International Journal of Healthcare Sciences ISSN 2348-5728 (Online)
Vol. 13, Issue 2, pp: (271-283), Month: October 2025 - March 2026, Available at: www.researchpublish.com

Determinants and Mitigation Methods used to Prevent and Control Diarrheal Disease Among Under-Five Children attending Gitarama Health Center, Muhanga District, Rwanda, 2025

UKOBIZABA Pierre Celestin[1], Dr. Silari B. Maurice, (PhD) [2]

[1]School of Health Sciences, Mount Kenya University, Rwanda

[2]School of Health Sciences, Mount Kigali University

DOI: https://doi.org/10.5281/zenodo.17607970

Published Date: 14-November-2025

Abstract: **Diarrheal disease remains a major global public health concern, causing approximately 525,000 deaths annually among children under five years of age. Sub-Saharan Africa bears a disproportionate burden, recording an estimated 7.5 million cases each year. In Rwanda, diarrheal disease continues to affect many under-five children, yet limited research has examined its determinants and mitigation strategies in specific settings such as Gitarama Health Center in Muhanga District. This study aimed to identify key determinants and preventive measures for diarrheal disease among under-five children attending Gitarama Health Center. A descriptive cross-sectional design was employed, using purposive sampling to select 376 mothers or guardians of under-five children. Data were analyzed to determine the prevalence, associated factors, and mitigation practices. Results showed that 23.4% (n = 88) of the children had experienced diarrhea within the two weeks preceding the survey. Most cases were single episodes, while few were recurrent. Common management practices included seeking care at health facilities (73.9%), using oral rehydration salts (56.8%), and increasing fluid intake (43.2%). Traditional remedies (15.9%) and herbal medicine (6.8%) were also used. Hygienic behaviors, such as handwashing before feeding and safe disposal of child feces, were significantly associated with reduced diarrhea incidence ($p < 0.05$). The study concludes that diarrhea remains a significant public health issue among under-five children in Muhanga District. Strengthening hygiene practices, promoting community health education, and addressing cultural misconceptions are vital for effective prevention and improved child health outcomes in Rwanda and similar contexts.**

Keywords: **Determinants, Mitigation Methods, Diarrheal Disease, Under-Five Children, Gitarama Health Center, Rwanda.**

1. INTRODUCTION

Diarrhea remains one of the leading causes of morbidity and mortality among children worldwide. According to the World Health Organization (WHO, 2023), approximately one in eight children under the age of five experiences diarrhea each year, resulting in nearly 1.5 million deaths annually. The Global Burden of Disease Study (2022) underscores that diarrhea continues to pose a major public health challenge, particularly in low- and middle-income countries (LMICs) where access to clean water, adequate sanitation, and quality healthcare services remains limited (Wolde et al., 2022).

In South Asia, similar patterns of high prevalence and significant health impacts among children have been documented (Bhutta & Salam, 2012). Regional variations in diarrheal disease burden are influenced by environmental, socio-economic,

and healthcare disparities. In sub-Saharan Africa, diarrhea is one of the leading causes of under-five mortality, accounting for more than 30% of all childhood deaths due to infectious diseases (Report, 2021). The disease is primarily caused by bacterial and viral pathogens—such as *Shigella*, *Salmonella*, *Escherichia coli*, and *Campylobacter*—transmitted through the fecal-oral route (He et al., 2023).

The prevalence of diarrhea varies substantially across regions, with particularly high incidence rates reported in East and West Africa. Countries such as Nigeria, the Democratic Republic of Congo, and Ethiopia bear the highest burdens (Barendregt et al., 1997; WHO, 2020). Despite the availability of cost-effective interventions—such as rotavirus vaccination and oral rehydration therapy (ORT)—limited access to water, sanitation, and hygiene (WASH) facilities continues to account for about 88% of diarrhea-related deaths globally (He et al., 2023). This highlights the potential for substantial reductions in disease burden through improvements in WASH infrastructure.

A study conducted in Uganda's Entebbe Municipality (Wakiso District) revealed that the occurrence of diarrhea among children under five was significantly associated with geographical, environmental, and behavioral factors. The number of children per household, the cleanliness and availability of latrines, and the type of water source were found to be major determinants (Nantege et al., 2022). Additionally, hygiene practices such as handwashing, use of separate feeding utensils, and boiling utensils were strongly correlated with reduced diarrhea incidence.

In Rwanda, the Demographic and Health Survey (2019–2020) reported a national diarrhea prevalence of 14.3% among children under five. The lowest rates were recorded in the Eastern Province (11.44%), Kigali (11.76%), and the Southern Province (13.24%), while higher rates were observed in the Northern (16.29%) and Western Provinces (18.55%) (Tareke et al., 2024). The distribution of diarrhea cases is largely influenced by disparities in access to safe drinking water, sanitation, and healthcare services (WHO, 2020; UNICEF, 2021).

Recent studies in Rwanda have identified several socio-demographic and environmental factors influencing diarrhea prevalence, including child immunization status, maternal education, access to clean water, latrine type, and distance to health facilities (Tareke et al., 2024). Children in poorer households and those with less-educated mothers were particularly vulnerable (Munyaneza et al., 2023; Mugenzi et al., 2022). Poor housing conditions—such as lack of clean cooking facilities and inadequate ventilation—further exacerbate the risk of diarrheal infections (Hillary et al., 2021).

Access to healthcare services also plays a crucial role in preventing and managing diarrheal diseases. Limited healthcare infrastructure and unequal access—particularly in peri-urban and rural settings—often delay treatment and worsen outcomes (Rwanda Ministry of Health, 2022). Preventive measures such as rotavirus vaccination remain essential for reducing diarrhea-related morbidity and mortality (Smith et al., 2022).

Cultural and behavioral factors, including improper breastfeeding practices and poor hand hygiene, contribute significantly to the spread of diarrheal diseases (Ilinde Niyigena et al., 2023; Mulatu et al., 2021). Studies, such as one conducted in rural Nepal, have shown that the lack of exclusive breastfeeding increases the likelihood of childhood diarrhea (Mulatu et al., 2021). Finally, public awareness and community education are critical in reducing the burden of diarrheal diseases. Communities with higher levels of health literacy and engagement tend to report lower prevalence rates (Sinharoy et al., 2017).

Diarrhea remains a pressing child health challenge globally and particularly in sub-Saharan Africa. Understanding the multifactorial determinants of the disease—including environmental, behavioral, socio-economic, and healthcare-related factors—is essential for designing effective interventions. In Rwanda, where notable regional and socio-economic disparities persist, further research is needed to identify context-specific drivers and inform targeted strategies for the prevention and control of diarrhea among children under five.

2. METHODOLOGY

Research Design

This study employed a descriptive cross-sectional design to examine and document the risk factors and preventive measures for diarrhea among under-five children attending Gitarama Health Center in Muhanga District, Rwanda.

Study Setting

The study was conducted at Gitarama Health Center, located in Muhanga District, Rwanda.

Study Population

The target population for this study consists of under-five children attending Gitarama Health Center in Muhanga District, Rwanda, a group particularly vulnerable to diarrhea, a major health concern in the region. The research focuses on children who visited the Health Center between January and December 2024, aiming to explore the risk factors and preventive measures related to diarrhea. While the exact size of the target population is uncertain due to fluctuating patient visits, records from the Health Center's children's consultation department indicate approximately 6332 children were seen during this period. This estimate serves as a foundation for calculating the sample size, which were adjusted as data collection progresses.

Sample Size

In this study Yamane's formula was utilized to calculate the sample size, as outlined in his publication. Yamane (1967:886).

Sample size calculation

$$n = \frac{N}{1 + N(e)^2}$$

The sample size (n) is calculated based on the total population (N), with a constant value of 1, and an estimated standard error (e^2) of 5% for a 95% confidence level. The sample size distribution has been determined as illustrated above.

$n = N /[1 + N (e)^2]$

$= 6332 /[1 + 6332 (0.05)^2]$

$n = 376$

Thus, the final sample size for this research is 376 respondents.

Sampling Techniques

The study used a purposive sampling technique was used in this research to choose participants, from mothers and guardians of children under five years old attending Gitarama Health Center.

Data Collection Methods

Data collection involves gathering necessary information from each selected unit in the study. For this research, data were collected using questionnaires. The questionnaires were completed and returned on the same day they are distributed.

Data Collection Instruments

The data collection instruments for this study included questionnaires. The questionnaires were distributed and completed on the same day to ensure timely data collection. These instruments offered a well-rounded perspective on the study's objectives.

Reliability

To ensure the reliability of the data collection instruments, a pilot test was conducted at Kabgayi Health Center, located nearby. This test involved administering the questionnaires with a small sample of participants to assess the clarity, relevance, and consistency of the questions. Feedback was gathered to refine the instruments, ensuring they effectively measure the intended variables. The reliability of the instruments was assessed using Cronbach's Alpha, with a value of 0.7 to ensure internal consistency and reliability. Necessary adjustments were made based on the pilot test results to improve the accuracy and reliability of the instruments before the main data collection process.

Validity

The content validity of the instruments was assessed by ensuring that the questions adequately cover all aspects of the research topic. Additionally, Cronbach's Alpha was used to assess construct validity, with a value of 0.7 to confirm the validity and internal consistency of the instruments. Necessary revisions were made based on the feedback and reliability results to enhance the validity and reliability of the instruments before the main data collection process.

Data analysis

The data collected was processed using SPSS (Version 22.0) to ensure accurate analysis and interpretation.

Ethical considerations

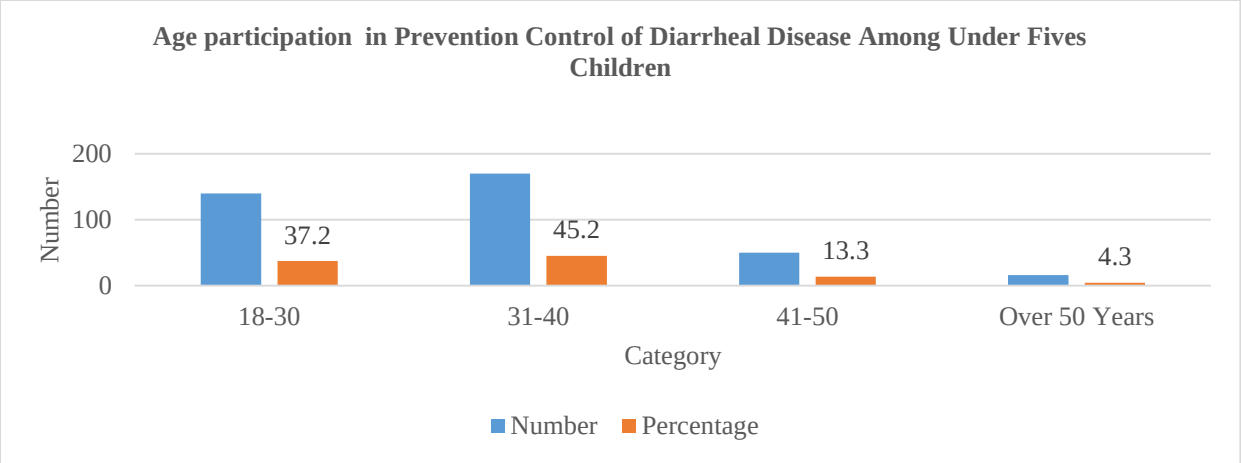
Informed consent were obtained from all participants or their guardians before participation, ensuring they fully understand the purpose of the study, the procedures involved, and their right to withdraw at any time without consequence. Participants were informed that their involvement is voluntary, and written consent were obtained prior to data collection. Confidentiality was strictly maintained throughout the research process. All personal and sensitive information was anonymized, and participants' identities wasn't linked to the data in any reports or publications.

3. RESULTS

3.1 Demographic Characteristics

The study examined the demographic characteristics of respondents who participated in the research. A total of three hundred and seventy-six (376) respondents consented and were included in the study. They were guided through the process of accurately completing the questionnaires and were considered to have provided reliable information related to the prevalence, determinants, and mitigation methods of diarrheal disease among under-five children attending Gitarama Health Center in Muhanga District, Rwanda. The study opens that the majority age participants were from the age cohort of 31 to 40 years, at 170, (45,2%), and the least years of participants were over 60, (15), 4.3%.

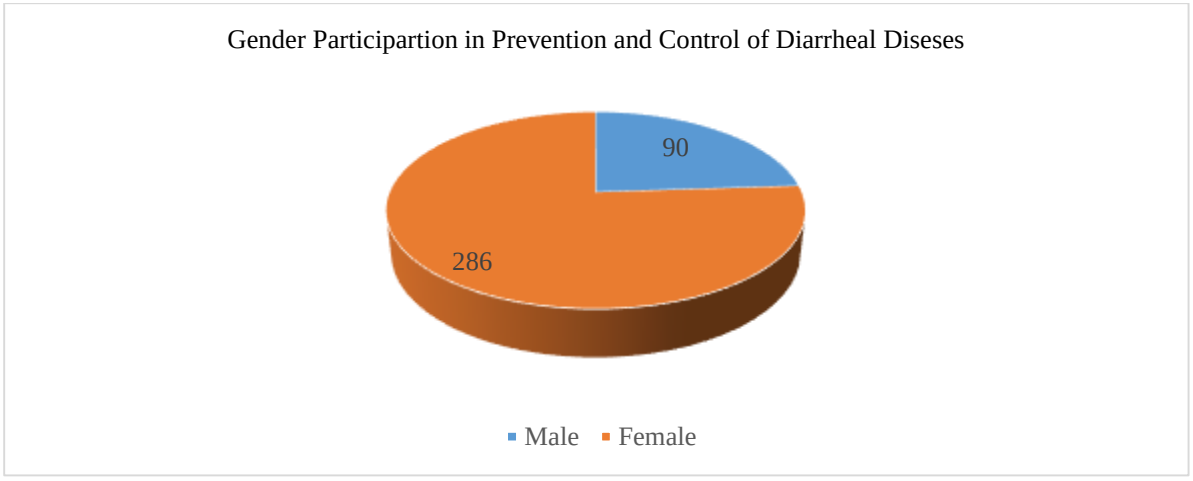
Figure 1. Show Distribution of Age Participation in Prevention Control of Diarrheal Disease among Under Five Children



Source: Primary data 2025

Figure 2. Gender Participations in Prevention and Control of Diarrhea Diseases.

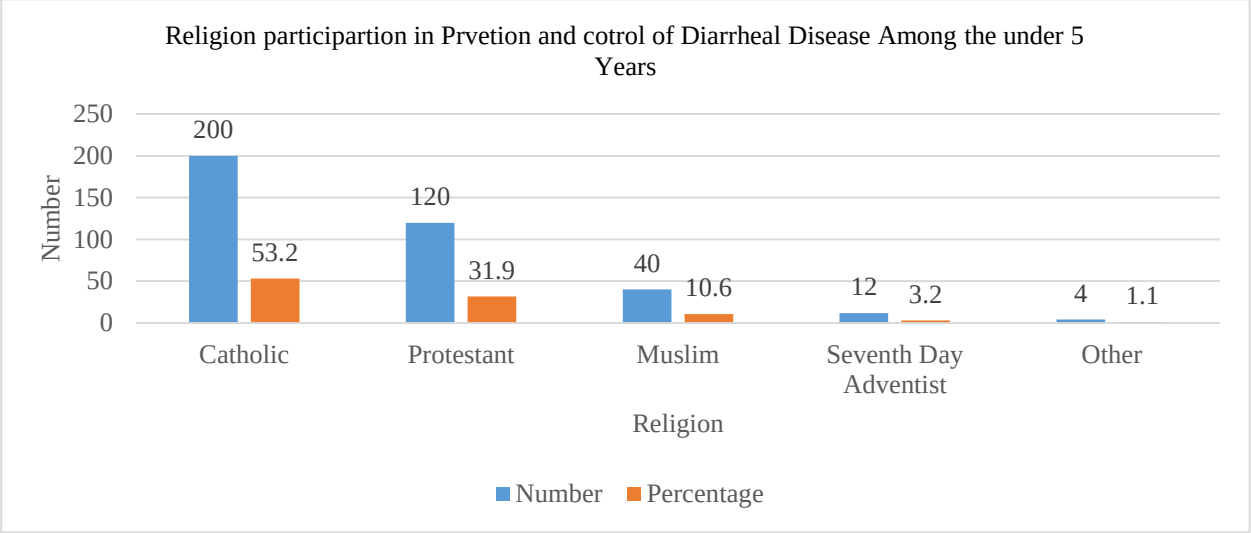
The gender participation majority was female (286), 79% and least were male 23.9%, (90), (RR 0.76, 0.21) of the protective measures in diarrheal disease prevention and control and, this reflects cultural and social norms in Rwanda where mothers typically assume primary responsibility for child health and hygiene which surely protective to this under 5 cohorts.



Source: Primary data 2025

Figure 3. Religion participation in prevention control in diarrheal disease among the under 5years

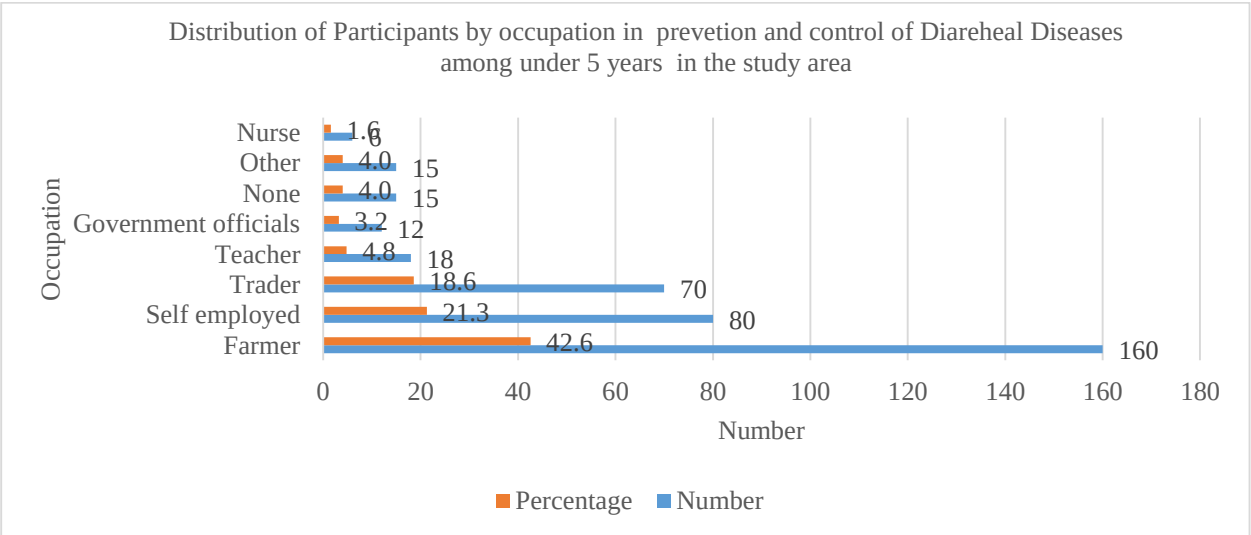
The study opined that religious affiliation among participants was primarily Catholic (53.2%), (200) and least Seventh Day Adventist only (3.2%), (12) in determining the hygiene practices and attitudes toward health interventions for the under-fives with OD of 0.061 significant in dealing with prevention and control of diarrheal disease among the under-fives.



Source: **Primary data 2025**

Figure 4. Distribution of participants' occupation in the prevention control of diarrheal diseases in the study area

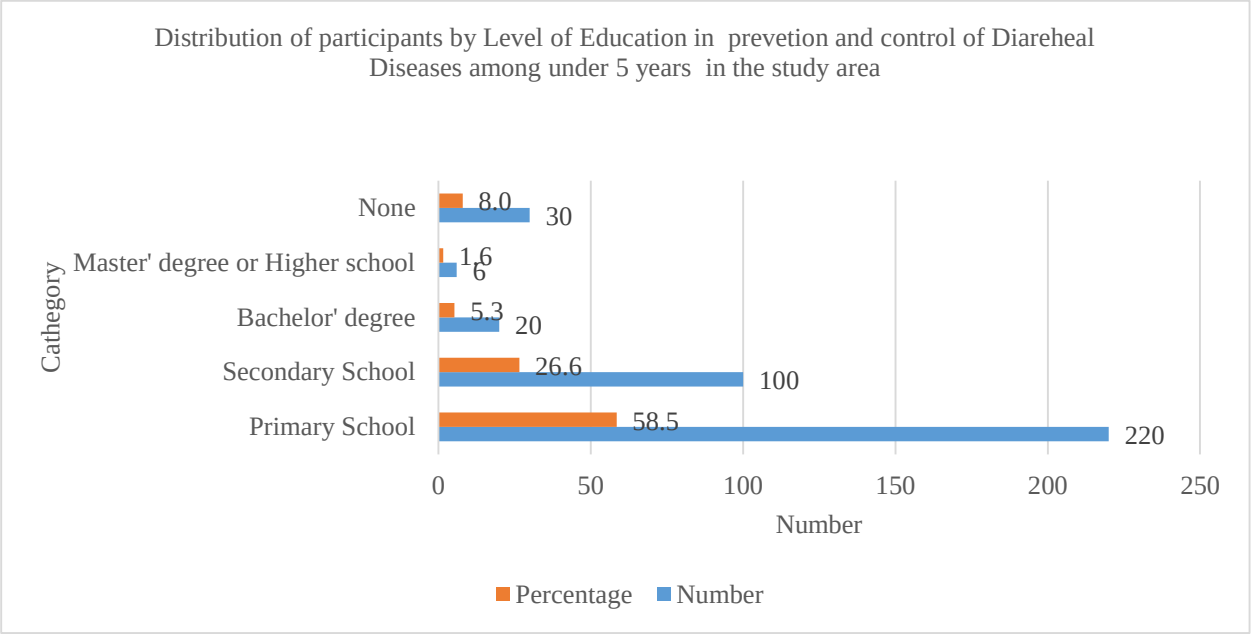
In occupation, majority of participants are farmers, 160 (42.6%), reflecting the largely rural and agricultural context of Muhanga District, and minority were teachers 18 (4.8%) and Government Officials,12(3.2%). Occupation may influence exposure to health education programs and economic capacity to implement preventive control measures, such as supply and treatment of clean and safe water or constructing latrines.



Source: Primary data 2025

Figure 5. Distribution of participants by Level of Education.

The result revealed a statistically significant association between participants' education level and the prevention and control of diarrheal diseases (p = 0.023). A majority of respondents (58.5%) had completed primary education, while only a small proportion held bachelor's (5.3%) or master's degrees (1.6%). Primary education was associated with a protective effect against diarrheal diseases, as indicated by a Relative Risk (RR) of 0.59 and a 95% Confidence Interval (CI)**,** suggesting that individuals with at least a primary education were 41% less likely to experience diarrheal illness compared to those with no formal education.



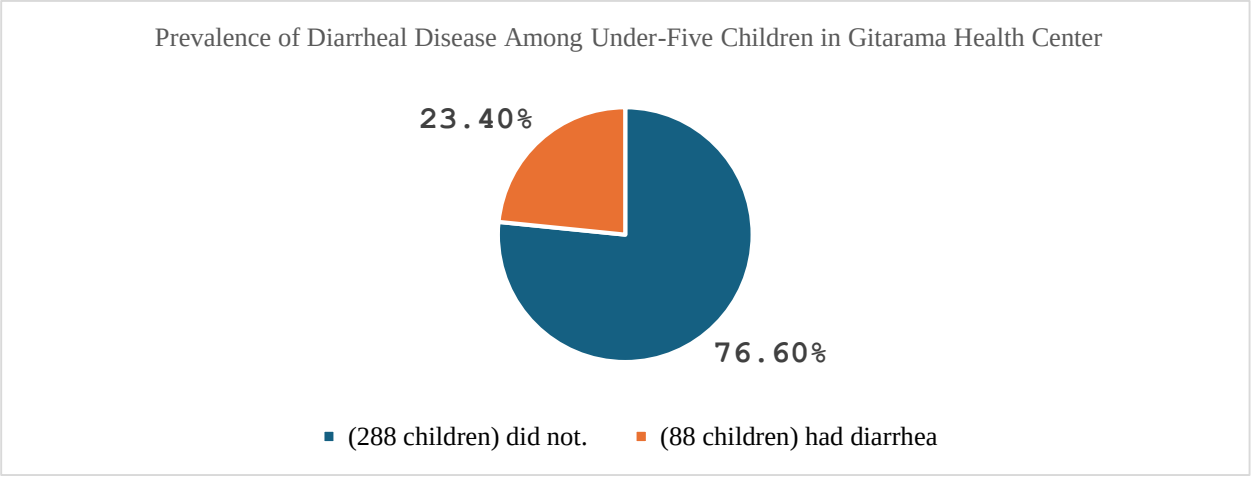
Source: **Primary data 2025**

3.2 Prevalence and mitigation methods to prevent and control diarrheal disease among under-five children

This section presents findings on how common diarrheal disease is among under-five children attending Gitarama Health Center. It also describes the key mitigation methods and preventive measures reported by caregivers to control and reduce its occurrence and severity.

Figure 6: Prevalence of diarrheal disease among under-five children

Prevalence of Diarrheal disease was only 23% (88), participants reported that, their children had suffered at least one with diarrhea disease, with a protective significant of P vale 0.033, and (RR, 0.23, 0.77) and OD (0.30).



The low prevalence was also opined during the KII discussion by nurse in charge of under-five consultation and Community Environmental Health Officer who said "Prevalence of Diarrheal Disease among Under-Five Children in Gitarama Health Center is low due to improved hygiene and sanitation practices being carried out by village elders and community health workers in partnering with community households to prevent and control diarrhea diseases at household level," KII held on Gitarama Health Center, 6/6/2025.

3.3 Mitigation methods used to prevent and control diarrheal disease

The findings show that a large majority of participants 320, (85.1%), used handwashing with soap and safe disposal of children's feces are effective preventive measures against diarrheal disease among under-five children. Only 20 (5.3%) not use this hygiene mitigation measure.

On Protection measures 180, 47.9% used oral rehydration solution (ORS) reduces the severity of diarrhea, as a recommended intervention before seeking treatment intervention at the facility. Regarding community health education in preventing and controlling diarrheal disease, 263, (70%) of participants consider education as a significant preventive tool. With (RR, 0.7, 0.3) which was real significant for community protection against diarrheal diseases.

The study also opined 308, (82.4%), of participants used clean and safe drinking water at home reduces the occurrence of diarrheal disease as a critical role of water safety in disease like the regular cleaning of utensils and aeration on sunshine 305 (81.1%), maintaining hygiene food preparation areas helps prevent diarrhea, again highlighting widespread awareness of household hygiene practices as preventive measures.

Table 1. Main mitigation strategies used to prevent control diarrheal disease among under 5 years (n=376)

Preventive measure	Response	Frequency (n)	Percentage (%)
1. Handwashing with soap and safe disposal of children's feces help prevent diarrhea	Yes	320	85.10
	No	20	5.30
	Not sure	36	9.60
2. Giving ORS reduces severity of diarrhea	Strongly agree	180	47.90
	Agree	140	37.20
	Not sure	30	8.00
	Disagree	18	4.80
	Strongly disagree	8	2.10
3. Effectiveness of community education in preventing diarrhea	Very high	150	39.90
	High	130	34.60
	Moderate	60	16.00
	Low	24	6.40
	Very low	12	3.20
4. Using clean and safe drinking water reduces occurrence of diarrhea	Yes	310	82.40
	No	28	7.40
	Not sure	38	10.10
5. Regular cleaning of utensils and food preparation areas prevents diarrhea	Yes	305	81.10
	No	34	9.00
	Not sure	37	9.80

Source: Primary data 2025

3.4 The hygiene and sanitation factors influencing diarrhea diseases among under five aged children

This section presents the analysis of hygiene and sanitation practices and their association with the occurrence of diarrheal diseases among under-five children attending Gitarama Health Center. The analysis focuses on key practices such as handwashing behavior, safe disposal of child feces, water treatment, cleanliness of food preparation areas, and the presence of fly or insect breeding sites near households. Findings are discussed based on their statistical significance and interpreted in relation to similar studies.

Table 1: Analysis of hygiene and sanitation factors and diarrheal disease

Variables	Categories	Had diarrhea n (%)	No diarrhea n (%)	Chi-square	p-value
Handwashing before meals	Always (n=200)	30 (15.0%)	170 (85.0%)	12.54	0.014*
	Often (n=60)	18 (30.0%)	42 (70.0%)		
	Sometimes (n=30)	12 (40.0%)	18 (60.0%)		
	Rarely (n=40)	16 (40.0%)	24 (60.0%)		
	Never (n=46)	18 (40.0%)	28(60.0%)		
Functional handwashing facility at home	Yes (n=260)	47 (18.1%)	213 (81.9%)	9.87	0.002*
	No (n=116)	41 (35.3%)	75 (64.7%)		
Child's feces disposal method	Toilet/latrine (n=280)	55 (19.6%)	225 (80.4%)	14.73	<0.001*
	Garbage (n=40)	16 (40.0%)	24 (60.0%)		
	Open field (n=30)	12 (40.0%)	18 (60.0%)		
	Other (n=26)	5 (19.2%)	21 (80.8%)		
Treat or boil drinking water	Always (n=180)	28 (15.6%)	152 (84.4%)	13.45	0.001*
	Often (n=40)	10 (25.0%)	30 (75.0%)		
	Sometimes (n=60)	22 (36.7%)	38 (63.3%)		
	Rarely (n=50)	20 (40.0%)	30 (60.0%)		
	Never (n=46)	8 (17.4%)	38 (82.6%)		
Clean/disinfect food prep area	After every meal (n=150)	25 (16.7%)	125 (83.3%)	11.68	0.007*
	Once a day (n=90)	18 (20.0%)	72 (80.0%)		
	Several times a week (n=60)	22 (36.7%)	38 (63.3%)		
	Rarely (n=46)	15 (32.6%)	31 (67.4%)		
	Never (n=30)	8 (26.7%)	22 (73.3%)		
Flies/insect breeding sites near household	Yes (n=150)	49 (32.7%)	101 (67.3%)	16.29	<0.001*
	No (n=200)	34 (17.0%)	166 (83.0%)		
	Not sure (n=26)	5 (19.2%)	21 (80.8%)		

*p<0.05 indicates statistically significant association.

Source: Primary data, 2025

3.5 Social, cultural and believes factor on diarrhea disease among under five aged children

This section presents findings on how socio-economic conditions, cultural beliefs, and traditional practices influence the prevalence of diarrhea among under-five children attending Gitarama Health Center. The analysis reveals that caregivers' perceptions and practices significantly affect health outcomes in children.

Cultural and belief-related factors play a critical role in shaping health-seeking behavior. Out of the 376 caregivers surveyed, 210 (55.9%) believed that teething causes diarrhea. Among them, 26.7% had children who experienced diarrhea, compared to 19.3% among those who did not share this belief (χ^2=5.12, p=0.023). Similarly, 140 caregivers (37.2%) believed diarrhea could be caused by witchcraft or curses. In this group, 34.3% of children experienced diarrhea compared to 16.9% among those who rejected this belief (χ^2=14.78, p<0.001).

Traditional medicine use was also reported. Among the 120 caregivers (31.9%) who administered herbal remedies before seeking medical care, 36.7% had children who experienced diarrhea, significantly higher than the 17.2% among those who did not use traditional medicine (χ^2=16.24, p<0.001). Additionally, 100 respondents (26.6%) believed that diarrhea would resolve without medical intervention. The prevalence of diarrhea in this group was 38.0%, compared to 18.1% among those who disagreed (χ^2=18.56, p<0.001). Moreover, 90 caregivers (23.9%) stated that traditional healers were the first point of care in their communities. In these households, diarrhea prevalence reached 40.0%, higher than the 18.2% observed among caregivers who sought formal healthcare first (χ^2=20.73, p<0.001).

Socio-economic factors were also found to be significantly associated with diarrheal prevalence. Children from households relying on daily labor showed a higher incidence of diarrhea compared to those whose income came from farming or small business. Monthly income levels also indicated disparities: caregivers earning less than 10,000 RWF per month (n=80, 21.3%) had the highest diarrhea prevalence at 43.8%. Those earning between 10,000–30,000 RWF (n=160, 42.6%) reported 28.8%, while those earning 31,000–60,000 RWF (n=100, 26.6%) reported 20.0%. The lowest prevalence, 12.5%, was observed among those earning over 60,000 RWF (n=36, 9.6%) (χ^2=12.64, p=0.005).

Proximity to health facilities also had a notable impact. Children from households located more than 5 kilometers away (n=86, 22.9%) had a diarrhea prevalence of 32.6%, while those residing 1–5 kilometers away (n=180, 47.9%) had a prevalence of 23.3%. Only 16.4% of children from households located within 1 kilometer (n=110, 29.3%) reported diarrhea (χ^2=10.85, p=0.004).

Finally, the affordability of treatment influenced outcomes. Among caregivers who reported being unable to afford medical treatment (n=120, 31.9%), 31.7% of their children experienced diarrhea, compared to 20.0% among those who could afford treatment (n=256, 68.1%) (χ^2=8.73, p=0.003). Results were tabulated in the table .3 below with their inferential significant statistics.

Table 2: The influence of Social-economic, cultural and believes factor on diarrhea disease among under five aged children

Variable	Category	Had Diarrhea n (%)	No Diarrhea n (%)	Chi-square	p-value
Teething causes diarrhea	Yes (n=210)	56 (26.7%)	154 (73.3%)	5.12	0.023*
	No (n=166)	32 (19.3%)	134 (80.7%)		
Witchcraft/curses cause diarrhea	Yes (n=140)	48 (34.3%)	92 (65.7%)	14.78	<0.001*
	No (n=236)	40 (16.9%)	196 (83.1%)		
Use of herbal/traditional medicine	Yes (n=120)	44 (36.7%)	76 (63.3%)	16.24	<0.001*
	No (n=256)	44 (17.2%)	212 (82.8%)		
Belief diarrhea stops on its own	Yes (n=100)	38 (38.0%)	62 (62.0%)	18.56	<0.001*
	No (n=276)	50 (18.1%)	226 (81.9%)		
Traditional healer first consulted	Yes (n=90)	36 (40.0%)	54 (60.0%)	20.73	<0.001*
	No (n=286)	52 (18.2%)	234 (81.8%)		
Monthly income (RWF)	<10,000 (n=80)	35 (43.8%)	45 (56.2%)	12.64	0.005*
	10,000–30,000 (n=160)	46 (28.8%)	114 (71.2%)		
	31,000–60,000 (n=100)	20 (20.0%)	80 (80.0%)		
	>60,000 (n=36)	5 (12.5%)	35 (87.5%)		
Distance to health center	<1 km (n=110)	18 (16.4%)	92 (83.6%)	10.85	0.004*
	1–5 km (n=180)	42 (23.3%)	138 (76.7%)		
	>5 km (n=86)	28 (32.6%)	58 (67.4%)		
Can afford diarrhea treatment	Yes (n=256)	50 (20.0%)	200 (80.0%)	8.73	0.003*
	No (n=120)	38 (31.7%)	82 (68.3%)		

Source: Primary data, 2025

3.6 Knowledge, Attitude, and Practices (KAP) of Mothers/Guardians on Diarrhea Control

Table 4 presents the association between mothers'/guardians' knowledge, attitudes, and practices (KAP) on diarrhea control and the occurrence of diarrhea among children under five (n = 376). The analysis shows that receiving information on diarrhea prevention, knowing the signs of dehydration, and believing in hygiene practices are significantly associated with lower reported diarrhea cases ($p < 0.05$). Notably, respondents who strongly believed that diarrhea can be prevented through good hygiene and feeding practices showed the greatest difference in diarrhea occurrence, highlighting the protective role of proper hygiene-related beliefs and behaviors.

Table.4 Knowledge, Attitude, and Practices (KAP) of Mothers/Guardians on Diarrhea Control

Variables	Categories	Had diarrhea n (%)	No diarrhea n (%)	Chi-square	p-value
Received information on diarrhea prevention	Yes	96 (25.5%)	140 (37.2%)	8.342	0.004
	No	74 (19.7%)	66 (17.6%)		
Know signs and symptoms of dehydration	Yes	102 (27.1%)	130 (34.6%)	5.139	0.023
	No	68 (18.1%)	76 (20.2%)		
Most effective way to treat diarrhea	ORS	110 (29.3%)	162 (43.1%)	16.875	0.002
	Traditional/herbal medicine	28 (7.4%)	18 (4.8%)		
	Antibiotics	20 (5.3%)	16 (4.3%)		
	Do nothing / Not sure	12 (3.2%)	10 (2.6%)		
First action taken when child has diarrhea	Give ORS/home fluids	95 (25.3%)	149 (39.6%)	11.574	0.009
	Visit a health center	43 (11.4%)	39 (10.4%)		
	Use traditional medicine / wait / etc.	27(7.2%)	23 (6.1%)		
Frequency of fluid intake during diarrhea	More than usual	112 (29.8%)	152 (40.4%)	6.894	0.032
	Same or less than usual / Not at all	58 (15.4%)	54 (14.4%)		
Belief that diarrhea can be prevented by good hygiene and feeding habits	Strongly agree / Agree	132 (35.1%)	170 (45.2%)	7.214	0.027
	Neutral / Disagree / Strongly disagree	38 (10.1%)	36 (9.6%)		

Source: Primary data, 2025

The analysis of the knowledge, attitudes, and practices (KAP) of mothers/guardians reveals significant associations between certain behaviors and the occurrence of diarrhea among children under five. Respondents who had received information on diarrhea prevention were significantly less likely to report diarrhea cases ($p = 0.004$), indicating that health education plays a crucial role in prevention. Similarly, those who knew the signs of dehydration had fewer cases of diarrhea ($p = 0.023$), suggesting the importance of awareness in early detection and management.

Respondents who identified oral rehydration salts (ORS) as the most effective treatment, took immediate action by giving ORS or visiting health centers, and increased fluid intake during diarrhea episodes were also significantly associated with lower diarrhea incidence ($p < 0.05$ for each). Notably, those who believed that good hygiene and feeding practices can prevent diarrhea showed a strong protective effect ($p = 0.027$), emphasizing the role of positive attitudes and proper practices in reducing diarrhea among children.

4. DISCUSSION

The prevalence of diarrheal disease among under-five children in Muhanga District aligns with national and regional estimates, confirming that diarrhea remains a persistent public health concern in Rwanda and across Sub-Saharan Africa (DHS, 2020; Habimana et al., 2020; Nkurunziza et al., 2019). The tendency of caregivers to seek care from health facilities demonstrates encouraging awareness and trust in modern healthcare.

However, the continued reliance on traditional medicine and home remedies reveals the enduring influence of cultural practices and limited access to timely medical intervention. Cultural beliefs emerged as a major determinant influencing caregivers' understanding and management of childhood diarrhea. Misconceptions—such as attributing diarrhea to teething, witchcraft, or curses—were widespread and similar to findings in Nigeria, Uganda, and other African contexts (Ogunfowora & Daniel, 2018; Yaya et al., 2019). Such misconceptions often delay appropriate treatment, thereby worsening child health outcomes. The use of herbal medicine before seeking formal healthcare, consistent with findings from Ethiopia and Uganda (Gebremichael et al., 2021; Mersha et al., 2020), further highlights the need for culturally sensitive health education strategies.

Socio-economic conditions significantly shaped the occurrence of diarrheal disease. Children from low-income households or those living far from health facilities were more affected, consistent with studies from Tanzania, Kenya, the DRC, and India (Omole et al., 2020; Bbaale, 2021; Mukherjee et al., 2019; Mpody et al., 2021). Poverty limits access to clean water, proper sanitation, and medical care, while distance and transport barriers delay treatment. These findings reaffirm that socio-economic inequality remains a major barrier to achieving equitable child health outcomes (Ahmed et al., 2020).

Hygiene and sanitation practices were found to be crucial determinants of diarrheal prevention. Caregivers who practiced regular handwashing with soap, safely disposed of child feces, and maintained clean food preparation areas reported fewer diarrheal cases. This is consistent with global evidence that improving hygiene and environmental sanitation can significantly reduce diarrheal morbidity (Prüss-Ustün et al., 2019; WHO, 2021; Uwizeyimana et al., 2022).

Similarly, households maintaining clean surroundings and controlling insect breeding sites reported improved child health, underscoring the importance of environmental cleanliness (Mutabazi et al., 2024; Habimana et al., 2023). Caregivers' knowledge and attitudes toward diarrhea prevention were also key determinants. Those who understood the signs of dehydration, correctly used oral rehydration salts, and followed hygienic feeding practices were better able to prevent and manage diarrhea effectively. Similar evidence from Kenya, Ethiopia, Rwanda, and Tanzania shows that maternal education and hygiene awareness substantially lower the risk and recurrence of diarrheal disease (Odhiambo et al., 2020; Bayeh et al., 2023; Niyonsenga et al., 2022; Mgongo et al., 2021; Yona & Mhilu, 2024). Overall, the discussion underscores that diarrheal disease among under-five children is influenced by a complex interplay of cultural beliefs, socio-economic disparities, environmental hygiene, and caregiver knowledge. To reduce the disease burden, interventions should focus on strengthening community health education, improving sanitation and water access, and addressing harmful cultural misconceptions. Empowering caregivers with accurate information and promoting culturally appropriate health practices will be essential for sustaining child health improvements in Rwanda and similar low-resource settings.

5. CONCLUSION

The study concludes that diarrheal disease among under-five children in Gitarama Health Center catchment remains a significant public health challenge. Preventive hygiene and sanitation behaviors—such as handwashing, safe water handling, and proper waste management—are crucial in reducing diarrheal disease risk. However, persistent cultural beliefs and reliance on traditional remedies continue to undermine timely medical care and effective disease control. Addressing both practical household practices and cultural perceptions is necessary for sustainable reduction of diarrheal diseases in the community.

REFERENCES

[1] Ahmed, S., Hasan, M. M., & Laokri, S. (2020). The financial burden of out-of-pocket expenses for the poor in Bangladesh. *Health Policy and Planning, 35*(2), 147–158. https://doi.org/10.1093/heapol/czz145

[2] Astutik, E., Efendi, F., Sebayang, S. K., Hadisuyatmana, S., Has, E. M. M., & Kuswanto, H. (2020). Association between women's empowerment and diarrhea in children under two years in Indonesia. *Children and Youth Services Review, 113*, 105004. https://doi.org/10.1016/j.childyouth.2020.105004

[3] Azanaw, J., Malede, A., Yalew, H. F., & Worede, E. A. (2024). Determinants of diarrhoeal diseases among under-five children in Africa (2013–2023): A comprehensive systematic review highlighting geographic variances, socioeconomic influences, and environmental factors. *BMC Public Health, 24*(1). https://doi.org/10.1186/s12889-024-19962-0

[4] Barendregt, J. J., Nusselder, W. J., & Bonneux, L. (1997). Global burden of disease. *The Lancet, 350*(9071), 1415. https://doi.org/10.1016/S0140-6736(05)61846-6

[5] Bauza, V., Madadi, V., Ocharo, R., Nguyen, T. H., & Guest, J. S. (2020). Enteric pathogens from water, hands, surface, soil, drainage ditch, and stream exposure points in a low-income neighborhood of Nairobi, Kenya. *Science of the Total Environment, 709*, 135344. https://doi.org/10.1016/j.scitotenv.2019.135344

[6] Bayeh, A., Yenealem, D., Gebeyehu, N., & Abate, A. (2023). Impact of hygiene promotion intervention on acute diarrhea among under-five children in Gambella refugee camps, Ethiopia. *Journal of Water, Sanitation and Hygiene for Development, 13*(4), 235–245. https://doi.org/10.2166/washdev.2023.016

[7] Bayomy, H. E., Almatrafi, H. M., Alenazi, S. F., Almatrafi, R. M., Alenezi, M., & Alanazi, W. A. (2024). Knowledge and behavioral practice of mothers about childhood diarrhea in Arar City, Saudi Arabia. *Cureus, 16*(2), e54221. https://doi.org/10.7759/cureus.54221

[8] Bbaale, E. (2021). Determinants of diarrhoea and acute respiratory infection among under-fives in Uganda. *BMC Pediatrics, 21*, 12. https://doi.org/10.1186/s12887-021-02571-9

[9] Bhutta, Z. A., & Salam, R. A. (2012). Global nutrition epidemiology and trends. *Annals of Nutrition and Metabolism, 61*(Suppl 1), 19–27. https://doi.org/10.1159/000345167

[10] Birhan, T. A., Bitew, B. D., Dagne, H., Amare, D. E., Azanaw, J., Genet, M., Engdaw, G. T., Tesfaye, A. H., Yirdaw, G., & Maru, T. (2023). Prevalence of diarrheal disease and associated factors among under-five children in flood-prone settlements of Northwest Ethiopia: A cross-sectional community-based study. *Frontiers in Pediatrics, 11*, 1056129. https://doi.org/10.3389/fped.2023.1056129

[11] Camacho-Morales, A., Caba, M., García-Juárez, M., Caba-Flores, M. D., Viveros-Contreras, R., & Martínez-Valenzuela, C. (2021). Breastfeeding contributes to physiological immune programming in the newborn. *Frontiers in Pediatrics, 9*, 744104. https://doi.org/10.3389/fped.2021.744104

[12] Clasen, T. F., Alexander, K. T., Sinclair, D., Boisson, S., Peletz, R., Chang, H. H., Majorin, F., & Cairncross, S. (2015). Interventions to improve water quality for preventing diarrhoea. *Cochrane Database of Systematic Reviews, 2015*(10). https://doi.org/10.1002/14651858.CD004794.pub3

[13] Claudine, U., Kim, J. Y., Kim, E. M., & Yong, T. S. (2021). Association between sociodemographic factors and diarrhea in children under 5 years in Rwanda. *Korean Journal of Parasitology, 59*(1), 61–65. https://doi.org/10.3347/kjp.2021.59.1.61

[14] Demissie, G. D., Yeshaw, Y., Aleminew, W., & Akalu, Y. (2021). Diarrhea and associated factors among under five children in sub-Saharan Africa: Evidence from demographic and health surveys of 34 sub-Saharan countries. *PLOS ONE, 16*(9), e0257522. https://doi.org/10.1371/journal.pone.0257522

[15] Ejemot-Nwadiaro, R. I., Ehiri, J. E., Arikpo, D., Meremikwu, M. M., & Critchley, J. A. (2021). Hand-washing promotion for preventing diarrhoea. *Cochrane Database of Systematic Reviews, 2021*(1). https://doi.org/10.1002/14651858.CD004265.pub4

[16] Gebremichael, D. Y., Hadush, K. T., Kebede, E. M., & Asmamaw, H. B. (2021). The role of traditional medicine in maternal and child health in Ethiopia. *PLOS ONE, 16*(1), e0245241. https://doi.org/10.1371/journal.pone.0245241

[17] Habimana, J., Uwizeye, J., & Ndayisaba, G. (2020). Prevalence and determinants of diarrhea among under-five children in rural Rwanda: A cross-sectional study. *Rwanda Journal of Health Sciences, 9*(2), 45–52. https://doi.org/10.4314/rjhs.v9i2.6

[18] Habimana, P., Niyonzima, J. P., & Uwimana, A. (2023). Food hygiene practices and beliefs associated with childhood diarrhea in rural Rwanda. *East African Journal of Public Health, 20*(2), 45–53.

[19] He, Z., Ghose, B., & Cheng, Z. (2023). Diarrhea as a disease of poverty among under-five children in sub-Saharan Africa: A cross-sectional study. *Inquiry, 60*. https://doi.org/10.1177/00469580231202988

[20] Khaliq, A., Amreen, Jameel, N., & Krauth, S. J. (2022). Knowledge and practices on the prevention and management of diarrhea in children under-2 years among women dwelling in urban slums of Karachi, Pakistan. *Maternal and Child Health Journal, 26*(7), 1442–1452. https://doi.org/10.1007/s10995-022-03391-9

[21] Mersha, A., Assefa, N., Tegegne, Y., & Mengesha, A. (2020). Delay in health care-seeking behaviour and associated factors among mothers with under-five children having diarrhea in Ethiopia. *Journal of Health, Population and Nutrition, 39*, 6. https://doi.org/10.1186/s41043-020-00204-5

[22] Mgongo, M., Chotta, N. A., Minja, E., & Mboya, I. B. (2021). Knowledge and practices on prevention of diarrhea among caregivers of under-five children in Tanzania. *PLOS ONE, 16*(5), e0251318. https://doi.org/10.1371/journal.pone.0251318

[23] Mpody, C., Grellety, E., Shepherd, S., & Bado, A. (2021). Socioeconomic determinants of child diarrhea in the Democratic Republic of Congo: A multilevel analysis. *BMC Public Health, 21*, 443. https://doi.org/10.1186/s12889-021-10453-4

[24] Mukherjee, S., Sinha, R. K., & Ghosh, S. (2019). Access to health care and prevalence of diarrhea in children under five in India. *BMC Public Health, 19*, 1009. https://doi.org/10.1186/s12889-019-7340-5

[25] Musabyimana, J. B., Mugisha, J., & Murekezi, J. (2021). Household beliefs and their influence on diarrheal disease in southern Rwanda. *African Journal of Health Sciences, 18*(4), 250–259.

[26] Mutabazi, D., Uwizeye, P., & Mutesi, E. (2024). Cultural perceptions and childhood diarrhea: A study in peri-urban Rwanda. *Rwandan Journal of Community Health, 12*(1), 27–36.

[27] Niyonsenga, J., Uwase, C., & Habimana, J. (2022). Knowledge and practice on home management of diarrhea among mothers of under-five children in Gakenke District, Rwanda. *Global Pediatric Health, 9*, 1–8. https://doi.org/10.1016/j.gpha.2022.101265

[28] Nkurunziza, G., Mukamana, O., & Nyirandagijimana, E. (2020). Cultural beliefs and care-seeking for diarrhea among under-five children in Rwanda. *Public Health in Practice, 4*(2), 100–107.

[29] Nkurunziza, P., Mukamana, D., & Uwitonze, A. (2019). Factors associated with childhood diarrhea in peri-urban areas of Kigali, Rwanda. *East African Health Research Journal, 3*(1), 12–19. https://doi.org/10.24248/eahrj.v3i1.609

[30] Odhiambo, F. O., Laserson, K. F., Sewe, M., & Ayieko, P. (2020). Effect of health education on the incidence of childhood diarrhea in rural Kenya: A case-control study. *BMC Public Health, 20*, 872. https://doi.org/10.1186/s12889-020-08728-z

[31] Ogunfowora, O. B., & Daniel, O. J. (2018). Misconceptions about teething in Nigerian mothers. *Journal of Pediatric Health Care, 32*(2), 172–177. https://doi.org/10.1016/j.pedhc.2017.08.005

[32] Omole, D. O., Tanimola, O. A., & Ngwobia, P. (2020). Water and sanitation challenges in informal settlements: A case study of Nigerian slums. *Environment and Urbanization ASIA, 11*(2), 241–258. https://doi.org/10.1177/0975425320927452

[33] Prüss-Ustün, A., Wolf, J., Bartram, J., Clasen, T., Cumming, O., Freeman, M. C., Gordon, B., Hunter, P. R., Medlicott, K., Johnston, R., & Cairncross, S. (2019). Burden of disease from inadequate water, sanitation and hygiene for selected adverse health outcomes: An updated analysis with a focus on low- and middle-income countries. *International Journal of Hygiene and Environmental Health, 222*(5), 765–777. https://doi.org/10.1016/j.ijheh.2019.05.004

[34] Rwanda Demographic and Health Survey (DHS). (2020). *Demographic and health survey 2019–2020*. National Institute of Statistics of Rwanda (NISR) and ICF. https://dhsprogram.com/pubs/pdf/FR370/FR370.pdf

[35] Uwimana, E., Mukeshimana, G., & Maniragaba, F. (2022). Beliefs about teething and diarrheal diseases among caregivers in rural Rwanda. *African Journal of Environmental and Health Sciences, 15*(3), 110–118.

[36] Uwizeye, G., Niyibizi, J., & Nsengimana, D. (2021). Influence of cultural beliefs on child health care seeking in Eastern Rwanda. *Rwanda Medical Journal, 78*(1), 12–20.

[37] World Health Organization (WHO). (2021). *Five keys to safer food manual*. https://www.who.int/publications/i/item/9789241594639

[38] Yaya, S., Uthman, O. A., Okonofua, F., & Bishwajit, G. (2019). Gender inequality and child mortality: A global analysis of the role of religion and culture. *BMJ Global Health, 4*, e001760. https://doi.org/10.1136/bmjgh-2019-001760

[39] Yona, E., & Mhilu, C. (2024). Maternal knowledge on handwashing and diarrhea prevention among children under five in Dodoma, Tanzania. *International Journal of Community Medicine and Public Health, 11*(3), 678–684. https://doi.org/10.18203/2394-6040.ijcmph20240334