hygiene practices, and water and sanitation have been conducted in Nyalenda, but still, high diarrhoea incidents are reported in the health facilities, making diarrhoea number one in the top ten diseases in this area.

Health-targeting diarrhoeal prevention in children cannot be met without focusing on the mothers/ caregivers (Winter et al., 2019). Mothers education has proved to be an important determinant of health status of children under 5 years old (Adeyinka et al., 2017; Demissie et al., 2021; Kaçan et al., 2022a; Ugboko et al., 2021). Lack of knowledge of diarrhoea increases the disease burden in children (Desmennu et al., 2017). Increasing mothers' knowledge has been proven to reduce child morbidity and mortality from infectious diseases (Wabwile, 2019).

Children require a clean, friendly environment where they cannot contact germs while crawling or playing. They also need good hygiene and sanitation conditions to prevent diarrhoeal diseases and other infections (Mulatya & Ochieng, 2020a). This study introduces a

communication model that visually illustrates health information to increase caregivers' knowledge and practice of diarrhoeal disease prevention (Raiyn, 2016). Using visual content to educate mothers was meant to increase their understanding and enhance their knowledge capacity in reducing diarrhoeal episodes. Children are in good health when they present with complete physical, mental, intellectual, and emotional well-being (Sharp, 1947). A healthy child enjoys good growth and development that increase skills and the complexity of functions in children (Watson & Lowrey, 1951).

The World Health Organization (WHO) prioritises the education of caregivers as a step towards eliminating diarrhoea diseases in infants and children. The traditional methods of imparting knowledge through lecture formats have been unsuccessful, given persistent diarrhoea episodes even after the education approach. Visual charts have been proven effective in food restaurants to increase performance for those with language barriers (Madera et al., 2013; Patinella et al., 2021; Rajagopal, 2012). Studies also reveal that visual charts improve learning (Lee et al., 2014; Mayer, 2017; Páez Molina, 2020).

Visual charts make it visible and clear for people, thus increasing knowledge and experience (Ahmed et al., 2019). Applying various methods and techniques in training and communication enhances knowledge (Bermudez-Millan et al., 2004). Despite this evidence, no studies have used visual charts in diarrhoea disease prevention at the household level. It is, therefore, the aim of this study to determine the effect of the use of visual charts in augmenting knowledge and practices of diarrhoea prevention measures among caregivers in order to reduce the diarrhoea prevalence in children aged 6-24 months.

## LITERATURE REVIEW

Hand washing, waste treatment, water treatment, latrine cleanliness and food hygiene are related to diarrhoea disease (Melese et al., 2019). Improved sanitation, clean water and good hygiene (WASH) are primary drivers of public health in eradicating diarrhoea diseases (Gakidou et al., 2017; Stanaway et al., 2018). Unprotected water sources and a lack of latrines increase the chances of diarrhoea (Workie et al., 2019). Households with good water connections and high levels of sanitation and

hygiene are likely to have a low incidence of diarrhoea diseases (Darvesh et al., 2017). The type of toilet facility, child stool disposal area and lack of hand washing facilities in strategic areas like toilets facilitate diarrhoea disease (Ali et al., 2022b). The time of initiation of weaning is also essential in determining diarrhoea disease (Fenta et al., 2020; Workie et al., 2019).

Studies recommend food hygiene interventions alongside water, sanitation, and hand washing to help reduce diarrhoea disease (Joshi et al., 2020a). Food hygiene practices contribute to diarrhoea in children under five years in low-socioeconomic areas (Agustina et al., 2013a). The key prioritised food hygiene practices identified by the World Health Organisation (WHO) are thorough cooking of food, maintaining the cleanliness of utensils, mothers' and children's handwashing with soap before feeding and eating, proper storage of raw and cooked food and reheating of leftover/ stored food (Gautam et al., 2017). Hygienic food preparation and feeding measures are essential (Islam et al., 2013; Touré et al., 2013). Proper management of utensils and hygienic food storage helps reduce diarrhoea disease (Chidziwisano et al., 2019; Joshi et al., 2020b; Simiyu et al., 2019). Habits of buying food from food vendors and poor child bottle-feeding are associated with diarrhoea disease (Agustina et al., 2013b).

Good hygiene practices have been proven to reduce diarrhoea disease in children (Agustina et al., 2013b; Brunauer et al., 2021; Joshi et al., 2020a). Studies report that caregivers may have the knowledge, but the knowledge may not directly translate to practice (Khaliq et al., 2022; Rumbo et al., 2016). Failure to observe hygiene measures may lead to frequent cases of diarrhoea in children (Joshi et al., 2020b). Studies recommend promoting existing practices alongside new interventions (Chidziwisano et al., 2019; Kumar et al., 2020).

## METHODOLOGY

The study employed a quasi-experimental design using quantitative methods of analysis. The information from the quantitative elements was synthesised during the analysis phase and merged during interpretation. The study consisted of two groups (Intervention and control groups). The intervention group was trained at the beginning and the middle of the study period using visual charts, while no training was given to the control group. This study targeted 302 caregivers of children aged 6-24 months living in Nyalenda informal settlements. The practice of diarrhoea disease prevention was also assessed using 12 items, scored as either 0 or 1. The aggregate scores were determined for each caregiver, and the mean practice scores were similarly used to compare the study groups at baseline and endline. The practice scores were categorised into above average (Good) practice for those who scored greater than 6/12 versus below average (Poor) practice for those who had less than 6/12. The practice questionnaire items were similarly summarised by cross-tabulation to determine the frequencies and percentages. The practice scores were compared between the interventional and control groups employing an independent sample t-test.  $A \leq 0.05$  p-value was considered statistically significant.

## RESULTS AND DISCUSSION

### Practice Scores for Diarrhoea Disease Prevention Measures

#### Baseline Results

The overall mean practice score for diarrhoea prevention out of 12 items calculated was  $6.2 \pm 1.7$  at baseline for all the recruited caregivers [Table 1]. When categorised by division, the Caregivers from Nyalenda A had a mean practice score of  $6.1 \pm 1.6$ , while those from Nyalenda B had a mean practice score of  $6.2 \pm 1.7$ . There was no statistically significant difference in practice scores between the two study groups at baseline ( $p=0.426$ ).

**Table 1: The Mean Practice Scores at Baseline for Caregivers in the Study.**

Outcome	n	Mean	SD	p-value
Baseline mean practice score overall	302	6.2	1.7	-
Baseline mean practice score by division	Nyalenda A	6.1	1.6	0.426
	Nyalenda B	6.2	1.7	

The number of participants (n), average practice scores (Mean), and standard deviation of practice scores (SD) are as shown. The p-value is for the independent samples t-test performed for the difference in mean scores between the two study divisions.

When the practice scores were categorised into binary as above average (score>6) or below average (score<6),

64.6 per cent (n=195) of the caregivers at baseline had above average practice, with 64.2 per cent (n=97) in Nyalenda A and 64.9 per cent (n=98) in Nyalenda B having above average practice [Table 2]. There was no significant difference in the proportion of caregivers having above-average practice between the two groups (p=0.275) at baseline.

**Table 2: Proportions of Caregivers with below and Average Practice on Diarrhoea Prevention at Baseline in the Study**

Outcome		Total n	Below average practice n (%)	Above average practice n (%)	p-value
Baseline practice by division	Nyalenda A	151	54 (35.8%)	97 (64.2%)	0.904
	Nyalenda B	151	53 (35.1%)	98 (64.9%)	

The number of participants (Total n) and the frequency and percentage of participants with practice scores below average and above average [n (%)] are shown. The p-value is for the Chi-square test to assess the association between the practice category and the study division.

**Endline Results**

In the end, caregivers from Nyalenda A (intervention group) had a higher mean practice score of 7.8 ± 1.6 compared to Nyalenda B (control group), with a mean practice score of 6.2 ± 1.8. A two-tailed t-test for independent samples (equal variances assumed) showed that the difference between Nyalenda A and Nyalenda B

concerning the endline practice score was statistically significant (p = <.001). The Cohen’s d value was 1, representing a large effect size. The mean difference in difference calculated between endline and baseline mean practice scores for individual caregivers was larger in Nyalenda A (Mean difference in difference= 1.6, SD = 2.2) than in Nyalenda B (Mean difference in difference = -0.1, SD = 2.4). The difference between the two groups was significant (p<0.001), with a Cohen’s d value of 0.8 that indicated a medium effect size. The table [Table 3] and boxplots (Figure 1) show the difference in mean knowledge score between the study groups at baseline and endline.

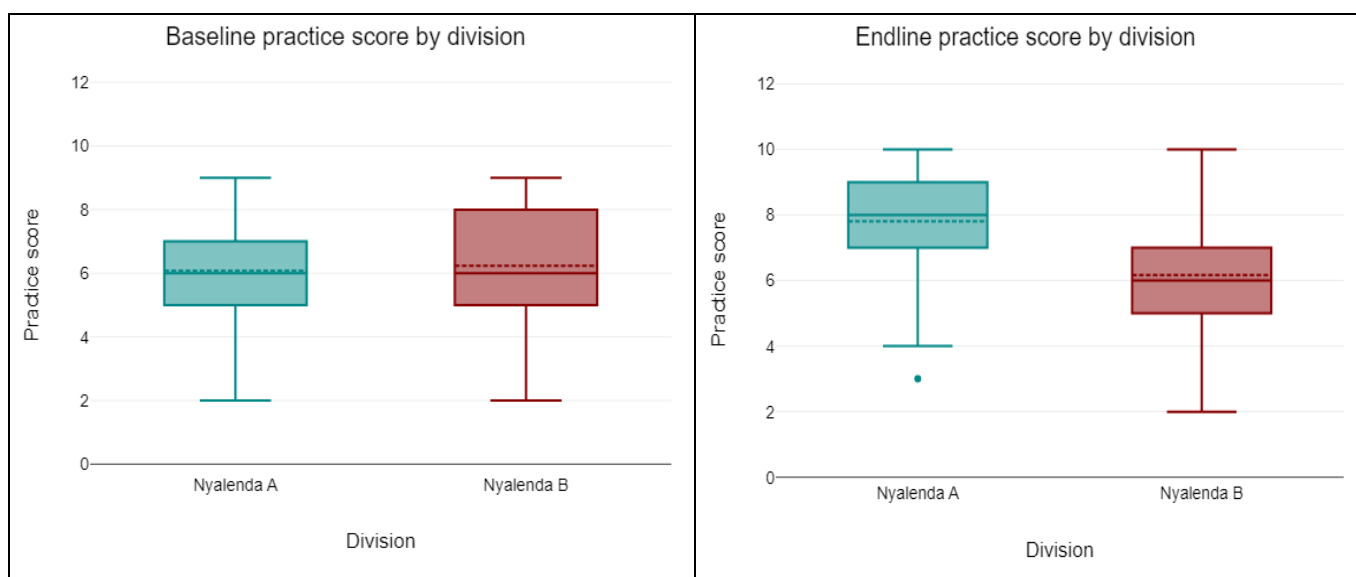
**Table 3: The Mean Practice Scores and Difference in Difference at Endline for Caregivers in the Study**

Outcome		n	Mean	SD	p-value
Endline mean practice score by division	Nyalenda A	145	7.8	1.6	<0.001*
	Nyalenda B	141	6.2	1.8	
Difference in difference (Endline - Baseline)	Nyalenda A	145	1.7	2.2	<0.001*
	Nyalenda B	141	-0.1	2.4	

\*statistically significant p<0.05

The number of participants (n), practice scores (Mean) and standard deviation of practice scores (SD) are as shown. The p-value is for the independent samples t-test

performed for the difference in mean scores between the two study divisions. \* indicates statistically significant  $p < 0.05$ .



**Figure 1: Boxplots Showing the Baseline and Endline Practice Scores for Caregivers in the Study by Division**

At the endline, a significantly higher proportion of caregivers in Nyalenda A (n=129, 89%) had above-average practice, compared to Nyalenda B (n=97,

68.8%) with  $\chi^2 = 17.5$ ,  $p = < 0.001$ . Table 4 summarises the results, and the representative bar charts are shown in Figure 2.

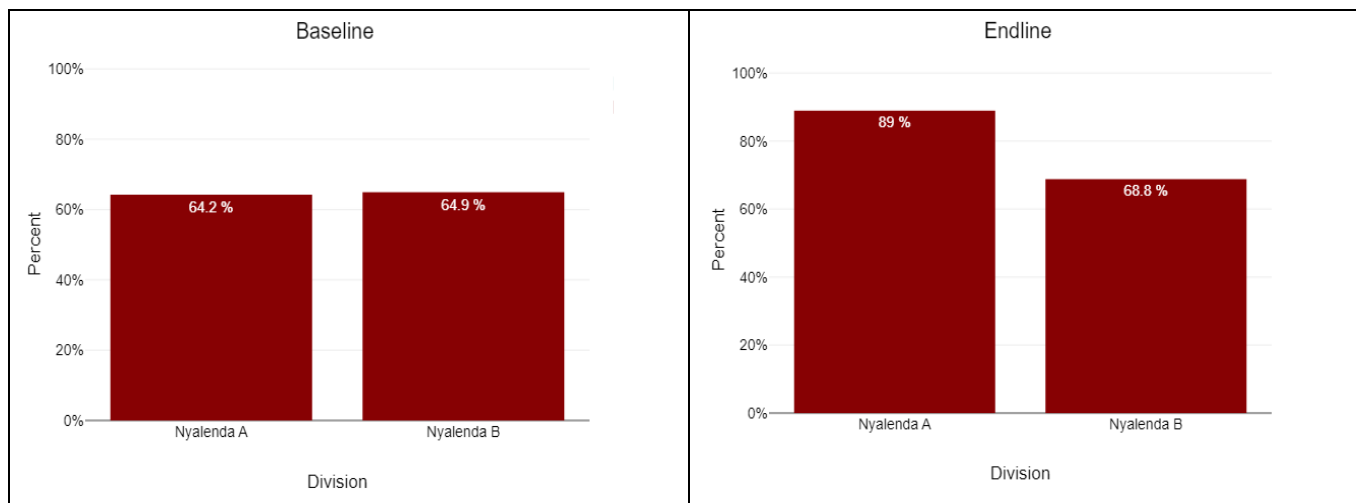
**Table 4: Proportions of Caregivers with below and Above-Average Practice on Diarrhoea Prevention at the End of the Study**

Outcome		Total n	Below average practice n (%)		Above average practice n (%)	p-value
Endline practice by division	Nyalenda A	145	16 (11%)		129 (89%)	<b>&lt;0.001*</b>
	Nyalenda B	141	44 (31.2%)		97 (68.8%)	

\*statistically significant  $p < 0.05$

The number of participants (Total n) and the frequency and percentage of participants with practice scores below average and above average [n (%)] are shown.

The p-value is for the Chi-square test to assess the association between the practice category and the study division. \* indicates statistically significant  $p < 0.05$ .



**Figure 2: Bar Graphs Showing the Proportion of Caregivers Having Above-average Practice Scores by Division at the Start and the End of the Study**

### Discussion

The study found that practice scores were comparable at baseline between the study groups. The study recorded practice scores slightly above average at baseline. At the end of the study, there was a significant improvement in the practice of diarrhoea prevention among caregivers in the intervention group Nyalenda A (compared to the control group (Nyalenda B). The intervention at the ending of the study, which involved visual charts, appears to have had a positive impact on the caregivers' implementation of diarrhoea prevention measures. The effect size was large, suggesting a strong influence of the visual charts on the caregivers' practices. The control group, on the other hand, showed no significant change in practice scores.

The previous studies align with these findings, highlighting the effectiveness of visual aids in health practice. Past studies have found that visual aids improve comprehension, recall, and adherence to medical instructions (Katz et al., 2006; Pratt & Searles, 2017). Similarly, hotel industries improved food safety practices (Štefančič and Mojca & Jevšnik, 2020). The implications of these findings are important, particularly for public health interventions in low-resource settings like Kisumu. The use of visual aids, as demonstrated by this study, can significantly enhance the effectiveness of such educational interventions (Mbanda et al., 2021).

Moreover, the study underscores the importance of tailoring health communication to the audience's needs and preferences (Bisimwa et al., 2022; Merali et al., 2018). Visual aids can bridge these gaps by presenting information in an accessible and engaging manner.

### CONCLUSION AND RECOMMENDATION

**Conclusion:** From the study, there was no significant difference in practice scores between intervention and control groups at the baseline ( $p=0.426$ ), while at the end of the study, there was a statistically significant improvement in diarrheal disease prevention practices in the intervention group ( $=<0.001$ ). The positive impact could be attributed to the visual charts made available at caregivers' residential (pinned at conspicuous areas that they could easily access and remind them of good diarrheal disease practices. The study rejects the null hypothesis that "there is no a statistically significant difference in the practice of diarrheal disease prevention between caregivers in the intervention and control groups after the intervention period".

**Recommendations:** The study recommends prioritising the implementation of visual charts as a key strategy to enhance caregivers' understanding and practice of diarrhoea prevention measures. Additionally, there is a significant opportunity to reduce diarrhoea prevalence in children by consistently emphasising hygiene promotion practices.

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