

Caregivers' Knowledge, Attitudes, and Practices Regarding Intestinal Parasite Prevention in Children Under 5 Years of Age in Masaka Sector, Kigali, Rwanda

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ABSTRACT

INTRODUCTION: Intestinal parasitic infections pose a significant health burden globally, particularly in developing nations. This study aims to assess the knowledge, attitudes, and practices (KAP) of caregivers regarding the prevention of intestinal parasites among children under 5 years of age in Masaka sector of Kigali, Rwanda.

METHODS: A descriptive cross-sectional study was conducted using multistage sampling, incorporating purposive and simple random sampling methods to recruit 383 participants.

RESULTS: This study indicated a high level of awareness among participants regarding symptoms associated with intestinal parasites, with 86.1% recognizing vomiting and 83% acknowledging diarrhea. However, only 26.1% were aware of weight loss as a symptom. Factors such as symptom intensity, cultural differences, and educational backgrounds influenced awareness levels. Notably, 61.1% of caregivers rated preventing infections as "very important," while 26.9% considered it "extremely important," reflecting a strong consensus on safeguarding child health. Furthermore, over 70% emphasized the significance of handwashing, clean water, and sanitation in preventing intestinal parasites.

CONCLUSION: While caregivers demonstrate understanding of common symptoms and sources of intestinal parasite infection, knowledge gaps persist regarding prevention strategies. Nonetheless, a significant majority of caregivers exhibit commendable preventive practices.

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INTRODUCTION

Intestinal parasitic infections (IPIs) affect a significant portion of the global population, however; the prevalence of disease varies from one country to another [1]. The prevalence of parasitic infections is 50% in developed countries while it reaches around 95% in most of the

developing countries [2]. According to the World Health Organization (WHO), around 3.5 billion people worldwide are affected by the IPIs, and over 450 million of these people develop clinical morbidity, many of whom are children of the developing countries [3]. Around 300 million people worldwide are severely ill with these worms and of those, 50% are school-age children [4].

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Despite the fact that IPIs rarely result in mortality, the problem's scope results in a sizable number of linked deaths worldwide, for example, about 39 million disability adjusted life years (DALYs) are attributed to IPIs and these thus represent a substantial economic burden [5].

Africa is considered as a high-burden regions for intestinal parasites with prevalence rates which could be as high as 80% or even more [6]. Especially in Sub-Saharan Africa like Ethiopia, Nigeria, and Somalia, IPIs are among public health issues and the majority of the affected are children. According to the estimates, in certain areas IPIs cause between 25 and 75% of all childhood illnesses, account for about 14% of outpatient visits and 16% of hospital admissions, and this causes an average of 35 days of illness per year in children under the age of five and below [7]. Infection, poverty, poor productivity, and insufficient socioeconomic development are all exacerbated by the morbidity brought on by these infections, which places a heavy strain on the health system [6]. Areas with inadequate sanitation facilities, poor hygiene practices, and limited access to healthcare are more susceptible to increased infection rates [8,9].

IPIs continue to be a major cause of children's morbidity and mortality in underdeveloped counties including Rwanda [8,9]. *Ascaris lumbricoides*, *Entamoeba histolytica* and *Giardia lamblia* are the most prevalent IPIs causative agents respectively [10]. According to the 2019-2020 Rwanda Demographic Health survey, IPIs were more prevalent in children aged 6 months and above with 23% and 25% rates among those aged 6-11 months and 12-23 months respectively [8]. In addition, a high number of IPIs was seen in rural areas compared to urban areas of residence [8], which showed that children above six months of age were more likely to have IPIs than the children less than 6 months (children between this (23%) and those between 12-23 months (25%) in comparison to urban areas rural areas has high prevalence [8].

IPIs in Masaka sector are among the top 5 diseases received at Masaka Health Centre(HC) and little is known about the genesis of these ailment, therefore, this study aims to assess Knowledge, Attitude, and practice of caretakers towards prevention of intestinal parasites among under 5 aged children of Masaka sector.

METHODS

Study Design: This descriptive cross-sectional study was conducted in Masaka sector, one of the sectors of Kicukiro District, located in Kigali city, Rwanda. Masaka sector encompasses an area of 52.71 km² and is subdivided into 6 cells. According to the population census conducted in August 2022, Masaka had a population of 78,788, with an estimated 10,069 children under the age of 5. The sector is served by two health centers, Masaka HC and Kabuga HC.

The study targeted caregivers of children under 5 years of age, including mothers, fathers, or hired assistants residing in Masaka sector. The sample size was determined using Cochran's formula [11]:

$$n_0 = \frac{Z^2 pq}{e^2}$$

Where: n is the required sample size; Z is the Z-score associated with the desired level of confidence. For a 95% confidence level, Z would be 1.96; P is the estimated proportion of caregivers with the desired knowledge, attitude, and practices (KAP) toward preventive measures of Intestinal Parasitic Infections (IPIs). In the absence of an estimate, a conservative estimate of 0.5 was utilized; E is the desired margin of error, representing the maximum acceptable difference between the true population proportion and the estimated proportion from the sample.

Applying the above formula, the study determined a sample size of 383 children.

Participants: Eligibility criteria for participation in this study included caregivers with children aged between 6 months and 5 years residing in or around the study area, with only one caregiver per household eligible. Caregivers with children under 6 months old, those who refused to participate, or did not sign the consent form were excluded.

Study Tool: A multistage sampling approach was employed, incorporating purposive sampling and simple random sampling techniques. The questionnaire, administered in the local language (Kinyarwanda), was completed by caregivers under the guidance of the investigators.

The data collection tool consisted of a questionnaire translated into the local language to enhance community engagement. The questionnaire was customized in kobo toolbox electronic software

to facilitate the data collection processes. Participation was contingent upon individuals agreeing to sign the consent form, with collected data promptly stored on the cloud account and managed exclusively by the investigators.

Data analysis: Data analysis was conducted using Statistical Package for Social Science (SPSS) version 28, with descriptive statistical analysis employed to generate and present findings through histograms, tables, and bar graphs.

Prior to commencement, ethical clearance was obtained from the Institutional Review Board (IRB) of the University of Rwanda, College of Medicine and Health Sciences (Ref: CMHS/IRB/434/2023). Additionally, permission was granted by the director of corporate services of Masaka Sector, Kicukiro District in Kigali city, and the Executive Secretary of Masaka sector to conduct the research within the community. Participation in the study was voluntary, with no financial incentives offered. Informed consent was obtained from each participant following a brief explanation of the research aims.

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Table 1: Characteristics of Respondents

Variable	Frequency	Percentages
Gender		
Male	163	42.5%
Female	220	57.5%
Age		
15-30	275	71.8%
31-60	108	28.2%
Relationship with the child		
Parent	296	77.28%
Guardian	61	15.92%
Others	26	6.7%
Education level		
Non formal education	61	15.93%
Primary level	106	27.68%
Secondary level	179	46.74%
Higher education	37	9.66%

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RESULTS

General Characteristics of Study Participants

Table 1 presents the demographic characteristics of the 383 caregivers who participated in the study in Masaka sector. Of these, 42% (163) were male, while 57.4% (220) were female. Regarding age, 71.8% (275) fell between 15 and 30 years, with the remaining 28.2% (108) between 31 and 60 years. In terms of the caregiver-child relationship, 77.3% (296) were parents, 16% (61) were guardians, and 6.2% (26) were classified as "others" (such as babysitters, siblings, or other relatives).

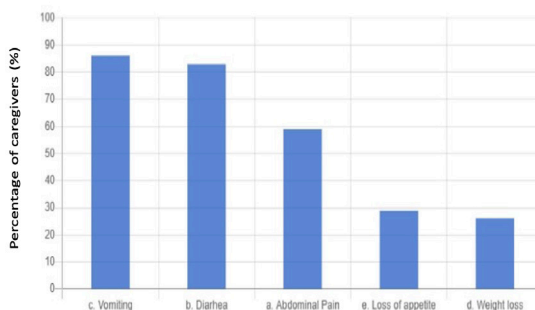


Figure 1: Knowledge of Caregivers towards Intestinal Parasites infestation

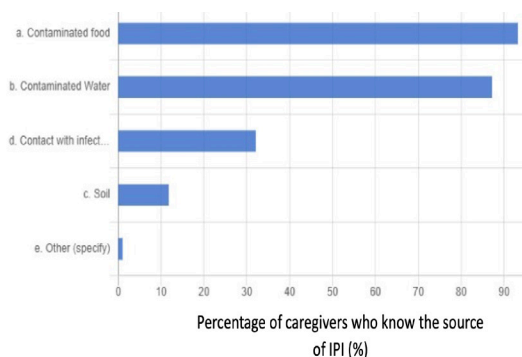


Figure 2: Knowledge of an individuals about the source of intestinal parasitic infection

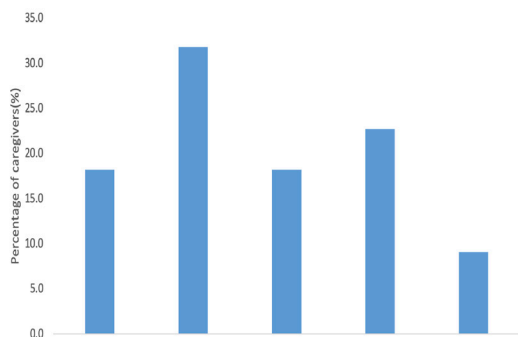


Figure 3: Effects of Health education on the Attitudes of Caregivers towards Prevention of Intestinal Parasitic Infections

Furthermore, 16% (61) of the respondents had no formal education, while 27.7% (106), 46.7% (179), and 9.6% (37) had attended primary, secondary, and university education levels, respectively.

The study revealed a notable level of awareness among participants, with 86.1% recognizing vomiting and 83% identifying diarrhea as symptoms of intestinal parasites (see Figure 1). Additionally, 59% are aware of abdominal pain, while 28.9% recognize loss of appetite.

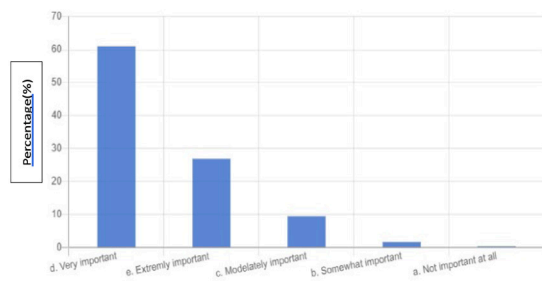


Figure 4: Attitude of caregivers about the Importance of taking preventive measures

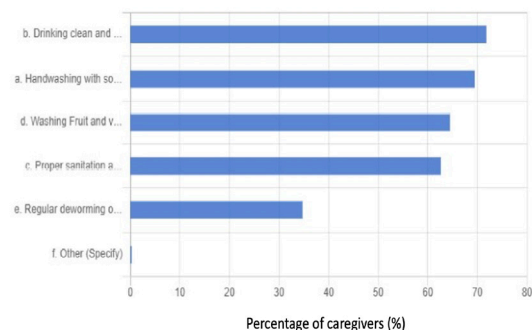


Figure 5a: Practice applied by individuals in community for preventing Intestinal parasite infections

However, awareness decreases for symptoms such as weight loss, with only 26.1% recognizing it as a potential sign of intestinal parasites (Figure

1). The majority, comprising 93.2%, recognize contaminated food as a primary mode of transmission, while 87.2% identify contaminated water as a significant route (Figure 2).

Additionally, a notable 32.1% acknowledge contact with infected individuals as a mode of transmission. However, there is comparatively lower awareness, with only 11.7% associating soil with transmission (Figure 2).

The attitudes of respondents towards preventing intestinal parasitic infections indicate a generally positive stance on the effectiveness of health education in reducing their prevalence. A significant portion, comprising 53%, strongly agree, demonstrating robust support for the notion that health education is a powerful strategy. Additionally, 29.7% express agreement, further contributing to a majority perspective favoring the role of health education. While 12.8% remain neutral, suggesting an opportunity for targeted educational initiatives to enhance understanding. Relatively low percentages of disagreement (3.1%) and strongly disagree (0.2%) (Figure 3).

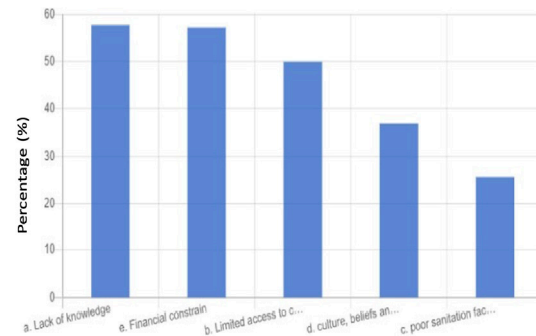


Figure 5b: Challenges that affected the implementation of preventive measures against Intestinal parasite infections

A notable 61.1% of respondents express the view that preventing such infections is "very important," highlighting widespread recognition of the importance of safeguarding young children's health from these preventable illnesses.

Furthermore, 26.9% of respondents consider preventing intestinal parasite infections in young children to be "extremely important," indicating a strong collective commitment to child health. Meanwhile, 9.4% find it "moderately important," suggesting varying degrees of importance among respondents. Lower percentages of "somewhat important" (1.5%) and "not important" (0.2%) indicate a prevailing consensus among respondents

regarding the critical importance of preventing intestinal parasitic infections in children (Figure 4).

Practices aimed at preventing intestinal parasitic infections in children reveal several positive trends in preventive behaviors. The majority of respondents prioritize key practices, with 71.8% emphasizing the importance of drinking clean water, 69.4% advocating for handwashing with soap and water, 64.5% stressing the washing of fruits and vegetables, and 62.6% recognizing the significance of proper sanitation and waste disposal (Figure 5a). However, the study also identifies challenges encountered in implementing these practices. The most prevalent challenges include a lack of knowledge (57.7%) and financial constraints (57.2%), highlighting the need for targeted educational campaigns and potential economic support to address these barriers. Additionally, limited access to clean water (49.9%), cultural beliefs and practices (36.9%), and inadequate sanitation facilities (25.6%) contribute to the challenges faced (Figure 5b).

DISCUSSION

Caregiver Knowledge on Intestinal Parasitic Infections

This study reveals that our targeted population possesses some knowledge concerning the signs and symptoms of intestinal parasite infections, with unanimous agreement on common indicators such as diarrhea, vomiting, and abdominal pain. Additionally, the majority of the population recognizes contaminated water and food as the primary sources of intestinal parasitic infections. However, despite this awareness, caregivers demonstrate insufficient knowledge regarding the prevention of intestinal parasitic infections in children under five years of age. Given the crucial role of knowledge in both recognition and prevention, these findings underscore a concerning gap.

These findings align with those of a study done in Uganda, where less than one-quarter of caregivers exhibited adequate knowledge about intestinal parasitic infections [12]. Furthermore, more than half of the caregivers surveyed were unable to identify more than two correct methods of preventing such infections.

However, McLennan's study [13] suggests that there may not necessarily be a correlation between

biomedical knowledge and preventative actions. McLennan found that some caregivers with limited expertise still practiced appropriate preventive measures. This discrepancy may be attributed to different geographic contexts; for instance, McLennan's study was conducted in a poor Santo Domingo slum district, whereas ours took place in Masaka Sector, Kigali.

Caregiver Attitudes towards Preventing Intestinal Parasitic Infections

This study on caregiver attitudes towards preventing intestinal parasitic infections in young children unveils overwhelmingly positive sentiments among respondents. A substantial 61.1% express that preventing such infections is "very important," while 26.9% consider it "extremely important." These responses underscore a collective commitment to child health, reflecting widespread acknowledgment of the significance of safeguarding young children from preventable illnesses. The overall tone of attitudes is positive, highlighting a strong sense of responsibility towards child health [14].

However, despite this positive attitude towards intestinal parasites, less than half of the respondents are convinced that sickness can spread to other family members and result in growth retardation if left untreated. This suggests that respondents may not prioritize receiving treatment for the infection, possibly due to ignorance. Some caregivers may dismiss symptoms, especially if they do not cause significant discomfort to the children. These findings underscore the necessity for targeted public health interventions and educational campaigns to reinforce and support these positive attitudes [15].

Similarly, a study conducted among 120 pupils in two primary schools in Igbeagu community, Nigeria, revealed overwhelmingly positive attitudes of caregivers towards the prevention and treatment of intestinal parasitic infections among the respondents. An impressive 97.5% of participants expressed generally positive attitudes on this aspect [16].

Caregivers Practices toward Prevention of Intestinal Parasite Infection

To explore caregivers' basic hygiene practices concerning intestinal parasitic (IP) infections, they were queried about their hand hygiene habits, fruit washing practices, consumption of clean water, sanitation and hygiene practices, and proper deworming. As expected, the majority of respondents exhibited positive preventive

practices against intestinal parasites in this study. The high level of adherence to good practices can be attributed to respondents' strong understanding of the primary sources of intestinal parasites. This suggests that the knowledge possessed by these caregivers effectively translates into favorable practices [17]. This achievement is noteworthy, as not all knowledge necessarily leads to action. Reports have highlighted instances of inadequate preventive practices despite individuals possessing sound knowledge of various conditions. For example, a community-based study conducted in Ethiopia revealed that although 94.4% of participants exhibited good knowledge, 35.9% demonstrated poor practices regarding intestinal parasites [18].

Lack of knowledge and financial constraints were observed among most of the participants as a challenge in implementing these practices. Highlighting the necessity of focused educational initiatives and possible financial assistance to remove these obstacles. 96.6% of the respondents agreed that health education or training would be highly appreciated and might help them in preventing intestinal parasites infection [19].

CONCLUSION

The study findings highlight that while caregivers generally possess some knowledge about the signs and sources of intestinal parasitic infections (IPIs), there are notable gaps in understanding preventive measures, particularly for children under five years old. Despite positive attitudes toward prevention, a significant portion lacks awareness of the consequences of untreated infections. However, a commendable majority demonstrates good preventive practices, aligning with their solid knowledge of infection sources. Challenges such as financial constraints hinder full implementation of preventive measures. Therefore, targeted educational interventions are crucial to bridge knowledge gaps, dispel misconceptions, and bolster positive attitudes, while addressing identified challenges can enhance effective preventive practices in the community.

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REFERENCES

- [1] M. Seid, T. Yohanes, Y. Goshu, K. Jemal, and M. Siraj, "The effect of compliance to Hand hygiene during COVID-19 on intestinal parasitic infection and intensity of soil transmitted helminthes, among patients attending general hospital, southern Ethiopia: Observational study," *PLoS ONE*, vol. 17, no. 6 June, pp. 1–23, 2022, doi: 10.1371/journal.pone.0270378.
- [2] N. Nkenfou, C. T. Nana, and V. K. Payne, "Intestinal Parasitic Infections in HIV Infected and Non- Infected Patients in a Low HIV Prevalence Region , West- Cameroon," vol. 8, no. 2, pp. 1–6, 2013, doi: 10.1371/journal.pone.0057914.
- [3] M. Sackey, M. M. Weigel, and R. X. Armijos, "Predictors and Nutritional Consequences of Intestinal Parasitic Infections in Rural Ecuadorian Children," vol. 49, no. February, pp. 17–23, 2003.
- [4] C. Izere, L. Agarwal, and C. Point, "ASSESSMENT AND MAPPING OF INTESTINAL PARASITIC INFECTIONS AND ITS," vol. 9, no. 2, pp. 19–32, 2021.
- [5] V. Mehraj, J. Hatcher, S. Akhtar, G. Rafique, and M. A. Beg, "Prevalence and Factors Associated with Intestinal Parasitic Infection among Children in an Urban Slum of Karachi," vol. 3, no. 11, 2008, doi: 10.1371/journal.pone.0003680.
- [6] S. Lustigman et al., "A research agenda for helminth diseases of humans: The problem of helminthiasis," *PLoS Negl. Trop. Dis.*, vol. 6, no. 4, 2012, doi: 10.1371/journal.pntd.0001582.
- [7] C. Izere, "Assessment and Mapping of Intestinal Parasitic Infections and Associated Risk Factors from Different Northern Health Centers in Rwanda," no. December 2020, 2023, doi: 10.32474/CTBM.2020.02.000133.
- [8] H. Survey, Rwanda. 2019.
- [9] H. Survey, Rwanda. 2014.
- [10] B. K. Niyizurugero E, Ndayanze JB, "prevalence of intestinal parasitic infections and associated risk factors among kigali institute of education kigali, Rwanda," *Trop Biomed*, vol. 30(4), no. prevalence of intestinal parasitic infections and associated risk factors among Kigali institute of education students in Kigali, Rwanda, pp. 718–726, 2013.
- [11] W. G. Cochran, *Sampling Techniques*, Third Edition, Page 75 read with 51. 1963.

- [12] K. Joseph, "Caregivers' Knowledge, Attitudes, and Practices on Prevention of Diarrhoea in Children Under Five Years in Soweto Namuwongo an Undergraduate Research Paper Presented To the School ...," no. December 2012, 2014, doi: 10.13140/2.1.3186.8803.
- [13] F. Curtale et al., "Knowledge, perceptions and behaviour of mothers toward intestinal helminths in Upper Egypt: Implications for control," *Health Policy Plan.*, vol. 13, no. 4, pp. 423–432, 1998, doi: 10.1093/heapol/13.4.423.
- [14] D. Chambers, A. Cantrell, and A. Booth, "Recognition of risk and prevention in safeguarding of children and young people: a mapping review and component analysis of service development interventions aimed at health and social care professionals," *BMC Health Serv. Res.*, vol. 21, no. 1, pp. 1–11, 2021, doi: 10.1186/s12913-021-07257-8.
- [15] K. B. Mukara, P. Waiswa, R. Lilford, and D. L. Tucci, "Knowledge and care seeking practices for ear infections among parents of under five children in Kigali, Rwanda: A cross-sectional study," *BMC Ear Nose Throat Disord.*, vol. 17, no. 1, pp. 1–9, 2017, doi: 10.1186/s12901-017-0040-1.
- [16] U. Mathiazhakan, "A Study To Assess The Knowledge, Attitude And Practice Of Caregiver Of Children Admitted With Diarrhoea At KMCH Hospital Coimbatore A Study To Assess The Knowledge, Attitude And Practice Of Caregiver Of Children Admitted With Diarrhoea At Kmch Hospital," *Int. J. Pharm. Biol. Sci.*, vol. 6, no. 1, pp. 16–22, 2016.
- [17] A. Yoseph, A. Tamiso, and A. Ejeso, "Knowledge, attitudes, and practices related to COVID-19 pandemic among adult population in Sidama Regional State, Southern Ethiopia: A community based cross-sectional study," *PLoS ONE*, vol. 16, no. 1 January, pp. 1–19, 2021, doi: 10.1371/journal.pone.0246283.
- [18] B. Galal, A. El-Aal, S. E. Nady, E. A. Shokr, and M. W. Shokry, "Awareness And Practices Of Preventive Behaviors Toward Intestinal Parasitic Infection Among Mothers Of Preschool Children," *J. Posit. Sch. Psychol.*, vol. 6, no. 8, pp. 6290–6305, 2022.
- [19] A. G. Azene, M. S. Workie, and A. M. Aragaw, "Knowledge, Attitude, and Prevention Practices Toward Coronavirus Disease 2019 in Ethiopia: A Systematic Review and Meta-Analysis," *Curr. Ther. Res. - Clin. Exp.*, vol. 94, p. 100633, 2021, doi: 10.1016/j.curtheres.2021.100633.