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PREVALENCE OF AMOEBIASIS IN CHILDREN AGED 1 TO 5 YEARS AT BAYAZID ROKHAN TEACHING HOSPITAL, KABUL, AFGHANISTAN: A DESCRIPTIVE STUDY

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Abstract

Background: *Entamoeba histolytica, a protozoan parasite, is the third leading cause of human mortality and morbidity globally, following malaria and schistosomiasis. This study aimed to assess the incidence of Entamoeba spp. in the pediatric department of Bayazid Rokhan Teaching Hospital, Kabul, Afghanistan, in 2024. A total of 230 patients suspected of having amoebiasis were examined.*

Methodology: *This descriptive study, conducted as a case series, involved the diagnosis of amoebiasis based on clinical signs and symptoms. The definitive diagnosis was established using the criteria set by the World Health Organization and relevant global medical literature.*

Results: *The findings revealed that amoebiasis is most prevalent in children aged 1-5 years. Among the 40 confirmed cases, 56% were male and 44% were female. The disease is rare in children under one year of age. Geographically, most cases were reported from urban areas, likely due to better access to healthcare facilities, while patients from surrounding rural provinces were underrepresented due to issues such as transportation barriers, lack of awareness, and neglect of health needs.*

Conclusion: *The study highlights the importance of improving living conditions, providing access to clean water, and promoting health education to reduce the prevalence of amoebiasis in the population. Efforts to enhance public health awareness and infrastructure, particularly in rural areas, are crucial to mitigating the spread of this disease.*

INTRODUCTION

The genus Entamoeba comprises a group of globally distributed parasitic protozoa that belong to the phylum Amoebozoa. Within this genus, seven species are currently recognized: Entamoeba histolytica, E. dispar, E. moshkovskii, E. coli, E. polecki, E. bangladeshi, and E. hartmanni. Among these, E. histolytica, E. dispar, and E. moshkovskii are morphologically identical, making them collectively known as the Entamoeba complex. However, it is E. histolytica that is primarily responsible for amoebiasis, a globally significant gastrointestinal infection. While E. dispar is

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considered non-pathogenic and typically exists harmlessly in the human gut, and recent studies suggest that E. moshkovskii may have the potential to cause disease. However, its pathogenic role remains under investigation. A major obstacle in distinguishing these species lies in their identical appearance under the microscope, which complicates diagnosis—particularly in resource-limited settings where microscopy remains the most common diagnostic method.Much of the early prevalence data for E. histolytica likely overstates the true infection rates, as these figures were collected before researchers were able to differentiate between E. histolytica and E. dispar (1).

More recently, E. moshkovskii has also been detected in individuals from amoebiasis-endemic regions (2, 3, 4, 5, 6), further complicating the epidemiological landscape. To improve diagnostic accuracy, more sophisticated methods—such as enzyme-linked immunosorbent assay (ELISA) and polymerase chain reaction (PCR)—have been developed. The sensitivity and specificity of these contemporary methods for detecting E. histolytica in clinical samples are significantly higher (3).

E. histolytica is the source of amoebiasis, which is still a serious public health issue, particularly in developing nations where overcrowding and inadequate sanitation are prevalent. High incidence rates are reported in regions including the Indian subcontinent, Africa, Southeast Asia, and Latin America. Amoebiasis primarily affects tourists and immigrants coming from endemic areas in more affluent nations like the US.

It's interesting to note that many E. histolytica infections go unnoticed for weeks or even years, during which time they may continue to harbor the parasite. When symptoms do appear, they usually include nausea, cramping in the abdomen, watery diarrhea, and decreased appetite. Individuals may experience fever and bloody feces in more severe situations. Although contact with infected surfaces or objects can also spread the parasite, the main way it is spread is through the consumption of tainted food or drink. Children are particularly at risk because they frequently play in contaminated areas and engage in hand-to-mouth practices.

Other significant intestinal protozoa include Cryptosporidium species and Giardia lamblia, in addition to E. histolytica. These infections, which cause illnesses like diarrhea, dysentery, vomiting, and abdominal swelling, are among the most prevalent causes of gastrointestinal disorders globally. Developmental delays and malnutrition can also happen, particularly in young children. Children are more susceptible to serious illnesses because of their developing immune systems and frequent contact with dirty surroundings.

Amoebiasis is one of the most deadly parasitic infections, with an estimated 500 million people worldwide suffering from it and between 40,000 and 100,000 dying each year. With almost 200 million cases worldwide, Giardia lamblia also presents a significant burden. Particularly harmful to immune compromised people, such as those with HIV/AIDS, are Cryptosporidium species, especially C. parvum, C. hominis, and C. canis. Thirty to fifty percent of instances of chronic diarrhea in these groups have been attributed to cryptosporidiosis. It accounts for 10–15% of diarrheal illnesses in children in underdeveloped nations.

In addition to protozoal infections, hookworms and other geohelminthic parasites are still common in many tropical and subtropical areas. Hookworm infections are widespread in regions such as the western and coastal parts of Kenya and can lead to serious health problems such anemia, gastrointestinal bleeding, and hepato-splenomegaly. Many of these illnesses are classified as neglected tropical diseases (NTDs) and continue to receive little funding and research despite their serious consequences (4).

A study provides an epidemiological analysis of the prevalence, seasonal distribution, and demographic patterns of E. histolytica infections across seven tehsils—Timergara, Balambat, Khall, Warae, Maidan, Samar Bagh, and Jandool—covering a total of 3927 cases in 2020. The findings show notable variations in disease prevalence, with Balambat (1000 cases) and Timergara (800 cases) being the most affected tehsils. A peak in infections was consistently observed during the summer months of May and August, likely due to increased water contamination during the monsoon season. The age-specific analysis indicated that children aged 6-15 years were the most affected group, comprising 41.3% of total cases, while males (66%) were more affected than females

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(34%). Warae Tehsil, part of Upper Dir, reported 450 cases, with a higher burden in rural villages such as Toor Mung Kalone and Jugha Banj, where access to healthcare is limited.(9)

In another study that was followed by an overview of released literature performed based on PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guideline. A total of 15 patients with ameobiasis were diagnosed with an average age of 48.5 years old at the occurrence time of infection. Men (78%) were the most affected patients. Most of the cases were reported following a trip to endemic regions, such as Mali, India, Nepal, Algeria, Cameroon or Congo. All of the processed patients exhibited a hepatic ameobiasis. Amoebic abscess was observed in all cases with an average size of 6.3 cm. Of these patients, seven cases (46.7%) benefited from drainage following a risk of rupture or super infection of the abscess (10).

A study done by at Nkombo Health Center found the following parasite prevalences among children under 5 years: Entamoeba histolytica (17.3%), Entamoeba coli (2.4%), Ascaris lumbricoides (25.0%), Trichuris trichiura (10.1%), Ankylostoma duodenale (6.0%), Schistosoma mansoni (3.0%), and Strongyloides stercoralis (2.4%). Overall, 66.1% of participants tested positive for these parasites. Contributing factors included hand-washing before eating (64.5%), seasonal effects (35.7% affected during the rainy season), and water treatment (57.1% consumed untreated water) (11).

Afghanistan, located in Central Asia, faces a unique set of challenges related to public health, especially in rural areas where access to healthcare, clean water, and proper sanitation is limited. These conditions create an environment ripe for the spread of infectious diseases, including amoebiasis, which is caused by Entamoeba histolytica. The country's socio-political instability, lack of effective sanitation infrastructure, and widespread poverty contribute to the persistence and spread of this disease. Amoebiasis is particularly prevalent in regions where food and water contamination are common, exacerbated by poor hygiene practices and insufficient access to medical care. The vulnerability of Afghanistan's population to such diseases is further compounded by high levels of internal displacement and overcrowding, which increase the risks of infection. Additionally, Afghanistan's healthcare system has been underfunded and strained due to prolonged conflict, limiting the ability to effectively address and control the spread of diseases like amoebiasis (12, 13, 14). This makes the country an area of concern for public health authorities, requiring targeted interventions to address these risks.

Given the context of Afghanistan's public health challenges, this study aims to assess the incidence and demographic characteristics of Entamoeba spp. infections in the Pediatric Department of Bayazid Rokhan Teaching Hospital during the year 2024. By focusing on pediatric patients, the study intends to provide valuable insights into the prevalence of amoebiasis among children, a particularly vulnerable group in the country. The study will also examine how factors such as age, gender, and geographical location contribute to the occurrence of this infection. The findings are expected to inform the development of targeted health interventions and prevention strategies that could significantly reduce the burden of amoebiasis in Afghanistan, especially in high-risk areas. Furthermore, understanding the demographic patterns of the disease will help in improving the healthcare response to parasitic infections in the pediatric population.

Methodology

This research was conducted as a descriptive study using a case series approach, with randomized sampling of all patients who visited the hospital in 2024.

Study population:

This research focused on children under five years of age diagnosed with amoebiasis and acute gastroenteritis, who were referred to the Pediatric Department of Bayazid Rokhan Hospital during 2024. A total of 230 patients with acute gastroenteritis visited the hospital, of which 40 had bloody diarrhea. The study examined factors such as age, gender, residence, co-morbidities, and complications. Patients over five years of age were excluded. Evaluations and treatments were conducted based on the patients' general condition and disease severity. After clinical improvement, patients were discharged and followed up at four-

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week intervals. However, some patients escaped treatment after clinical improvement, and others did not complete prescribed tests outside the hospital. Unjustified reasons.

Exclusion criteria: children who were older than five years old or relatives of those patients who did not agree to inpatient treatment or who did not have clinical evidence of Amoebiasis were not included in our research, for example Shigellosis (Bacillary dysentery)

Inclusion criteria: All children who aged 1-5 years and had clinical evidence of Amoebiasis and registered and included in our study.

Statistical analysis:

The data on age, sex, residence, comorbidities, and other factors were collected in the table and analyzed using Excel and SPSS version 26.

Results

In a descriptive study of 230 patients during the year 2024. Who was referred to pediatric department of Bayazid Rokhan Teaching Hospital There were 40 cases of dysentery, of which 17 were inpatients and 23 were outpatients. 40 patients who were suspected to have Amoebiasis in terms of signs and symptoms were diagnosed with Amoebiasis after completing the examinations, and this number of patients was studied in terms of age, gender, residence and comorbidities (Table 1).

Table 1: Distribution of Dysentery Cases among Patients

Variable	N	n%
Dysentery	40	5.2%
Other patients	190	94.8%
Total patients	230	100%

The table 2 and Figure 1 shows the percentage of occurrence of ameobiasis in a descriptive study in terms of age, the highest occurrence of which are seen in the ages of 1-5years.

Table 2: Prevalence of Ameobiasis across Different Age Groups

Age	Number	Percentage
1y<	7	18%
1-5	33	82%
Total	40	100%

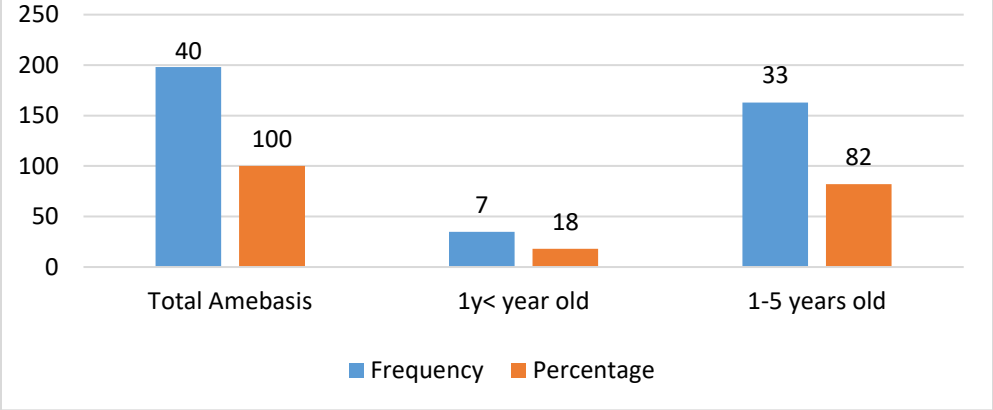

Figure 1: Frequency and percentage of incidence

Tables 3, 4, and 5, along with Figure 2, present a descriptive analysis of the distribution of Ameobiasis among children based on age, sex, and residential location. As shown in Table 3, the prevalence of Ameobiasis was notably higher among children aged 1–5 years (40.2%) compared to those aged 0–11

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months (25%), indicating a greater risk of exposure and infection in older children, potentially due to increased mobility and interaction with contaminated environments. Table 4 and Figure 3 depict the sex-wise distribution, revealing that males (56%) were more frequently affected than females (44%), which may reflect behavioral differences, exposure patterns, or gender-based disparities in care-seeking behaviors. Table 5 highlights the role of residential setting, with a greater incidence reported in rural areas, suggesting that inadequate sanitation, limited access to clean water, and insufficient healthcare infrastructure may contribute significantly to the higher disease burden in these communities. These findings underscore the importance of age-specific, gender-sensitive, and geographically targeted public health interventions aimed at reducing the prevalence of Ameobiasis among pediatric populations.

Table 3: Prevalence of Condition Ameobiasis among Children Aged 0–11 Months and 1–5 Years

Age	0-11month	1-5 years
Percentage	25%	40.2%

Table 4: Sex Distribution Analysis among a Sample Population

Sex	Number	Percentage
Male	23	56%
Female	17	44%
Total	40	100%

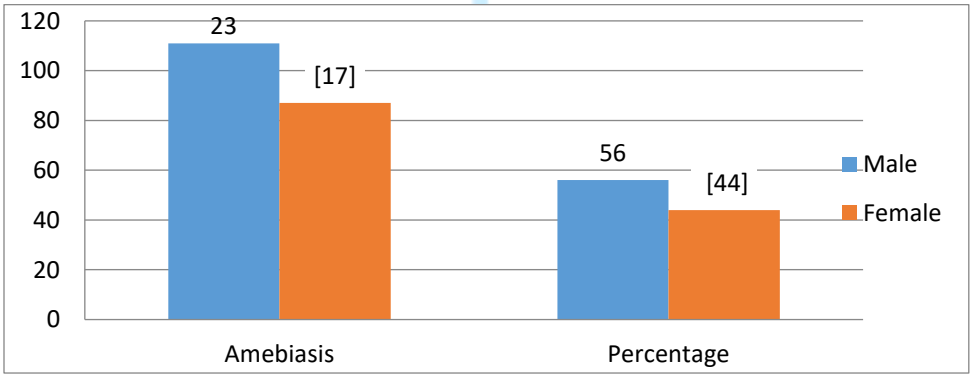

Figure 2: Gender-wise Distribution of Ameobiasis Incidence Among Children

Table (5): Distribution of Study Participants by Place of Residence

Place of residence	Number	Percentage
Center	35	87%
Province	5	13%
Total	40	100%

Table 6 presents the prevalence of complementary (co-occurring) diseases among pediatric patients diagnosed with Ameobiasis. The most frequently associated condition was Acute Watery Diarrhea (AWD), observed in 80% of the cases, indicating a strong clinical overlap and possibly shared risk factors such as poor hygiene and contaminated water sources. Bronchiolitis and Pneumonia were identified as co-existing conditions in 13% and 7% of the cases, respectively. These findings suggest that children affected by Ameobiasis often present with multiple health complications, which may exacerbate disease severity and complicate treatment outcomes. The high occurrence of AWD highlights the need for integrated management strategies addressing both

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parasitic and diarrheal diseases in pediatric populations.

Table (6): Prevalence of Complementary Diseases Among Pediatric Patients

Complementary Disease	Number	Percentage
AWD	32	80%
Bronchiolitis	5	13%
Pneumonia	3	7%
Total	40	100%

Discussion

This study conducted at Bayazid Rokhan Teaching Hospital in 2024 reveals a substantial burden of Ameobiasis among children under five, with 40 confirmed cases out of 230 pediatric patients (17.4%) diagnosed with dysentery. Such a prevalence rate is consistent with findings from similar settings where poor sanitation, limited access to clean drinking water, and overcrowding contribute to the transmission of Entamoeba histolytica (18, 22). Ameobiasis remains a leading parasitic cause of diarrhea and dysentery in low-income countries, particularly among young children whose immune systems are still developing. The consistency of our findings with broader regional data highlights the continuing relevance of this disease in the public health landscape of resource-limited environments.

Age-specific analysis revealed that the majority of infections occurred in children aged 1–5 years (82%), compared to only 18% in infants below one year. This trend mirrors global epidemiological patterns, as increased mobility and exploratory behaviors in toddlers result in greater exposure to contaminated environments (19). Furthermore, Kotloff (17) emphasized that the peak incidence of diarrheal illness occurs between 6 months and 2 years of age—a period during which children transition to complementary feeding and reduced maternal immunity. Our findings support the need for early, age-targeted interventions such as hygiene education for caregivers, timely vaccinations, and access to safe food and water to reduce exposure among children in this age group.

Gender-wise, boys accounted for a higher proportion of Ameobiasis cases (56%) compared to girls (44%). This disparity may stem from gender-based behavioral differences, including more frequent outdoor play or cultural norms that expose boys to higher environmental risks (22). It has also been suggested that gendered care-seeking behaviors may influence diagnosis rates, as caregivers may be more likely to seek treatment for male children in some communities (16). These results call for gender-sensitive health interventions and education that promote equal care access for all children regardless of sex.

Interestingly, 87% of diagnosed cases came from central urban areas, while only 13% were from provincial regions. Although rural areas often lack adequate sanitation, this distribution may reflect healthcare accessibility and utilization rather than true prevalence. Urban populations are more likely to access hospitals and diagnostic services, leading to higher reported case numbers (21). Meanwhile, underreporting from rural communities due to logistical and financial barriers masks the actual burden, as noted by Yori et al. (23). These observations underline the importance of strengthening surveillance and outreach programs in rural and underserved areas to ensure accurate disease tracking and early intervention.

A major clinical finding was the high rate of coexisting illnesses among Ameobiasis patients, most notably Acute Watery Diarrhea (80%). This co-morbidity indicates shared transmission routes and environmental risk factors such as contaminated water supplies. Similar overlaps were documented in a multicountry study by Platts-Mills et al. (20), who reported frequent co-infections with E. histolytica, rotavirus, and bacterial pathogens in children under five. Abas et al. (15) also reported the concurrence of Ameobiasis with respiratory infections and malnutrition in conflict-affected areas. The presence of multiple comorbidities complicates diagnosis and treatment and suggests the need for integrated child health programs that address nutritional status, hygiene practices, and comprehensive disease management in endemic settings.

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Conclusion

The present study highlights a significant burden of Ameobiasis among pediatric patients in Bayazid Rokhan Teaching Hospital during 2024, with a notably high occurrence among children aged 1–5 years. The disproportionate prevalence in this age group is consistent with broader epidemiological patterns observed in low-resource settings, where poor hygiene, limited access to safe water, and early mobility increase exposure risks. Gender and residential distribution further reveal disparities shaped by socio-cultural and infrastructural factors, with boys and urban dwellers showing higher case numbers, likely influenced by differential exposure and healthcare access. Additionally, the frequent co-occurrence of conditions such as Acute Watery Diarrhea and respiratory infections underscores the multifactorial nature of pediatric illness in endemic regions and calls for a syndromic and integrative approach to child health management.

Collectively, these findings affirm the need for targeted public health interventions that are age-appropriate, gender-sensitive, and geographically inclusive. Strengthening community-based surveillance, improving sanitation infrastructure, and delivering health education to caregivers are essential components in reducing disease transmission and improving outcomes. Given the overlap between Ameobiasis and other preventable illnesses, efforts should prioritize integrated pediatric care models and cross-sector collaboration among healthcare, education, and water and sanitation sectors. This approach is crucial not only for treating individual cases but also for breaking the broader cycle of enteric infections and child morbidity in under-resourced settings.

Recommendations

Strengthening Diagnostic Infrastructure:

Establishment of specialized diagnostic centers for parasitic infections—particularly Ameobiasis—is essential. Equipping public hospital laboratories with advanced and affordable diagnostic tools will ensure timely and accurate detection, especially for economically disadvantaged populations.

Ensuring Access to Essential Medications: A reliable supply of anti-parasitic medications should be ensured, at minimum for hospitalized patients. This will alleviate the financial burden on families and enhance treatment adherence, leading to improved clinical outcomes in pediatric care.

Expansion of Specialist Training in Pediatric Internal Medicine: Focused subspecialty training programs in pediatric internal medicine should be developed to enhance the expertise of local healthcare providers. This would enable more precise diagnosis and management of complex parasitic and comorbid conditions in children.

Implementation of Public Awareness Campaigns: Public education initiatives through print, broadcast, and digital media should be launched to increase awareness about the symptoms, transmission, and prevention of Ameobiasis. Improved community knowledge is crucial for early detection and control of the disease.

Development of Digital Medical Data Systems: Hospitals should adopt structured electronic databases for managing patient records and clinical data. Digitalization will improve the quality of data collection, support epidemiological monitoring, and facilitate future research efforts.

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REFERENCES

Clark CG, Diamond LS. Entamoeba histolytica: a method for isolate identification. Experimental Parasitology. 1993 Dec 1;77(4):450-5.

Ali et al., 2003; Parija and Khairnar, 2005; Khairnar, 2005; Khairnar et al., 2007; Fotedar et al., 2008; Tengku Shahrul Anuar et al., 2012.

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

P. Ackers, 2002.

JulioC. Carrero , Magda Reyes-López , Jesús Serrano Luna , Mineko Shibayama , Juan Unzueta, Nidia León-Sicairos , Mireya dela Garza [b] 19 September 2019.

Kepha S, Ochol D, Wakesho F, Omondi W, Njenga SM, Njaanake K, Kihara J, Mwatha S, Kanyi C, Oloo JO, Kibati P. Precision mapping of schistosomiasis and soil-transmitted helminthiasis among school age children at the coastal region, Kenya. PLOS Neglected Tropical Diseases. 2023 Jan.

Dadi AF, Akalu TY, Baraki AG, Wolde HF. Epidemiology of postnatal depression and its associated factors in Africa: A systematic review and meta-analysis. PloS one. 2020 Apr.

Mackey TK, Liang BA, Cuomo R, Hafen R, Brouwer KC, Lee DE. Emerging and reemerging neglected tropical diseases: a review of key characteristics, risk factors, and the policy and innovation environment. Clinical microbiology reviews. 2014 Oct.

Haque R , N Engl J Med , Tanyuksel M, Amebiasis Current Medical diagnosis and treatment Nineteenth edition 2010, Chapter 41.

Nisar M, Khan F, Ahmad N, Ullah S, Haq IU, Ahmad S, Ullah A, Saad M, Nasir F. Entamoeba Histolytica Incidence in District Dir Lower and Tehsil Wari Upper Dir Khyber Pakhtunkhwa, Pakistan. Indus Journal of Bioscience Research. 2024 Oct 30;2(02):163-70.

Nath J, Ghosh SK, Singha B, Paul J. Molecular epidemiology of amoebiasis: a cross-sectional study among North East Indian population. PLoS neglected tropical diseases. 2015 Dec 3;9(12):e0004225.

Nasrallah J, Akhoundi M, Haouchine D, Marteau A, Mantelet S, Wind P, Benamouzig R, Bouchaud O, Dhote R, Izri A. Updates on the worldwide burden of amoebiasis: A case series and literature review. Journal of infection and public health. 2022 Oct 1;15(10):1134-41.

Mehariya, B. K., & Mehariya, K. R. (2016). Distinct blue print to restraint neglected tropical diseases. International Journal of Bioassays, 12(6), 453-462.

Azargashb, E., Khazan, H., & Gholipoor, Z. (2020). Prevalence and risk factors of intestinal parasite infections in Mazandaran province, North of Iran. Infectious Disease Reports, 12(4), 305-315.

Norman, F. F., Monge-Maillo, B., & Martínez-Pérez, Á. (2015). Parasitic infections in travelers and immigrants: part I protozoa. Future Microbiology, 10(5), 551-560.

Ndahiro e. Prevalence of amoeba species and intestinal helminth among children under 5 years old case study: nkombo health center period: may 2019-june 2022.

Abas, M., Nadir, S. A., & Fadhil, H. (2024). A Prevalence of Entamoeba Sp. in Children With Diarrhea. Continents States University Journal.

Guevara-Ramírez, J. F., Rodríguez-Gutiérrez, A. F., & González, E. C. (2025). Antibiotic therapy in dysentery of infectious etiology in early childhood: a systematic scoping review. Boletín Médico del Hospital Infantil de México, 25(82), 20.

Kotloff, K. L. (2017). The burden and etiology of diarrheal illness in developing countries. Pediatric Clinics of North America, 64(4), 799–814.

Mbae, C. K., Nokes, D. J., Mulinge, E., Nyambura, J., Waruru, A., & Wainaina, J. (2013). Intestinal parasitic infections in children presenting with diarrhoea in outpatient and inpatient settings in an informal settlement of Nairobi, Kenya. BMC Infectious Diseases, 13(243).

Mulinge, E., Mbae, C., Ngugi, B., Irungu, T., & Matey, E. (2021). Entamoeba species infection in patients seeking treatment for diarrhea and abdominal discomfort in Mukuru informal settlement in Nairobi, Kenya. Food and Waterborne Parasitology, 22, e00135.

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

Platts-Mills, J. A., Cohen, A. L., Nakamura, T., & Operario, D. (2022). Trends and incidence of diarrhoea requiring hospitalisation in children under 5 years of age in 28 low-income and middle-income countries: findings from the Global Pediatric Diarrhea Surveillance Network. BMJ Global Health, 7(9), e009548.

Sultana, R., Luby, S. P., Gurley, E. S., & Rimi, N. A. (2021). Cost of illness for severe and non-severe diarrhea borne by households in a low-income urban community of Bangladesh: a cross-sectional study. PLoS Neglected Tropical Diseases, 15(3), e0009439.

Ugboko, H. U., Nwinyi, O. C., Oranusi, S. U., & Oyewale, J. O. (2020). Childhood diarrhoeal diseases in developing countries. Heliyon, 6(4), e03690.

Yori, P. P., François, R., & Rouhani, S. (2018). The other Campylobacters: Not innocent bystanders in endemic diarrhea and dysentery in children in low-income settings. PLoS Neglected Tropical Diseases, 12(5), e0006200s