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Research Article

Ascaris lumbricoides Infection Among Children: Prevalence and Risk Factors in a Peri-Urban Somali Community

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Abstract

Background: Ascaris lumbricoides is one of the most prevalent soil-transmitted helminths (STHs) worldwide, posing a significant public health challenge, particularly in low-resource settings. Children bear a disproportionate burden, often experiencing malnutrition, impaired cognitive development, and increased susceptibility to other infections due to chronic parasitic load.

Objectives: This study aimed to determine the prevalence of Ascaris lumbricoides infection among children aged 1 to 15 years in Deyniile District, Mogadishu, Somalia, and to identify socio-demographic, environmental, and behavioral factors associated with infection risk.

Methods: A community-based cross-sectional study was conducted involving 127 children. Stool samples were collected and analyzed microscopically using the Kato-Katz technique to detect Ascaris eggs. Structured interviews with caregivers provided data on demographics, hygiene practices, household socioeconomic status, environmental exposures, and health education.

Results: The overall prevalence of Ascaris lumbricoides infection was 20.47%. The highest infection burden was observed among children aged 1 to 5 years (27.54%), indicating increased vulnerability in early childhood. Bivariate analysis identified significant associations between infection and poor hand hygiene—specifically lack of handwashing after defecation and failure to use soap. Additionally, children from households with unemployed heads and families lacking health education had higher infection rates.

Conclusion: These findings highlight the persistent burden of Ascaris infection among children in peri-urban Somali settings and emphasize the multifactorial nature of transmission. Effective control requires integrated interventions combining regular deworming campaigns with targeted hygiene promotion and community-based health education addressing underlying socioeconomic challenges.

Keywords: Ascaris lumbricoides; Prevalence; Soil-transmitted helminths; Somalia; Children; Hygiene; Deworming; Public health

Introduction

Ascaris lumbricoides is a significant intestinal nematode causing ascariasis, a parasitic infection primarily transmitted via ingestion of eggs found in contaminated soil, food, or water. Globally, more than 800 million individuals are infected, particularly children in low- and middle-income countries [1].

While many infections are asymptomatic, ascariasis can cause abdominal pain, growth retardation, cognitive impairments, nutritional deficiencies, and intestinal obstruction. Endemic regions face high prevalence among children coupled with frequent reinfections, posing ongoing public health challenges.

Transmission is closely linked to poor sanitation, lack of safe water, overcrowding, and inadequate hygiene. Somalia, affected by prolonged conflict and displacement, experiences pervasive poverty and a weakened healthcare system, facilitating persistent soil-transmitted helminth (STH) transmission. Deyniile District, Mogadishu, characterized by dense population and limited access to services, exemplifies conditions conducive to sustained STH spread.

This study aims to quantify Ascaris lumbricoides prevalence among children aged 1–15 years in Deyniile and identify key risk factors influencing infection within the community, to inform targeted control efforts.

Methods

Study Design and Setting

A descriptive cross-sectional study was conducted from May to September 2024 in Deyniile District, Mogadishu, Somalia—a peri-urban area marked by poor sanitation infrastructure, limited clean water access, and a high concentration of internally displaced persons (IDPs).

Study Population

Children aged 1 to 15 years, residing in the district for at least six months, were eligible. Those whose parents or guardians provided informed consent participated. Children dewormed within the prior three months were excluded to avoid underestimating infection prevalence.

Sampling and Sample Size

Using a multistage sampling technique, neighborhood clusters were randomly selected. Within clusters, children were selected systematically. The sample size of 127 was calculated based on an anticipated prevalence of 20%, 5% margin of error, and 95% confidence interval, using the formula:

$$n = (Z^2 \times p \times (1-p)) / d^2$$

where Z = 1.96, p = 0.20, and d = 0.05.

Data Collection

- Stool Examination:
- Participants provided stool samples analyzed using the Kato-Katz technique, a WHO-recommended method for helminth egg detection and quantification.
- Questionnaire:

Caregivers completed a structured, pre-tested questionnaire covering:

- Demographics: Age, gender, school attendance
- Socioeconomic status: Household head occupation, household size
- Hygiene practices: Handwashing methods (soap, water, soil), frequency after defecation
- Environmental factors: Domestic animals presence, water source type
- Health behavior: Prior parasitic diagnosis, abdominal symptoms, worm observation in stool, family health education exposure

Ethical Considerations

The Somali Institute of Health Sciences Ethics Review Committee approved the study (Approval No: [insert]). Written informed consent was obtained from caregivers. Children testing positive received referral for deworming treatment.

Data Analysis

Data were entered and analyzed using Python with Pandas and Statsmodels libraries. Descriptive statistics (frequencies, proportions) summarized variables. Chi-square tests assessed bivariate associations between categorical variables and Ascaris infection. Statistical significance was set at $p < 0.05$.

Results

Prevalence Of 127 children examined, 26 were positive for Ascaris lumbricoides, yielding a prevalence of 20.47%.

Table 1: Prevalence of Ascaris lumbricoides Infection by Age Group.

Age Group	Total Children	Positive Cases	Prevalence (%)
1–5 years	69	19	27.54
6–10 years	41	5	12.2
11–15 years	17	2	11.76
Total	**127**	**26**	**20.47**

Note: Infection was highest among children aged 1–5 years.

Table 2: Prevalence of Ascaris lumbricoides Infection by Gender.

Gender	Number Tested	Number Positive	Prevalence (%)	p-value
Male	70	15	21.43	0.62
Female	57	11	19.3	
Total	**127**	**26**	**20.47**	

Note: No statistically significant difference in prevalence between genders ($p > 0.05$).

Table 3: Association of Selected Risk Factors with Ascaris Infection.

Risk Factor	Category	Infection Rate (%)	p-value
Handwashing after defecation	Always	8.3	0.01*
	Sometimes/Never	35.4	
Handwashing material	Soap	6.8	<0.01*
	Water only/Soil	31.6	
Occupation of household head	Employed	13.2	0.04*
	Unemployed	29.8	
Family health education	Yes	10.7	0.03*
	No	26.9	
Access to clean water	Yes	15.3	0.07
	No	25.7	
Animals near home	Yes	22.6	0.12
	No	16.3	

Note: $p < 0.05$ indicates statistical significance.

Discussion

The observed prevalence of 20.47% confirms that Ascaris lumbricoides remains a significant public health issue in Deyniile District, consistent with reports from East African informal settlements where prevalence ranges between 15% and 30% [2,3].

The highest infection rates among children aged 1–5 years align with global evidence showing increased vulnerability in early childhood due to behaviors such as playing in contaminated environments and limited hygiene autonomy [4].

Poor hand hygiene—especially inconsistent washing after defecation and use of water or soil instead of soap—was strongly linked to infection risk, confirming the critical protective role of soap-based handwashing [5].

Unemployment of household heads emerged as a key socioeconomic risk factor, likely reflecting reduced access to hygiene resources and health information. Families without health education had elevated infection rates, underscoring the importance of community-based health promotion.

Although factors such as presence of domestic animals and unsafe water were not statistically significant in this sample, they remain recognized contributors in similar contexts and warrant consideration in comprehensive control programs.

Limitations

This cross-sectional study cannot establish causality. Self-reported hygiene practices may be subject to recall and social desirability bias. The sample size, while adequate for prevalence estimation, limits generalizability beyond Deyniile District.

Conclusion

Ascaris lumbricoides infection persists in Somali peri-urban communities, with young children disproportionately affected. Key risk factors include inadequate handwashing, absence of hygiene education, and socioeconomic disadvantages. Sustainable control requires integrated multi-sectoral approaches beyond periodic deworming.

Recommendations

- Routine Deworming: National and local health authorities should sustain biannual deworming campaigns for children aged 1–15 years.
- WASH Promotion: Handwashing with soap should be prioritized through school and community-based programs.
- Community Health Education: Culturally appropriate health messages should be disseminated via health workers, religious centers, and media.
- Livelihood Support: Addressing poverty and unemployment will strengthen the impact and sustainability of health interventions.
- Further Research: Longitudinal and intervention studies are needed to evaluate the effectiveness of integrated control measures.

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