# PREVALENCE OF INTESTINAL PARASITES AMONG CHILDREN IN SELECTED PRIMARY SCHOOLS IN KATSINA-ALA LOCAL GOVERNMENT AREA OF BENUE

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**Abstract:** Intestinal parasites are serious public health problems in Nigeria with children being major victims. High prevalence has been reported among primary school children in Nigeria. This study aims at assessing the prevalence of intestinal parasites among children in some selected primary schools in Katsina-Ala Local Government Area and the associated risk factors. 180 faecal samples from the pupils were examined by direct smear technique and results were correlated with socioeconomic and hygienic factors. Data was analyzed using the chi-square test. The result obtained showed a high prevalence rate of 32.8% with females being highly infected (36.2%) than males (28.0%). *Entamoebahistolytica* (16.7%) was the commonest parasite followed by Hookworm (8.9%), *Strongyloides stercolaris* (5.0%) and *Ascarislum bricoides* (2.2%) being the least. The age group 8-12 years had the highest positive rate (34.2) while age group 3-7 years had the least (30.0%). There was no significant difference (P>0.05 between infection rate and age. No significant association was also found between parasite infection and source of water, hand washing habits, material used to clean up after toilet use, play site, patronage of food vendors, use of foot wears and play habits (P>0.05). The study therefore indicates a high prevalence of intestinal parasites among children in some selected schools in Katsina-Ala Local Government Area, Benue State, Nigeria. There is need for deworming and strict adherence to personal hygiene considering the high prevalence rate observed in the study.

**Keywords:** Prevalence, intestinal parasites, children, primary schools, Katsina-Ala

## Introduction

Intestinal parasitic infections are serious public health problems in the third world nations (Abdelsafi and Mohammed, 2014). Parasitic infections of the gastro-intestinal tract are one of the most common infections globally with children being the most affected. WHO (1998), reported that about 5.5 billion people are affected and 450 million are ill due to infections by intestinal parasites with children been the principal victims. Common symptoms of parasitic infections include diarrhoea, abdominal pain, vomiting, weight loss, anorexia, abdominal distention and iron deficiency anaemia (Workneh *et al.*, 2014). Environmental, socio-economic, demographic and health-related behaviours can lead to high prevalence of intestinal parasites (Norhayati *et al.*, 2003). These parasites are endemic worldwide and have been described as constituting the greatest single worldwide cause of illness and disease (Mehraj *et al.*, 2008; Steketee, 2003). Environmental, socio-economic, demographic and health-related behaviour are known to influence the transmission and distribution of their infection (Norhayati *et al.*, 2003).

Children are among the most Vulnerable to environmental threats as they are in a dynamic state of growth with their cells multiplying fast and their organ systems developing at a rapid rate (WHO, 2003). The morbidity of intestinal parasites is greatest among children of school age and may have an adverse effect on growth (Nematian *et al.*, 2008). Worm infestation is a major problem in children from developing countries, it produces nutritional deficiencies and anaemia in children, especially when hookworm infestation is present (Ahmed *et al.*, 2003). Work by WHO and other international key plays shows that there is real potential for improving child health and creating a better future for the coming generations through scaling up action to confront environmental dangers (WHO, 2003).

Because many parasitic infections especially those of helminthic origin are usually asymptomatic or produce only mild symptoms, they are often neglected until serious complications or chronic clinical pictures appear. The presence of these parasites in asymptomatic carriers has been a major source of infection to susceptible hosts, hence compounding the problems (Okon and Oku, 2001).

Many school children in developing countries go through their entire lives without enjoying good health free of intestinal parasites. For many, life is an uphill journey of hunger, poverty, disease and fatigue right from their youth. Though many parasites have limited life span, the continually exposure to and contact with sources of infection are factors that contribute to the susceptibility of individuals to re-infection.

In Katsina-Ala Local Government Area of Benue State, there is paucity of data on the prevalence and risk factors associated with transmission of intestinal parasites. This study was carried out to provide data on the prevalence and risk factors associated with intestinal parasites among primary school children in selected schools of Katsina-Ala Local Government Area of Benue State. It is hoped that the findings of this study will be useful to families, communities, as well as health and social welfare department of the local government.

## Materials and Methods

### *Study area*

Katsina-Ala Local Government is located in the North-Eastern part of Benue state and lies between latitudes 7°09' and 7°20' north of the equator and longitudes 9°15' and 9°30' east of the Greenwich Meridian. Politically the local government comprises of twelve (12) Council wards. The local government experiences a typical climate with two distinct seasons: the wet/rainy season and the dry season. The wet season lasts from April to October with an annual rainfall in the range of 150 – 180 mm. The dry season begins in November and ends in March. Temperatures here fluctuate between a minimum of $21^0$ - $24^0$C and a maximum of $29^0$ - $33^0$C. The indigenes are predominantly farmers (NPC, 2006).

The study was carried out in April 2016. 9 primary schools were selected from, 3 schools from each ward (Shitile, Ikurav-Tyev and Tongov) of Kastina-Ala Local Government Area of Benue State, Nigeria. Fig. 1 shows the Map of Katsina-Ala Local Government showing Council wards (green), the colour shapes on the council wards represent the sampled location.

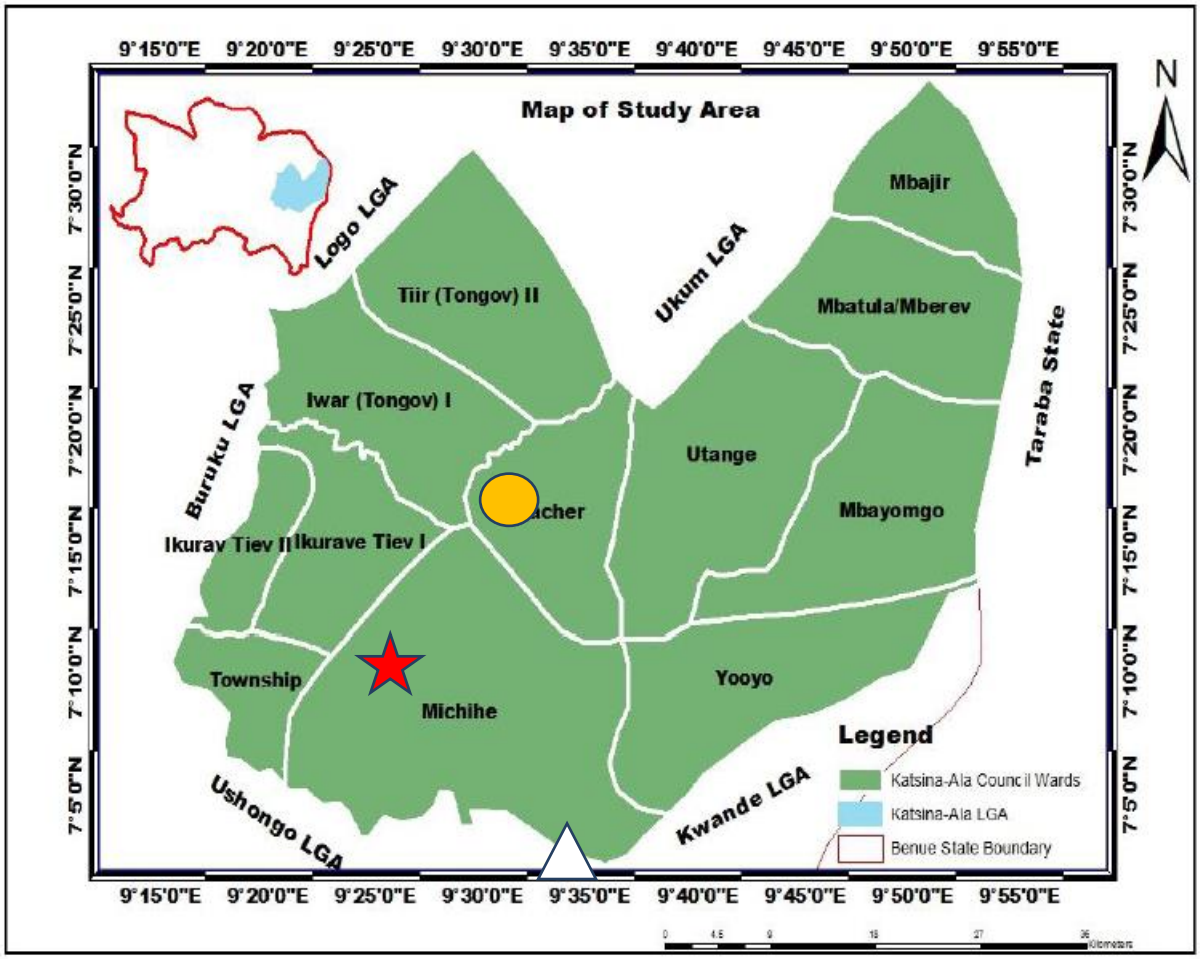



**Fig 1: Map of Katsina-Ala Local Government**

**Ethical consideration:** A letter of introduction was obtained from the Department of Biological Sciences, Faculty of Pure and Applied Sciences, Federal University Wukari prior to practical. All the subjects were verbally notified before sample collection, and the consent of their parents were obtained.

***Qualitative data collection***

Questionnaires were distributed to individuals recruited into the study. The questionnaire contained information on the age, gender, name of school, hand-washing habits, source of drinking water, patronage of food vendors, play sites, materials used to clean up after toilet use and play attitudes (sand) of the respondents. The parents/guardians/teachers of these children were of help in filling their questionnaires.

***Sample collection and analysis***

Clean well-labeled universal plastic bottles with cover were given to selected pupils for the study. The pupils were shown a demo on how to collect their early morning faecal samples, without contamination using the applicator stick attached to the cover of the sample container. The bottles were collected from the pupils the next day as they resumed for morning classes with the help of their class teachers, the questionnaires were properly filled. The faecal samples were immediately taken to the medical laboratory Department of General Hospital Katsina-Ala for analysis.

The faecal samples were examined for parasites using the direct wet mount technique adopted by Sing *et al.*, 2004). About 2 g of the faecal sample was emulsified with 3–4 ml of physiological saline using an applicator stick on a clean, grease free microscope slide. A drop of iodine solution was added to the smear, covered with a cover slip, and examined microscopically for ova, cysts and trophozoites using the 10X and 40X objectives. The parasites were identified using pictoral and identification keys by Arora and Arora (2012).

***Data analysis***

Data was analysed using the Social Package for Statistics Software (SPSS) version 20. Chi-square was calculated at $P<0.05$.

**Results and Discussion**

The study to determine the prevalence of intestinal parasites among children was carried out in selected primary schools in Katsina-Ala Local Government Area, Benue State Nigeria. The result shows that, of the 180 children examined, 59 were positive for intestinal parasites with an overall prevalence of 32.8%. Four parasites were identified including, *Entamoebahistolytica* (16.7%), *Ascarislum bricoides* (2.2%), Hookworm (8.9%) and *Strongyloides stercoralis* (5.0%) (Fig. 1).

The result according to age shows that the age group 8–12 years had the highest prevalence (34.2%) while the age group 3 – 7 had the lowest prevalence (30.0%) and there was no statistically significant difference ($P>0.05$) in prevalence between the age groups (Table 1). As shown in Fig. 2, the prevalence of parasitic infection in school pupils in relation to sex shows that of 75 males examined, 21(28.0%) were infected, while 38(36.2%) of 105 examined females were infected, and the difference in prevalence between sexes was statistically insignificant ($P>0.05$).

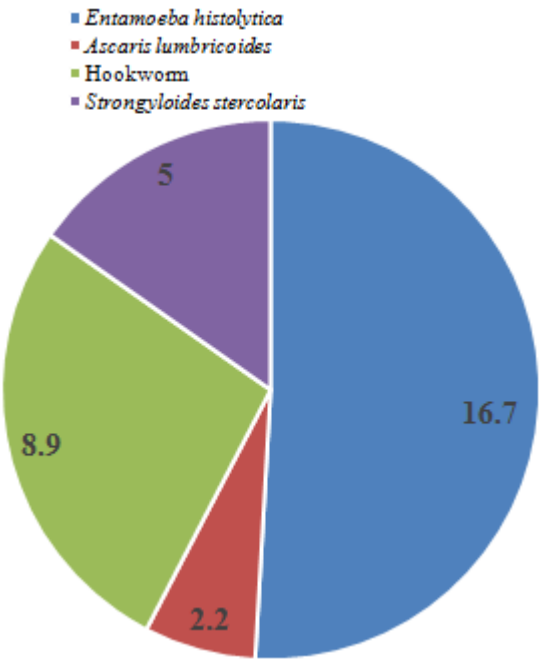
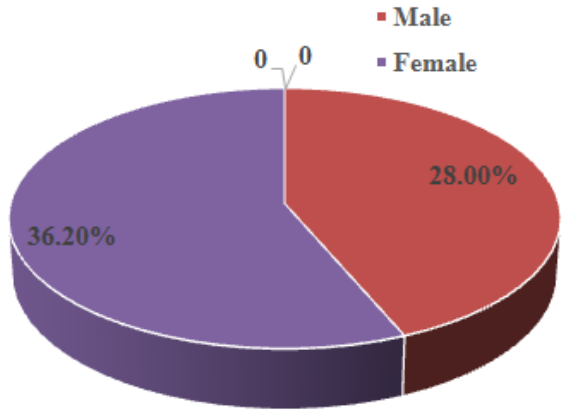



**Fig. 1: Prevalence of gastrointestinal species parasites in the study area**




$\chi^2$Cal =0.682; $\chi^2$Tab=0.4089; $\alpha = 0.05$; P>0.105; df = 1

**Fig. 2: Prevalence of parasitic infection in relation to sex of children in the study area**

**Table 1: Prevalence of parasitic infection in relation to age among children in the study area**

| Age | No. Examined | No. Infected | % |
|---|---|---|---|
| 3-7 | 60 | 18 | 30.0 |
| 8-12 | 120 | 41 | 34.2 |
| **Total** | 180 | 59 | 32.8 |

$\chi^2$Cal= 0.16129; $\chi^2$Tab =0.68798; $\alpha$ =0.05; P>0.05; df = 1

**Table 2: Prevalence of gastrointestinal parasites in relation to source of drinking water**

| Water source | No. Examined | No. Infected | % |
|---|---|---|---|
| Stream | 98 | 29 | 29.6 |
| Well | 22 | 10 | 45.5 |
| River | 37 | 14 | 37.8 |
| Tap water | 23 | 6 | 26.1 |
| Water vendor | 0 | 0 | 0.0 |
| Total | 180 | 59 | 32.8 |

$\chi^2$ − Cal =0.5891; $\chi^2$Tab =0.89892; $\alpha = 0.05$; P<0.05; df =4

**Table 3: Prevalence of gastrointestinal parasites in relation to hand washing before meals**

| Hand washing (before meals) | No. Examined | No. Infected | % |
|---|---|---|---|
| Yes | 42 | 12 | 28.6 |
| No | 79 | 28 | 35.4 |
| Sometimes | 59 | 19 | 32.2 |
| Total | 180 | 59 | 32.8 |

$\chi^2$ − Cal =1.4526; $\chi^2$ − tab =0.48368; $\alpha = 0.05$; P<0.05; df =2

The result obtained from the study indicates that of the 59 children infected with parasites, 29(29.6%) obtained their drinking water from streams, 10(45.5%) from wells, 14(37.8%) from rivers, 6(26.1%) from taps and (0.0%) from water vendors. There was no statistically significant association between source of drinking water and infection (P<0.05) (Table 2).

The results for hand washing before meals shows that hand washing before meals was more frequently practiced among children who were not infected (35.4%) than among children infected with parasites (28.6%). Even though, no statistically significant association was found between infection and hand washing before meals (P<0.05). The result shows that routine hand washing after toilet use was practiced among 26.9 and 34.5%, of infected and non-infected children, respectively (Table 4), and the difference was statistically insignificant. The results for the type of materials used for clean up after toilet use indicates that the children used water (21.4%), tissue paper 21.1%, paper (39.1%) and leaves (34.7%) (Table 5). There was no significant difference between infection and the type of material used to clean up after toilet use.

Results obtained from patronage of food vendors showed that 36.5% of the infected children always bought food from food vendors, 31.7% often patronize food vendors, 29.6% rarely patronize food vendors, while 17.6% never bought food from vendors. Although those who always bought food from food vendors were mostly infected 35(36.8%), there was no significant association between parasitic infection and patronage of food vendors (Table 6).

Data obtained from play sites reveals that of the 59 children infected with parasites 3(17.6%) occasionally play inside, 13(31.7%) seldom play outside, 8(29.6%) Mostly play inside and 35(36.8%) mostly play outside. No statistical significant association was found between play sites and infection rate (Table 7).

Results from playing with sand shows that of the 59 infected children 38(34.5%) always play with sand, 7(26.9%) never play with sand and 14(31.8%) sometimes play in sand. Children who always play in sand showed a high level of infection 38(34.5%) although there was significant association between parasitic infection and play habit of children (Table 8). The result further shows that of the 59 positive for intestinal parasites, 7(26.9%) always used foot wears, 38(33.9%) walked bare foot and 14(33.3%) sometimes use foot wears. The result showed a statistically significant association (P>0.05) between infection and use of footwear (Table 9).

**Table 4: Prevalence of Intestinal Parasites in Relation to Hand Washing After Toilet Use**

| Hand washing (after toilet use) | No. Examined | No. Infected | % |
|---|---|---|---|
| Yes | 26 | 7 | 26.9 |
| No | 110 | 38 | 34.5 |
| Sometimes | 44 | 14 | 31.8 |
| Total | 180 | 59 | 32.8 |

$\chi^2$ − Cal =0.057705; $\chi^2$ − tab =0.97156; $\alpha = 0.05$; P>0.05; df =2

**Table 5: Prevalence of intestinal parasites in relation to materials used to clean up after toilet use**

| Material used to clean up after toilet use | No. Examined | No. Infected | % |
|---|---|---|---|
| Water | 14 | 3 | 21.4 |
| Tissue paper | 19 | 4 | 21.1 |
| Paper | 23 | 9 | 39.1 |
| Leaves | 124 | 43 | 34.7 |
| Nothing | 0 | 0 | 0.0 |
| Total | 180 | 59 | 32.8 |

$\chi^2 -$ Cal =3.4953; $\chi^2 -$ tab =0.32137; $\alpha = 0.05$; P>0.05; df =4

**Table 6: Prevalence of intestinal parasites in relation to patronage of food vendors**

| Patronage of food vendors | No. Examined | No. Infected | % |
|---|---|---|---|
| Always | 95 | 35 | 36.8 |
| Never | 17 | 3 | 17.6 |
| Often | 41 | 13 | 31.7 |
| Rarely | 27 | 8 | 29.6 |
| Total | 180 | 59 | 32.8 |

$\chi^2 -$ Cal =1.9513; $\chi^2 -$ tab =0.58257; $\alpha = 0.05$; P>0.05; df =3

**Table 7: Prevalence of intestinal parasites in relation to play sites**

| Play site | No. Examined | No. Infected | % |
|---|---|---|---|
| Only inside | 17 | 3 | 17.6 |
| Only outside | 41 | 13 | 31.7 |
| Mostly inside | 27 | 8 | 29.6 |
| Mostly outside | 95 | 35 | 36.8 |
| Total | 180 | 59 | 32.8 |

$\chi^2 -$Cal =1.9513; $\chi^2 -$ tab =0.58; $\alpha = 0.05$; P>0.05; df =3

**Table 8: Prevalence of intestinal parasites in relation to playing with sand**

| Playing with sand | No. Examined | No. Infected | % |
|---|---|---|---|
| Always | 110 | 38 | 34.5 |
| Never | 26 | 7 | 26.9 |
| Sometimes | 44 | 14 | 31.8 |
| Total | 180 | 59 | 32.8 |

$\chi^2 -$ Cal =0.057705; $\chi^2 -$ tab =0.97156; $\alpha = 0.05$; P<0.05; df =2

**Table 9: Prevalence of intestinal parasites in relation to foot wears**

| Use of foot wears | No. Examined | No. Infected | % |
|---|---|---|---|
| Always | 26 | 7 | 26.9 |
| Never | 112 | 38 | 33.9 |
| Sometimes | 42 | 14 | 33.3 |
| Total | 180 | 59 | 32.8 |

$\chi^2 -$ Cal =0.18142; $\chi^2 -$ tab =0.91328; $\alpha = 0.05$; P>0.05; df =2

The study to determine the prevalence of intestinal parasites among children was carried out in selected primary schools in Katsina-Ala Local Government Area, Benue State Nigeria. The result shows that, of the 180 children examined, 59 were positive for intestinal parasites with an overall prevalence of 32.8%. Four parasites were identified including, *Entamoebahistolytica* (16.7%), *Ascarislum bricoides* (2.2%), Hookworm (8.9%) and *Strongyloides stercoralis* (5.0%) (Fig 1). The overall prevalence of 32.8% for intestinal parasites established in this study is higher when compared with the finding of Okpala *et al.* (2014) who reported a prevalence of 13.8% in Esan West local government area Edo state. It is, however,lower than Chirdan*et al.* (2010) who reported a prevalence of 57.8% in Jos, Nigeria and Houmsou *et al.* (2009) who reported a prevalence of 58.5% in primary school children in Makurdi, Benue state, Nigeria. The findings of the study further agree with Hussein (2011) who reported a prevalence of 22.2% in Northern districts of West Bank; Palestine.

The high prevalence of intestinal parasites in this study could be attributed to poor hygiene as most of the pupils examined lack good health education with poor family background, high poverty rate, poor socio-economic development that enhances the transmission of these parasites. In addition, the high prevalence rate might be due to the river waters around, type of contaminated and unhygienic food eaten by the pupils, contact with contaminated playing ground and the poor state of facilities like toilets, water source among others in the schools (Norhayati *et al.*, 2003).

The study recorded a prevalence of 16.7% *Entamoebahistolytica*, *Ascarislum bricoides* 2.2%, Hookworm 8.9% and *Strongyloidesstercolaris* 5.0%. This agrees with the study done by Odo*et al.* (2016) which reported a prevalence of Hookworm, *Ascarislum bricoides*, *Trichuris trichuria*, *Entamoebahistolytica* and *Giardia lamblia* as 14, 14, 11.5, 10.5 and 8.5%, respectively. Previous studies attribute the transmission of these parasites to be due to the sanitary condition of the environment as most children are exposed to moist soil during outdoor activities like games. Unhygienic conditions may also be responsible for the high prevalence (Nematian *et al.*, 2008).

Children belonging to the age group 8 – 12 years were the most infected (34.2%) while the age group 3-7 years were least affected (30.0%), and there was no statistically significant association between the age and infection in the current study. This is similar to the work of Odu *et al.* (2013) who reported that intestinal parasites were not age dependent. However, it is in contrast with Akingbade *et al.* (2013) who reported that infection was significantly associated with the age group 4 – 5years.

The study showed a high prevalence in females (36.2%) than males (28.0%) although, there was no significant difference (P>0.05) between infection rate and sex. This indicates that both sexes are susceptible to intestinal parasites in Katsina-Ala local government of Benue state. This finding also agrees with Odo *et al.* (2016) who reported that intestinal parasitic infection was not sex biased. The finding also agrees with Suresh *et al.* (2014) who reported that the rate of parasitic infection was found to be equal among males and females. The study however, contradicts the work of Biu *et al.* (2012) who reported that prevalence of intestinal parasites was significantly higher among males than females.

Sanitation and hygiene behavior have proven to be substantial contributors to a sustainable control of soil-transmitted helminthiasis, schistosomiasis, diarrhea, and other fecal-orally transmitted diseases (Bartram *et al.*, 2010). The result obtained from the study indicates that of the 59 children infected with parasites, 29(29.6%) obtained their drinking water from streams, 10(45.5%) from wells, 14(37.8%) from rivers, 6(26.1%) from taps and (0.0%) from water vendors. Even though, no statistically significant association (P<0.05)was established between source of drinking water and infection, the high proportion of people obtaining drinking water from untreated sources is an indication that drinking water is likely a source of infection in the study area.

Understanding the populations at-risk, including their socio-economic and environmental conditions, is fundamental for appropriate allocation of resources and to develop cost-effective control interventions (Brooker *et al.*, 2006).Data obtained from play sites reveals that of the 59 children infected with parasites, 3(17.6%) occasionally play inside, 13(31.7%) seldom play outside, 8(29.6%) Mostly play inside and 35(36.8%) mostly play outside. No statistical significant association was found between play sites and infection rate. The result further shows that of the 59 infected children 38(34.5%) always play with sand, 7(26.9%) never play with

sand and 14(31.8%) sometimes play in sand. Children who always play in sand showed a high level of infection 38(34.5%) although there was significant association between parasitic infection and play habit of children. The result further shows that of the 59 positive for intestinal parasites, 7(26.9%) always used foot wears, 38(33.9%) walked bare foot and 14(33.3%) sometimes use foot wears. The result showed a statistically significant association (P>0.05) between infection and use of footwear. The consequence is that this high level of contact with soil as indicated by walking barefooted, playing outside and playing with sand could significantly aid transmission of intestinal parasites in the study area. This is further complicated by the fact that hand washing before meals and after use of toilets is seldom practiced among children in the study age.

**Conclusion**

The study established that gastrointestinal parasitic infection is high in Katsina-Ala local government area of Benue state. The high prevalence is attributed to poor sanitary conditions, socioeconomic status and hygienic practices among the schools in relation to the children. Deworming, improvement of sanitary facilities and strict adherence to personal hygiene should be encouraged and parents should be involved in this regard.

**Conflict of Interest**

Authors declare that there is no conflict of interest reported on this work.

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