PREVALENCE OF HELMINTH PARASITES AMONG CHILDREN IN GREAT BRIGHT STAR SECONDARY SCHOOL, CHIKAJI, SABON GARI, KADUNA STATE

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ABSTRACT

Helminth infections remain a significant public health concern, particularly among children in developing countries where poor sanitation and inadequate hygiene practices facilitate transmission. This study assessed the incidence of helminth parasites among children associated with Great Bright Star Secondary School, Chikaji, Sabon Gari, Kaduna State(WHO,2022). One hundred and fourthy one (141) Stool samples collected from children were examined using the flotation technique in the Helminthology Laboratory, Ahmadu Bello University, Zaria. Data collected between 2020 and 2023 were analyzed according to age and sex. The overall prevalence increased from 28.7% in 2020 to 38.5% in 2023. Children aged 0–5 years consistently recorded the highest prevalence rates, reaching 66.7% in 2023. Male children generally showed higher infection rates than females, except in 2022 when females recorded higher prevalence. The findings indicate persistent transmission of helminth infections among children and highlight the need for regular deworming programmes, improved sanitation, and health education(WHO,2023).

Keywords: Helminths, prevalence, children, soil-transmitted helminths, Kaduna State, parasitic infections.

Introduction

Helminths are parasitic worms belonging mainly to the phyla Nematoda and Platyhelminthes. They constitute one of the most common groups of parasites affecting humans worldwide, particularly in tropical and subtropical regions where environmental sanitation is poor (Norhayati et al., 2018). Soil-transmitted helminths such as *Ascaris lumbricoides*, hookworms, and *Trichuris trichiura* are among the most prevalent intestinal parasites globally (Luka et al., 2010).

According to the World Health Organization (WHO, 2023), more than one billion people are infected with soil-transmitted helminths worldwide. Children are particularly vulnerable because of frequent contact with contaminated soil, poor hygiene habits, and developing immune systems. Helminth infections can cause malnutrition, anemia, impaired growth, poor cognitive development, and reduced educational performance.

The burden of helminth infections remains high in many parts of Nigeria despite ongoing public health interventions. Therefore, continuous surveillance is essential to determine infection trends and identify vulnerable populations. This study investigated the prevalence of helminth infections among children in Great Bright Star Secondary School, Chikaji, Sabon Gari, Kaduna State.

Statement of the Problem

Helminth infections continue to constitute a major public health challenge, particularly among children living in low- and middle-income countries where inadequate sanitation, poor environmental hygiene, unsafe water supplies, and limited access to preventive healthcare facilitate the transmission of soil-transmitted helminths (World Health Organization [WHO], 2023). Although considerable progress has been made through school-based deworming programmes and other control interventions, millions of children remain at risk of infection, with adverse consequences including malnutrition, iron-deficiency anaemia, impaired physical growth, reduced cognitive development, and poor academic performance (Jourdan et al., 2024; Pullan et al., 2024).

In Nigeria, helminthiasis remains endemic in many rural and peri-urban communities despite ongoing public health efforts. Children are particularly vulnerable because of frequent exposure to contaminated soil, inadequate hand hygiene, open defecation practices, and poor environmental sanitation. While several studies have reported the prevalence of intestinal helminth infections in different parts of the country, the epidemiology of these infections varies considerably across geographical locations due to differences in environmental conditions, sanitation infrastructure, socioeconomic status, and the implementation of deworming programmes (Musa et al., 2023; Afolabi et al., 2023). Consequently, findings from one locality cannot be generalized to another, making location-specific epidemiological studies necessary.

In Chikaji, Sabon Gari Local Government Area of Kaduna State, there is limited recent information on the prevalence and distribution of helminth infections among children attending schools and residing within the community. The absence of current epidemiological data makes it difficult for health authorities, school administrators, and policymakers to assess the effectiveness of existing control measures, identify high-risk groups, and design appropriate intervention strategies. Furthermore, changes in environmental conditions, population growth, and variations in public health programmes may influence the pattern of helminth transmission over time, necessitating continuous surveillance.

Therefore, there is a need to determine the current prevalence of helminth infections among children associated with Great Bright Star Secondary School, Chikaji, Sabon Gari, Kaduna State, and to examine variations in infection according to age, sex, and annual trends. The findings of this study provides updated epidemiological evidence that can support targeted deworming programmes, health education, improved sanitation initiatives, and policy decisions aimed at reducing the burden of helminth infections among children in the study area.

Objectives of the Study

The following were the objectives of the study.

1. To determine the prevalence of helminth infections among children.
2. To compare infection rates according to age and sex.
3. To assess yearly trends in infection prevalence from 2020–2023.

Literature Review

Helminth infections remain among the most widespread neglected tropical diseases affecting humans, particularly children in developing countries. These infections are caused by parasitic worms belonging primarily to the phyla Nematoda (roundworms) and Platyhelminthes (flatworms), which include cestodes (tapeworms) and trematodes (flukes). Among these, soil-transmitted helminths (STHs), namely *Ascaris lumbricoides*, *Trichuris trichiura*, and hookworms (*Ancylostoma duodenale* and *Necator americanus*), constitute the most important intestinal helminths of public health concern because of their widespread distribution and significant disease burden among children (WHO, 2023). These parasites are transmitted through contact with contaminated soil, ingestion of infective eggs, or skin penetration by infective larvae, particularly in environments characterized by poor sanitation, inadequate waste disposal, and limited access to safe drinking water (Jourdan et al., 2024).

Globally, soil-transmitted helminth infections continue to pose a substantial public health challenge despite decades of control efforts. According to the World Health Organization (2023), approximately 1.5 billion people, representing nearly 24% of the world's population, are infected with one or more species of soil-transmitted helminths. School-aged children account for the largest proportion of those infected because they are frequently exposed to contaminated environments during play and often exhibit inadequate personal hygiene practices. Chronic helminth infections are associated with malnutrition, iron-deficiency anaemia, vitamin deficiencies, impaired physical growth, delayed cognitive development, reduced school attendance, and poor academic performance. These adverse health outcomes contribute significantly to reduced quality of life and socioeconomic productivity, particularly in low- and middle-income countries (Pullan et al., 2024).

The burden of helminth infections is particularly high in sub-Saharan Africa, where tropical climatic conditions, poverty, poor sanitation, and inadequate access to healthcare create favorable conditions for the survival and transmission of intestinal parasites. Nigeria remains one of the countries with the highest burden of soil-transmitted helminth infections in Africa. Although periodic mass drug administration and school-based deworming programmes have contributed to reductions in infection intensity in some regions, transmission persists in many communities because of environmental contamination, poor sanitation infrastructure, inadequate health education, and inconsistent implementation of preventive interventions (WHO, 2023). Studies conducted in different parts of Nigeria have consistently demonstrated varying prevalence rates depending on geographical location, climatic conditions, socioeconomic characteristics, and the availability of sanitation facilities (Afolabi et al., 2023; Musa et al., 2023).

Several epidemiological studies have investigated the prevalence of helminth infections among school-aged children in Nigeria. Luka et al. (2010) reported that intestinal helminth infections remain highly prevalent among primary school children, with *Ascaris lumbricoides* being the most frequently isolated parasite. More recently, Afolabi et al. (2023) reported that inadequate sanitation, lack of potable water, poor hand hygiene, and walking barefoot were significant predictors of soil-transmitted helminth infections among children in north-western Nigeria. Similarly, Musa et al. (2023) observed that children residing in rural and peri-urban communities recorded higher infection rates than those in urban settings due to greater environmental exposure and poorer sanitation conditions.

Age has consistently been identified as one of the most important determinants of helminth infection. Younger children generally exhibit higher infection rates than older children because they are more likely to engage in behaviours that increase exposure to contaminated soil, such as playing outdoors, crawling, and frequent hand-to-mouth activities. Their immune systems are also relatively immature, making them more susceptible to infection (Ekundayo et al., 2020). Studies conducted in various parts of Nigeria have

demonstrated that preschool and early school-aged children bear the greatest burden of intestinal helminth infections, highlighting the need for targeted preventive interventions within this age group.

Sex-related differences in helminth infection have also been investigated, although findings remain inconsistent. Some researchers have reported slightly higher prevalence among male children, attributing the difference to greater participation in outdoor recreational activities and increased contact with contaminated environments (Ezeamama et al., 2019; Musa et al., 2023). Conversely, other studies have found no statistically significant association between sex and helminth infection, suggesting that environmental exposure, sanitation, parental education, and socioeconomic status are stronger determinants of infection than biological sex (Ajayi et al., 2021). These inconsistent findings indicate that local epidemiological investigations remain necessary to understand transmission patterns within specific communities.

Control of soil-transmitted helminth infections requires a comprehensive and integrated public health approach. The World Health Organization recommends periodic preventive chemotherapy through mass deworming of at-risk populations, particularly preschool- and school-aged children, combined with improvements in water supply, sanitation, hygiene (WASH), environmental management, and community health education (WHO, 2023). Recent evidence indicates that preventive chemotherapy alone is insufficient to interrupt transmission where environmental contamination persists. Sustainable reduction in helminth prevalence can only be achieved when deworming programmes are integrated with improved sanitation infrastructure, access to safe drinking water, proper waste disposal, and continuous behavioural change interventions aimed at promoting personal hygiene (Jourdan et al., 2024; Pullan et al., 2024).

Despite numerous studies conducted across Nigeria, recent epidemiological information on helminth infections among children in Chikaji, Sabon Gari Local Government Area of Kaduna State remains limited. Differences in ecological conditions, sanitation practices, socioeconomic characteristics, and the implementation of deworming programmes make it inappropriate to generalize findings from other regions to the study area. Furthermore, changing environmental conditions and population dynamics may influence transmission patterns over time. Consequently, there is a need for continuous surveillance to provide current prevalence data that can guide evidence-based public health interventions. The present study therefore seeks to determine the prevalence of helminth infections among children associated with Great Bright Star Secondary School, Chikaji, Sabon Gari, Kaduna State, and to evaluate infection patterns according to age, sex, and annual trends between 2020 and 2023. Such information will contribute to the planning and implementation of effective parasite control programmes in the study area.

MATERIALS AND METHODS

STUDY AREA

The study was conducted in the Helminthology Laboratory, Ahmadu Bello University (ABU), Zaria. Zaria lies within the Guinea Savannah ecological zone and experiences wet and dry seasons annually.

STUDY POPULATION

The study population comprised children attending Great Bright Star Secondary School and children residing in the surrounding communities of Chikaji, Sabon Gari Local Government Area, Kaduna State.

SAMPLE COLLECTION

A **cross-sectional sampling technique** was employed. Children whose parents/guardians consented to participation during the study period were recruited, and stool specimens were collected for parasitological examination.

Total Sample Size Per Year

The total number of stool samples examined per year was:

Year	Sample Size (n)
2020	101
2021	118
2022	95
2023	104
Total	**418**

The cumulative sample size for the study was **418 stool samples**.

Inclusion Criteria

- Children enrolled in Great Bright Star Secondary School during the study period.
- Children whose parents or guardians provided informed consent.
- Children who submitted adequate stool samples for laboratory examination.

Exclusion Criteria

- Children whose parents/guardians declined consent.
- Children receiving antihelminthic treatment within two weeks prior to sample collection.
- Improperly labeled, insufficient, or contaminated stool samples.

Ethical Approval Procedures

Ethical approval for the study was obtained from the ministry of education ethic committee before commencement of sample collection. Permission was also obtained from the school authorities. Informed consent was sought from parents or guardians of participating children, and confidentiality of participants' information was maintained throughout the study.

LABORATORY EXAMINATION

Quantity of Stool Examined

Approximately **2–5 g of fresh stool** was collected from each participant in clean, sterile, labeled specimen containers.

Sample Preparation Procedures

Stool samples were preserved in **10% formalin** immediately after collection and transported to the Helminthology Laboratory for examination. A zinc sulphate-sucrose flotation solution was prepared according to standard parasitological procedures. Approximately 1 g of stool was emulsified in the flotation medium, filtered, centrifuged where necessary, and examined microscopically.

Duration of Sample Preservation

Samples preserved in 10% formalin were processed within **24–48 hours** of collection to minimize deterioration of parasitic stages and maintain specimen integrity.

Quality Control Measures

- All specimen containers were properly labeled with unique identification numbers.
- Reagents and flotation solutions were prepared according to standard laboratory protocols.
- Positive and negative control slides were used periodically to verify microscope performance.
- Ten percent (10%) of examined slides were re-examined by a second trained parasitologist for quality assurance.
- Microscopes were calibrated regularly before examination.

Identification Criteria for Helminth Eggs

Helminth eggs were identified microscopically based on standard morphological characteristics including:

- Egg size and shape.
- Shell thickness and surface appearance.
- Presence or absence of operculum.
- Internal embryonic structures.
- Coloration and contents of the egg.

Identification was carried out using standard parasitological keys described by **Soulsby (2012)**.

DATA ANALYSIS

Data were analyzed using descriptive statistics. Prevalence was calculated as the percentage of positive samples among the total examined.

RESULTS

Table 1: Overall Helminth Infection Prevalence (2020–2023)

Year	Examined	Positive	Prevalence (%)
2020	101	29	28.7
2021	118	37	31.4
2022	95	35	36.8
2023	104	40	38.5

Table 2: Prevalence by Age Group

Year	0–4 yrs (%)	5–9 yrs (%)	10–15 yrs (%)
2020	50.0	23.7	25.5
2021	35.0	25.5	35.3
2022	56.3	38.1	31.1
2023	66.7	38.7	32.8

Table 3: Prevalence by Sex

Year	Female Examined (n)	Female Positive (n)	Prevalence (%)	Male Examined (n)	Male Positive (n)	Prevalence (%)
2020	44	14	31.8	57	15	26.3
2021	47	15	31.9	71	22	31.0
2022	40	14	35.0	55	22	40.0
2023	57	20	35.1	47	19	40.4

DISCUSSION

The findings of this study revealed a gradual increase in the prevalence of helminth infections among children between 2020 and 2023, with prevalence increasing from 28.7% in 2020 to 38.5% in 2023. This trend suggests the continued transmission of helminth parasites within the study area despite existing control efforts. The persistence of infection may be associated with inadequate sanitation facilities, poor environmental hygiene, unsafe water sources, and inconsistent deworming programmes. Recent reports have shown that soil-transmitted helminth infections remain a major public health challenge in many low- and middle-income countries, particularly in communities with limited access to sanitation and hygiene facilities (World Health Organization [WHO], 2023; Pullan et al., 2024).

Analysis of prevalence according to age group showed that the youngest age category consistently recorded the highest prevalence rates, particularly in 2022 (56.3%) and 2023 (66.7%). This finding indicates that younger children are more susceptible to helminth infections than older age groups. The higher prevalence among younger children may be attributed to poor personal hygiene practices, frequent hand-to-mouth activities, close contact with contaminated soil, and immature immune responses. Similar findings have been reported in recent studies, which identified younger children as a high-risk group for soil-transmitted helminth infections because of increased environmental exposure and limited awareness of preventive practices (Afolabi et al., 2023; WHO, 2023).

Sex-related differences were also observed in the present study. Male children generally exhibited slightly higher prevalence rates than females, particularly in 2022 and 2023. Although the differences were relatively small, the observation may reflect behavioural differences that increase exposure to infective stages of helminths. Male children are often more engaged in outdoor activities that bring them into contact with contaminated soil and environments. Similar sex-related patterns have been reported in recent epidemiological studies, although several authors have noted that environmental and socio-economic factors may exert a greater influence on infection risk than sex alone (Musa et al., 2023; Jourdan et al., 2024).

The increasing prevalence observed in 2022 and 2023 may indicate gaps in the implementation of preventive measures, including routine deworming, health education, and environmental sanitation programmes. According to the WHO (2023), interruptions or inadequate coverage of school-based deworming programmes can result in rapid re-establishment of transmission within endemic communities. Furthermore, recent evidence suggests that sustainable control of helminth infections requires an integrated approach combining preventive chemotherapy, improved sanitation, access to safe water, and community

health education (Pullan et al., 2024; Jourdan et al., 2024). Therefore, the increasing trend observed in this study underscores the need to strengthen helminth control interventions among children in the study area.

The study revealed a progressive increase in helminth prevalence between 2020 and 2023. This trend may reflect persistent environmental contamination, inadequate sanitation facilities, and insufficient deworming interventions. Similar observations have been reported among school children in other parts of Nigeria (Okon et al., 2022).

Children aged 0–4 years consistently recorded the highest prevalence. This finding agrees with Ekundayo et al. (2020), who reported that younger children are more susceptible due to frequent hand-to-mouth activities, poor hygiene practices, and immature immunity. Younger children often play directly on contaminated soil, increasing their risk of infection.

Sex-based differences were also observed. Although males generally recorded higher prevalence rates, the differences were relatively small. Ezeamama et al. (2019) similarly reported increased exposure among boys due to greater participation in outdoor activities. However, Ajayi et al. (2021) found no significant association between sex and helminth infection, suggesting that environmental and behavioral factors may be more important determinants of infection risk.

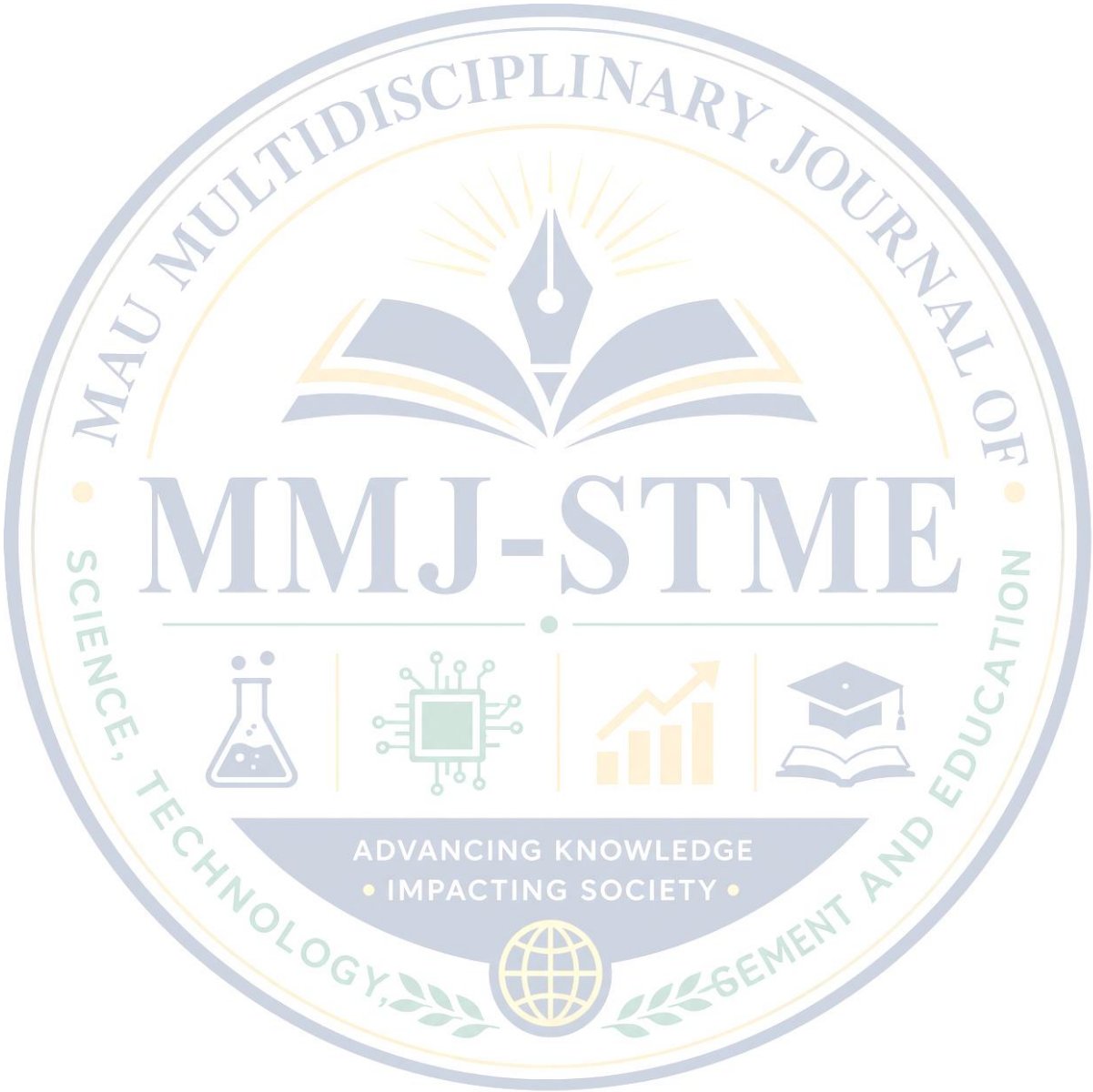
The increasing prevalence recorded in 2022 and 2023 suggests a possible decline in the effectiveness of preventive measures. According to WHO (2023), interruptions in school-based deworming programs can result in the rapid resurgence of helminth infections.

CONCLUSION

The study demonstrated a moderate but increasing prevalence of helminth infections among children from 2020 to 2023. Children aged 0–5 years were the most affected group, while males generally exhibited slightly higher prevalence than females. The findings indicate the continued public health significance of helminth infections and emphasize the need for strengthened preventive interventions.

RECOMMENDATIONS

1. Regular school-based deworming programmes should be implemented.
2. Health education on personal hygiene should be intensified.
3. Access to safe water and sanitation facilities should be improved.
4. Routine surveillance of helminth infections should be conducted.
5. Government and health agencies should strengthen parasite control programmes.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