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Incidence and Distribution of Parasitic Infections in the Abraka Communities of Delta State, Nigeria

Felix OghenemaroEnwa[1*], Kingsley Chukwuka Amaihunwa[2], Collins Ohwonigho Adjekuko[3], Blessing Chinedu Uti[1]

[1]Department of Pharmaceutical Microbiology and Biotechnology, Faculty of Pharmacy, Delta State University Abraka, Nigeria.
[2]Department of Medical Laboratory Science, Faculty of Science, Delta State University Abraka, Nigeria.
[3]Department of Biological Science, Faculty of Science, University of Delta, Agbor, Nigeria.

***E-mail** ✉ felixenwa@delsu.edu.ng

Abstract

This study investigates the prevalence of parasitic infections among people residing in rural communities and focuses on identifying the predominant parasites, associated risk factors, and potential preventive measures. A cross-sectional survey was conducted on 50 participants aged 12 to 56 years, selected based on defined inclusion criteria from Abraka and surrounding rural areas in Delta State, Nigeria. Stool specimens were collected and promptly analyzed in the departmental laboratory using standard macroscopic and microscopic parasitological techniques. Of the participants, 22 were male and 28 female; 19 samples tested positive for at least one parasitic infection. The most commonly identified parasites were *Ascaris lumbricoides* (78.9%) and *Trichuris trichiura* (21.1%). Infections were most prevalent in the 40–49 years age group (31.57%) and least common in individuals aged 50–57 years (5.26%). Females exhibited a slightly higher prevalence than males (52.64% vs. 47.36%). The overall infection rate was 38%, indicating the ongoing public health relevance of parasitic infections in these communities. Promoting health education, personal hygiene, handwashing practices, and proper sanitation facilities are essential to reduce infection rates in the region.

Keywords: Parasitic infection, Rural communities, Microscopy, Stool analysis

Introduction

Intestinal parasitic infections (IPIs), caused primarily by helminths and protozoa, remain a significant public health issue, particularly in developing countries. These infections, which affect the gastrointestinal tract—especially the intestinal wall—are transmitted through ingestion of food, water, or soil contaminated with feces containing protozoan cysts or helminth eggs and larvae [1]. IPIs are classified among the neglected tropical diseases (NTDs) and are most prevalent in impoverished settings such as remote rural communities, urban slums, and conflict-affected areas [2].

Globally, infections by *Ascaris lumbricoides*, *Trichuris trichiura*, hookworms, and protozoa like *Entamoeba histolytica* contribute to significant morbidity, affecting millions of people, particularly in tropical and subtropical regions [3]. In developing countries, the prevalence of IPIs is closely linked to risk factors such as poverty, low literacy, poor sanitation, inadequate access to clean water, and limited healthcare infrastructure [4, 5].

Monitoring the incidence and risk factors of IPIs is essential for understanding the health status of affected populations and guiding effective intervention strategies. High infection rates in rural communities have been consistently associated with poor environmental hygiene and inadequate medical services. This study, therefore, aims to assess the incidence of parasitic infections in rural communities of Delta State, Nigeria, particularly in

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the Abraka area. By identifying the specific risk factors and evaluating the current burden, the findings can inform public health policies and promote the development of targeted interventions to reduce the impact of these infections on vulnerable rural populations.

Materials and Methods

Study location
This investigation was conducted in selected rural settlements within the Abraka region and its surrounding communities, located in Delta State, Nigeria.

Participants
Fifty individuals, ranging in age from 12 to 56 years, were recruited for this study. The cohort comprised 22 males and 28 females, all of whom met the inclusion criteria and consented to participate.

Research design
A prospective, cross-sectional approach was employed to assess the incidence of parasitic infections in the study population.

Eligibility criteria
Inclusion criteria
Participants were required to provide informed consent and be free of any immediate health conditions that would interfere with the study.

Exclusion criteria

- Individuals undergoing treatment with antibiotics or antiparasitic medications
- Immunocompromised individuals
- Pregnant women
- Participants who declined to provide informed consent

Laboratory materials
The materials utilized included sterile stool containers, microscope slides and cover slips, latex gloves, Pasteur pipettes, mesh sieves (350–450 µm), 15 mL centrifuge tubes, beakers, glass applicators, normal saline solution, iodine, diethyl ether (10%), and a laboratory centrifuge.

Sample collection procedure
Participants were provided with labeled, sterile containers to collect fresh stool samples. Care was taken to ensure the specimens were uncontaminated by urine or water. All samples were transported without delay to the laboratory for further processing.

Macroscopic analysis
Each stool specimen underwent a preliminary visual assessment. The color, texture, and consistency were recorded, along with any presence of mucus, foul odor, or abnormal visible materials.

Microscopic analysis
Slides were prepared by adding two drops each of normal saline and iodine to separate ends of clean, labeled slides. Using a sterile applicator, small portions of the stool samples were applied to each drop and covered with coverslips. The preparations were first examined under a 10x objective lens to detect potential parasitic forms; suspected findings were subsequently examined under a 40x objective for confirmation. All microscopic evaluations followed established parasitological protocols.

Formol-ether concentration technique
Approximately 10% formalin (formol saline) was added to each stool sample and thoroughly mixed using a sterile glass applicator to produce a uniform suspension. The resulting mixture was then filtered through a fine mesh sieve into a clean beaker to remove large debris.
A volume of 7 mL of the filtrate was transferred into a 15 mL centrifuge tube, followed by the addition of 3 mL of diethyl ether, bringing the total volume to 10 mL. The contents were vigorously shaken to ensure proper mixing, after which the tube was centrifuged at 1500 revolutions per minute (rpm) for 2 to 5 minutes.
Post-centrifugation, four distinct layers were observed: a top ether layer, a layer of fecal debris, a layer of formal saline, and a sediment layer at the bottom containing parasitic elements such as eggs and cysts. The top three layers were carefully discarded, and the sediment was re-suspended in a small amount of formal saline.
A drop of the sediment was then transferred onto a clean microscope slide using a Pasteur pipette, covered with a cover slip, and examined under a light microscope. Microscopic observations were recorded and analyzed accordingly.

Results and Discussion

A total of 50 participants were included in this study, comprising 22 males and 28 females. As shown in **Table 1**, parasitic infections were detected in 19 individuals, representing an overall prevalence rate of 38%. The remaining 31 participants (62%) tested negative for intestinal parasites.

Table 1. Prevalence of intestinal parasitic infections among rural dwellers

Infection status	Number of individuals	Percentage (%)
Positive	19	38.0
Negative	31	62.0

When disaggregated by gender, females exhibited a slightly higher infection rate than males. As illustrated in **Table 2**, 52.64% of positive cases were female, while males accounted for 47.36% of the infections.

Table 2. Gender distribution of parasitic infections

Gender	Number examined	Number positive	Percentage (%)
Male	22	9	47.36
Female	28	10	52.64

Analysis by age group revealed that the highest infection rate was recorded among individuals aged 40–49 years, with a prevalence of 31.57%. The lowest prevalence was observed in the 50–57 age group (5.26%). Equal infection rates (21.05%) were observed among the 12–19, 20–29, and 30–39 age groups, as summarized in **Table 3**.

Table 3. Age-specific prevalence of intestinal parasitic infections

Age group (years)	Number examined	Number positive	Percentage (%)
12–19	9	4	21.05
20–29	17	4	21.05
30–39	11	4	21.05
40–49	10	6	31.57
50–57	3	1	5.26

Microscopic analysis identified two types of intestinal parasites in the positive samples. *Ascaris lumbricoides* was the most frequently detected parasite, accounting for 78.9% of all positive cases. *Trichuris trichiura* was also identified, making up the remaining 21.1%, as shown in **Table 4**.

Table 4. Distribution of identified intestinal parasites

Parasite species	Number detected	Percentage (%)
Ascaris lumbricoides	15	78.90
Trichuris trichiura	4	21.10

These findings align with existing literature, which consistently reports a higher prevalence of helminth infections in rural settings due to poor sanitation, limited access to clean water, and insufficient health education. The predominance of *A. lumbricoides* in this study supports previous observations that it is one of the most widespread soil-transmitted helminths in tropical regions.

The slightly higher prevalence in females may be linked to increased exposure during domestic or caregiving activities, while the notable infection rate in middle-aged adults (40–49 years) may reflect cumulative environmental exposure or occupational risks. The lower prevalence among older adults (50–57 years) could be attributed to better awareness, acquired immunity, or changes in activity patterns with age.

Overall, the 38% infection rate underscores the continuing burden of parasitic diseases in rural communities and highlights the need for strengthened public health measures, including deworming programs, health education, improved sanitation, and access to clean water.

The findings of this study provide a clear illustration of the continued public health burden posed by intestinal parasitic infections in rural settings, with specific emphasis on the Abraka communities and surrounding areas in Delta State, Nigeria. As shown in **Table 1**, the overall prevalence rate of 38% highlights the persistent threat of parasitic infections in these regions. This prevalence aligns with previous studies conducted among rural populations, such as the 28% infection rate reported by Mahni *et al*. [6]. Comparable infection rates have also been documented among nomadic populations in Ethiopia [7] as well as in studies by Chicca *et al.* [8], Avokpaho *et al.* [9], and Eyayu *et al*. [10]. Hemmati *et al*. [11] similarly reported a 32.7% prevalence rate in their investigation in Iran. These findings consistently reinforce the notion that intestinal parasitic infections remain endemic in many underserved rural areas globally, despite the progress made in public health interventions and medical understanding.

What these studies collectively underscore is a gap in the implementation and sustainability of effective parasite control strategies, especially in rural communities. The persistently high prevalence points to shortcomings in public health infrastructure, particularly in sanitation, hygiene, and access to clean water.

A noteworthy aspect of this study is the gender disparity observed in infection rates. As detailed in **Table 2**, females accounted for a slightly higher proportion of cases (52.64%) compared to males (47.36%). This observation is in line with findings from Watson *et al*. [12], Garn *et al.* [13], and Hailegebriel [14], all of whom documented higher infection rates among females in similar settings. The reasons for this gender-based variation may be multifactorial—ranging from differences in domestic roles and hygiene practices to greater exposure to contaminated water sources during caregiving or household duties. These findings suggest that gender-specific health education and intervention strategies may be warranted.

Further insight is gained through the age-specific analysis of infection rates, as presented in **Table 3**. The highest incidence was recorded in individuals aged 40–49 years (31.57%), while the lowest was observed in the 50–57 years age group (5.26%). This age-related pattern could be attributed to a range of factors including increased environmental exposure over time, socioeconomic roles, differences in immunity, or shifts in hygiene behavior across generations. The middle-aged demographic may also engage in more outdoor or agricultural work, heightening their exposure risk.

The parasitological findings, as illustrated in **Table 4**, revealed *Ascaris lumbricoides* as the predominant parasite, accounting for 78.9% of all infections. This high prevalence reflects its environmental robustness and its capacity to thrive in areas with inadequate sanitation. Though *Trichuris trichiura* was detected less frequently (21.1%), its presence remains clinically significant and further reinforces the endemic nature of soil-transmitted helminths in the region.

Taken together, these results call for a multifaceted, community-centered approach to disease control. This should include robust public health campaigns aimed at improving personal and environmental hygiene, expanding access to clean water, and encouraging the consistent use of sanitary facilities. Additionally, the development of targeted, context-specific interventions—sensitive to local behaviors, environmental conditions, and demographic vulnerabilities—is essential. A generic or uniform strategy may fall short of achieving sustainable reductions in infection rates, especially in settings as diverse and complex as rural communities in Delta State.

Beyond the statistical findings, this research underscores the critical need for developing and implementing tailored public health interventions. Inadequate sanitation, limited access to clean water, and poor hygiene practices are identified as key factors that sustain the spread of parasitic infections. The results highlight the importance of health education initiatives focused on promoting proper hygiene, regular handwashing, and safe food handling to reduce parasitic transmission. Furthermore, the study advocates for significant investments in infrastructure to ensure access to clean water and adequate sanitation facilities.

A key takeaway from this study is the importance of creating interventions that are carefully designed to address the specific needs of rural communities. The diversity of rural environments calls for region-specific strategies that consider factors such as local agricultural practices, water access, and socio-economic conditions. Tailoring interventions to these factors is vital for maximizing their effectiveness in reducing parasitic infections. The consequences of parasitic infections extend beyond health, contributing to cycles of malnutrition, decreased productivity, and impaired cognitive development. This research emphasizes the necessity for holistic programs that integrate health, education, and socio-economic development, addressing the interconnected nature of these community challenges. In conclusion, this study offers a detailed analysis of the complex issues posed by parasitic infections in rural communities. Examining infection rates, gender differences, age-related patterns, and the prevalence of specific parasites provides a solid foundation for effective interventions. These insights equip policymakers, healthcare professionals, and community leaders with the knowledge needed to adopt a comprehensive approach, ultimately reducing the impact of parasitic infections and promoting healthier, more prosperous rural populations.

Conclusion

This study emphasizes the critical need for comprehensive public health initiatives to tackle parasitic infections in rural communities. By adopting preventive strategies, improving healthcare infrastructure, and fostering community involvement, we can work towards alleviating the burden of these infections and enhancing the overall health and well-being of these at-risk populations.

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