

**PREVALENCE OF INTESTINAL PROTOZOAN INFECTIONS AMONG CHILDREN (1-4 YEARS)  
ATTENDING HEALTHCARE SERVICES AT AMUDAT HOSPITAL, AMUDAT DISTRICT.  
A CROSS-SECTIONAL STUDY.**

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## Abstract

### Background

Globally, intestinal parasitic infections (IPI) such as soil-transmitted helminths (STH) and Protozoa have been noted as one of the most common causes of illnesses and diseases especially among economically disadvantaged communities. With an average prevalence rate of 50% in developed countries and almost 95% in third-world countries, it is estimated that intestinal parasites result in 450 million illnesses. Hence this study aimed to determine the prevalence of intestinal protozoan infections among children (1-4 years) attending healthcare services at Amudat hospital, Amudat district.

### Methodology

A cross-sectional descriptive study utilizing quantitative methods to identify the risk factors of protozoan infections was applied during the study. A non-random convenient sampling technique was used where the first 10 participants were taken. A total of 100 children whose parents/guardians consented participated in the study. A semi-structured questionnaire was used to collect data.

### Results

61% of the respondents were aged (3-4) years and (88%) of the respondent's guardians/parents were peasants' farmers. The overall point prevalence of IPI in the study was 22.0 %, with about 9(41%) of the participants being infected by more than one type of parasite, 15(26.3 %) of those participants infected with intestinal parasites were female while 7(16.3%) of the males participants were infected. The most prevalent ssp of intestinal protozoa was *G. lamblia* (41%).

### Conclusion

The prevalence of IPIs amongst children aged 1-4yrs in Amudat hospital was relatively low with the most prevalent species being *G. lamblia*.

### Recommendations

There is a need for the government and the local leaders and health officials to provide health education to the parents to prevent IPIs among children and the overall population at large.

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**Keywords:** Amudat district, prevalence of intestinal protozoan infection, children aged (1-4) years.

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### Background

Globally, intestinal parasitic infections (IPI) such as Protozoa and soil-transmitted helminths (STH) have been identified as one of the common causes of illnesses and diseases especially among economically disadvantaged communities. According to WHO, IPS has been recognized as one of the most significant causes of illnesses with an estimated 450 million worldwide illnesses and an average prevalence rate of 50% in developed countries and almost 95% in developing countries. While infection occurs

worldwide, protozoan is highly prevalent in sub-Saharan Africa, South America, East Asia, and China (Bahmani et al., 2017).

*Entamoeba histolytica*, *Giardia lamblia*, and *cryptosporidium* are the most prevalent Intestinal protozoan parasites and the illnesses resulting from these intestinal protozoan parasites are amoebiasis, giardiasis, and cryptosporidiosis respectively, characterized by diarrhea (Butera et al, 2019). *Giardia lamblia*, *cryptosporidium* spp, and *Entamoeba* ssp are intestinal protozoa capable of

infecting a range of host spp and are important causes of human morbidity and mortality (Kotloff et al, 2019). *Cryptosporidium spp* mainly *cryptosporidium homines* and *cryptosporidium parvum* have been responsible for large-scale waterborne epidemics in the developed world and are amongst the top four causes of moderate to severe diarrhea in young children in the developing world (Sowet et al., 2021). Children are more susceptible to IPIs soon after weaning and there is a high chance of re-infection later. The prevalence of parasitic infection of the intestine varies from time to time and place to place and it depends on several contributing factors. Those infections are often ignored until severing or chronic complications are observed because they are usually asymptomatic or manifest only mild symptoms. According to studies, the prevalence of intestinal protozoan infections was 36.5%, out of which 16% was *giardia lamblia* being the most prevalent intestinal protozoan infection in Bushenyi district, located in the western part of Uganda among children between 1 and 4 years of age whose mothers had no formal education (Ntulume et al., 2022). There's limited literature on the prevalence of IPIs among children in Amudat, therefore this study aimed at determining the prevalence of intestinal protozoan infections among children (1-4 years) attending healthcare services at Amudat Hospital, Amudat district.

## Methodology

### Study area

This study was conducted at Amudat Hospital, a private not-for-profit hospital located in the Karamoja subregion in the northern part of Uganda, Amudat town council, and Amudat hospital along Nakapiripiriti road. It is approximately 400km by road, northeast of Kampala city, it lies on the coordinates of 01570,0N, 34570,0E latitudes 1'57080, ON, 34'56140, O'E. Amudat Hospital is overwhelmed by a large number of outpatients and inpatients attendances with over 700 registered patients attending laboratory services in a month. Outpatient service is offered 5 days a week and provides health care services to the population. It serves the nearby borders of Amudat Uganda like Turkana, Konyao, and west Pokot then the nearby districts of Uganda like Moroto and Nakapiripiriti.

### Study design

A cross-sectional descriptive study utilizing quantitative methods to identify the risk factors of intestinal protozoan infections was applied during the study.

### Study population

The study population comprised children 1-4 years attending outpatient clinics for laboratory services at Amudat Hospital at the time of the study.

## Sampling and sample size

### Sample size

The sample size determination was obtained by using the formula developed by (Kish and Leslie 1965)  $n = \frac{Z^2pq}{d^2}$

where n is the sample size.

Z is the statistical and certainty =1.96 at a 95% confidence interval.

P is assumed true population of the prevalence of attribute in the population.

q is the difference between 1 and p(1-p).

d represents the error allowed =5%

Therefore;

$$n = \frac{1.96^2 \times (25/100) \% \times (1-25/100)}{0.05^2}$$
$$\frac{3.8416 \times 0.25 \times 0.63}{0.0025}$$
$$= 272$$

Since this number is high for a cross-sectional, it needs to be reduced by Modified Kish and Leslie as below.

$$N = \frac{n}{1 + n/\text{population}}$$

$$N = \frac{272/1+272/\text{population}}{272/1+272/300} \quad \text{population}=300$$
$$272 \times 300 / 572$$

$$N = 142 \text{ study subjects}$$

### Inclusion criteria

The study included children (both boys and girls) aged below 5 years attending out and in-patient clinics who presented with signs and symptoms of intestinal protozoan infections. Children with no history of treatment for intestinal parasites in the last two weeks and had agreed to be included in the study.

### Exclusion criteria

The study excluded those who were critically ill and children who required admission to the hospital and health facilities in the study area and therefore could easily be lost to follow-up.

### Sampling method

A convenient nonrandom sampling method was used during the enrollment of the subjects for the study. Patients were briefed about the study and those who qualified to be included and agreed to be in the study signed consent forms. All pieces of information in the form were well elaborated orally to those unable to write and read and therefore the use of thumbprints on the form was necessary.

### **Data collection tools**

A semi-structured questionnaire with open and closed-ended questions was used to collect demographic information from participants.

### **Sample collection**

The participants including guardians or parents of children were issued precise and easy-to-follow standard procedures followed during sample collection including the container, quantity of sample, method of collection, and precautions to be observed to rid of any contamination. Stool sample containers will be given to the participants and laboratory numbers to identify specimens while processing and analyzing. The collected samples will be transported to the laboratory for analysis according to standard operating procedures. The clients' demographic data such as sex, age, and clinical notes were taken at the time of sample collection.

### **Data collection, Entry, and Cleaning**

Informed consent to participate in the study was obtained from the participants using a standard consent form designed for this study after the participants were interviewed, a questionnaire was reviewed by the laboratory technician and the researcher. All questionnaires were coded and validated daily during data collection. Data was entered in EPI infor. Software version 3.3.2 to minimize error. Data cleaning and validation were done before analysis.

### **Piloting the study**

A sample of 10 subjects was issued the semi-structured questionnaire to evaluate the effectiveness, accuracy, and completeness of this tool and thereafter necessary corrections were made in case of errors. There was a participant time log that helped track, in minutes, how long they spent on each component of the course. It was also translated into the local language that is to say Pokot and the pilot study was conducted at DNDi quarters in Amudat Hospital Amudat district.

### **Analysis of data**

The data obtained from the participants was recorded in a field book, entered in the research laboratory registers, and then later entered into the computer using MS Excel which is then exported to SPSS-16 software for analysis. The frequencies and proportions were determined. Data was summarized in tables, pie charts, and bar graphs.

### **Laboratory analysis for intestinal protozoa**

The testing was done under the supervision of qualified laboratory technicians and the principal researcher. The collected stool specimen was observed macroscopically for

consistency, the presence of blood stains, and any macroscopic parasites/worms (Fitri et al., 2022). Direct examination with normal saline, iodine, or eosin staining methods was used to process the stool. About 2mg of saline was emulsified in a drop of normal saline, iodine on a glass slide covered with coverslips, and then observed microscopically using x10 or x40 objective for cysts or trophozoites.

The formal ether concentration technique was performed by emulsifying about 2g of stool in 15mls of 10% v/v formal saline, the unpreserved preparation was allowed to stand for 30 minutes, then strained through two layers of gauze into a 15 conical centrifuge tube and centrifuged at 2000rpm for 5minutes. When needed, the washing step was repeated until the supernatant became clear. The sediment was suspended with 10 ml of 10% v/v formal saline, and then 3 ml of diethyl ether was added. The tube was shaken vigorously for 30 seconds and centrifuged at 2000 rpm for 5 minutes. The fecal debris layer was loosened by an applicator stick and the tube was rapidly inverted to discard the top three layers while the sediment remains at the bottom. A drop of iodine was mixed with the sediment, transferred to a microscope slide, covered with a cover glass, and scanned microscopically.

### **Ethical considerations**

The authority was given by the faculty of health sciences at the University of Kisubi for approval. Ethical approval was also sought from the Amudat hospital medical superintendent and written informed consent for carrying out the study was therefore acquired from the study participants (parents/ guardians) on an individual basis. This was done after a full explanation of the objectives, risks, and benefits of the study. It was classified the participants that were recruited were completely at will and after consent was given, it was withdrawn at any time while conducting the study without seeking permission. Patients' rights, confidentiality, and privacy were protected while conducting the study and collecting data.

### **Quality control**

The internal validity of the study was ensured by the following measures:

The questionnaire was pre-tested in a pilot study and then standardized. Double-labeled the samples with both the patient identification number to match the one on the questionnaire to avoid mixing up results. Collected data was carefully edited before it was entered into the database. A qualified laboratory technologist and the researcher analyzed the sample.

**Results**  
**Demographic characteristics of the respondents.**

**Table 1: Age of study participants (n= 100)**

AGE CATEGORY	SCORE
1-3	39
3-4	61

**Figure 1 shows the age of the study participants.**

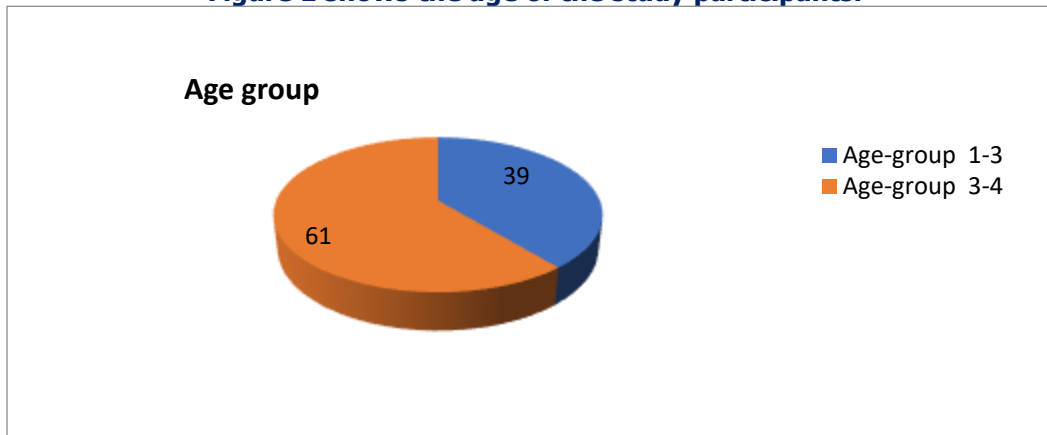


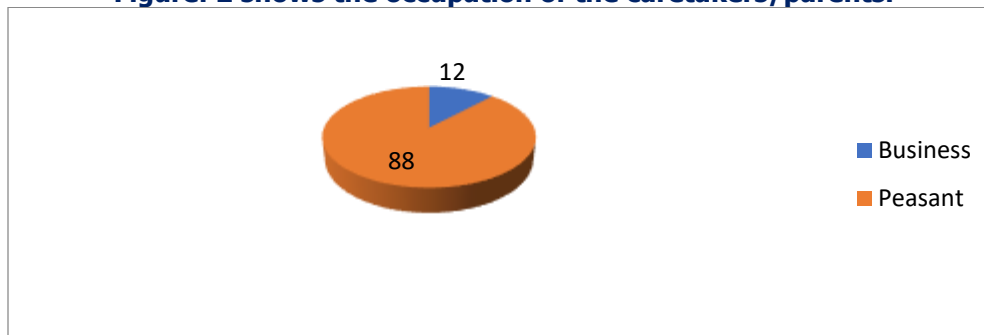
Figure 1: shows that 39% of the participants were aged (1-3) years and 61% were aged between (3-4) years.

**Table 2: showing gender.**

Sex	Percentage
Male	43
Female	57

Table 2: Indicates that 57% of the participants were females and 43% were males.

**Figure: 2 shows the occupation of the caretakers/parents.**



**Table: 3 shows the occupations of the caretakers/parents.**

Occupation	Percentage
Peasants	88
Business	12

Table: 3 shows that (88%) of the parents of the participants were peasants and (12%) were business dealers.

**Prevalence of Intestinal Protozoan Infection in children aged (1-4) years.**

**Figure 3: Prevalence of IPI by sex of the participants (n= 100)**

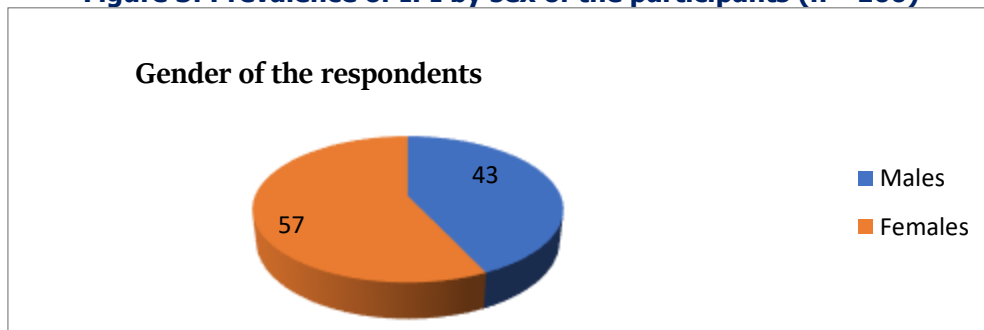


Figure: 3 shows that of the 57 female children, 15/57(26.3 %) were infected with intestinal parasites while 7/43(16.3%) of the males were infected with the parasites.

**Prevalence of Intestinal Protozoan Infections by species.**

The types of parasites observed in the stool specimens were *A. lumbricoides*, *E. histolytica*, and *G. lamblia* *E. vermicularis*.

**Tablet 4: number of participants infected by the different species.**

SPECIES	NUMBER INFECTED
<i>E. histolytica</i>	04
<i>G. lamblia</i>	09
<i>A. lumbricoid's</i>	05
<i>E. vermicularis</i>	04
	Total number 22

Table 4: shows that the overall point prevalence of IPI in the study was 22.0 %. Out of the 100 sampled, 22 were infected while 78 were not, as revealed through stool examination.

Out of the 22 infected cases, 9 out of 22 (41%) were infected by more than one type of parasite and 11 out of 22 (59%) were infected with only one parasite.

**Figure 4 Prevalence of Intestinal Protozoan Infections by species.**

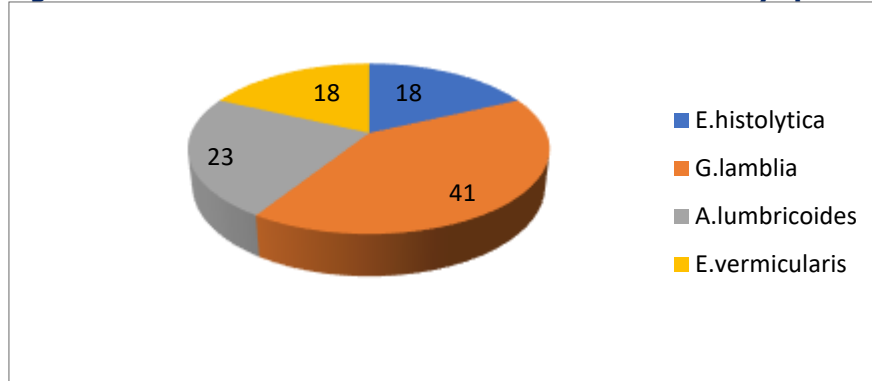


Figure 4: shows that the overall prevalence of *G. lamblia* was 41%, making it the most prevalent, the overall prevalence of helminthiasis was 22 % and the least prevalent species were *E. histolytica* and *E. vermicularis* with 18% each.

### Discussion of findings

The study showed an overall point prevalence of IPIs at 22% among children aged 1-4 years on the study carried out in Amudat Hospital, Amudat District. This prevalence is way below the prevalence of 48% reported by (Chelkeba et al., 2020) in the Kaabong district Karamoja sub-region, with a prevalence of 36.5% out of which 16% was *giardia lamblia* being the most prevalent intestinal protozoan infection in Bushenyi district, located in western part of Uganda among children between 1 and 4 years of age whose mothers had no formal education reported by (Ntulume et al., 2017). This study found. *Lamblia* is the most prevalent at 40.9%. (Hajare et al., 2022) Found the prevalence of *G.Lamblia* amongst school children in Amudat District, Amudat Uganda to be 14.6 % while (Guessan, 2010) reported 18.8 % in school children in the Agboville area in Côte d'Ivoire. (Hughes et al., 2023) in a study on an Agricultural community in Vietnam reported prevalence of 34.8% amongst low primary school children.

### Conclusion

The prevalence of IPIs amongst children aged 1-4yrs in Amudat hospital was relatively low with the most prevalent species being *G. lamblia*.

### Limitations

The research was limited due to financial constraints, participants were biased during information giving and issuance of the questionnaires for collected data, participants also failed to consent to the study while others

could not return the questionnaires deliberately or could lose them.

### Recommendations

There is a need for the government and the local leaders and health officials to provide health education to the parents to prevent IPI.s among children and the overall population at large.

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May the Lord Jesus see you through all your endeavors.

### List of abbreviations and acronyms

IPP:	Intestinal Protozoan Parasites
IPIs:	Intestinal Parasitic Infections
SSA:	Sub-Saharan Africa
SPPs:	Species
SPSS:	Statistical Package for the Social Sciences
DNDi :	Drugs for neglected diseases initiate
WHO:	World Health Organization.

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The study was not funded.

### Conflict of interest

The authors declare no competing interest.

### Authors biography

John Mukhwana is a student with a diploma in medical laboratory technology from the University of Kisubi (Unik). Habert Mabonga is a lecturer at University of Kisubi (Unik).

## References.

1. Chelkeba, L., Mekonnen, Z., Alemu, Y., & Emanu, D. (2020). Epidemiology of intestinal parasitic infections in preschool and school-aged Ethiopian children: A systematic review and meta-analysis. *BMC Public Health*, 20(1), 117. <https://doi.org/10.1186/s12889-020-8222-y>
2. Fitri, L. E., Candradikusuma, D., Setia, Y. D., Wibawa, P. A., Iskandar, A., Winaris, N., & Pawestri, A. R. (2022). Diagnostic Methods of Common Intestinal Protozoa: Current and Future Immunological and Molecular Methods. *Tropical Medicine and Infectious Disease*, 7(10), 253. <https://doi.org/10.3390/tropicalmed7100253>
3. Hajare, S. T., Chekol, Y., & Chauhan, N. M. (2022). Assessment of prevalence of Giardia lamblia infection and its associated factors among government elementary school children from Sidama zone, SNNPR, Ethiopia. *PLoS ONE*, 17(3), e0264812. <https://doi.org/10.1371/journal.pone.0264812>
4. Hughes, A., Ng-Nguyen, D., Clarke, N. E., Dyer, C. E. F., Hii, S. F., Clements, A. C. A., Anderson, R. M., Gray, D. J., Coffeng, L. E., Kaldor, J. M., Traub, R. J., & Vaz Nery, S. (2023). Epidemiology of soil-transmitted helminths using quantitative PCR and risk factors for hookworm and *Necator americanus* infection in school children in Dak Lak province, Vietnam. *Parasites & Vectors*, 16(1), 213. <https://doi.org/10.1186/s13071-023-05809-x>
5. N&#39, N., & Guessan. (2010). Prevalence and Spatial Distribution of Entamoeba histolytica/dispar and Giardia lamblia among Schoolchildren in Agboville Area (Côte d&#39;Ivoire). *PLoS Neglected Tropical Diseases*. [https://www.academia.edu/88953341/Prevalence\\_and\\_Spatial\\_Distribution\\_of\\_Entamoeba\\_histolytica\\_dispar\\_and\\_Giardia\\_lamblia\\_among\\_Schoolchildren\\_in\\_Agboville\\_Area\\_C%3%B4te\\_dIvoire\\_](https://www.academia.edu/88953341/Prevalence_and_Spatial_Distribution_of_Entamoeba_histolytica_dispar_and_Giardia_lamblia_among_Schoolchildren_in_Agboville_Area_C%3%B4te_dIvoire_)
6. Ntulume, I., Tibyangye, J., Aliero, A., & Branson, B. (2017). Prevalence of Intestinal Protozoan Infections and the Associated Risk Factors among Children in Bushenyi District, Western Uganda. *International Journal of TROPICAL DISEASE & Health*, 23(2), 1–9. <https://doi.org/10.9734/IJTDH/2017/33255>
7. Waterborne protozoan outbreaks: An update on the global, regional, and national prevalence from 2017 to 2020 and sources of contamination. (2022). *Science of The Total Environment*, 806, 150562. <https://doi.org/10.1016/j.scitotenv.2021.150562>

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