



Cryptosporidiosis Among Children in Some Selected Communities of Mayo Belwa Lga, Adamawa State.

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ABSTRACT

Cryptosporidiosis is a diarrhoeal disease caused by the protozoan parasite of the genus *Cryptosporidium* which affects a wide range of animals as well as humans. *Cryptosporidium hominis* and *Cryptosporidium parvum* are responsible for most human infections. The infection is acquired through consumption of contaminated water and food with sporulated oocysts as well as by direct contact with contaminated soil and infected hosts. Owing to the paucity of the information on this emerging zoonotic infection in Adamawa state in particular, this study was undertaken so as to determine the prevalence of *Cryptosporidium* among children in some selected communities in Mayo Belwa Local Government Area of the State. Faecal samples were collected from 150 randomly selected children (both males and females) who presented diarrhoea as well as those not with diarrhoea whose parents' consent were sought and showed willingness at the selected communities. The samples were collected in screw capped specimen bottles after ethical clearance was duly obtained and were examined using Modified Ziehl-Neelsen technique.

150 children were screened for cryptosporidiosis, 83 (55 %) were males and the remaining 67 (45 %) were females. From the results, higher prevalence of *Cryptosporidium* was observed in males than females among children; the male children from Binyeri and Dikong had higher prevalence of 33.33% and 58.33% respectively followed by the Gengle and Jereng with 23.81% and 23.67% with Mbilla having the least prevalence (8.33%). This was not statistically significant ($P > 0.05$). This study appears to be the first from Mayo-Belwa in North eastern Nigeria, therefore, provides baseline data on the prevalence of *Cryptosporidium* among children in Mayo-Belwa and Adamawa state at large. It is therefore, recommended that information/findings obtained from this study be used in establishing base line information and for implementing control/prevention intervention against parasitic opportunistic infections or related infections affecting the vulnerable group (children) in Mayo-Belwa Adamawa State.

Key Words: *Cryptosporidium*, gastrointestinal, children, unhygienic, diarrhoea.

INTRODUCTION

Cryptosporidiosis is a diarrheal disease caused by the protozoan parasite *Cryptosporidium* which affect a wide range of animals as well as humans (Chen, *et al.*, 2002). First described in laboratory mice by Tyzzer in 1912, *Cryptosporidium* was known as a causative agent of diarrhoeal disease in animals and then in humans during the 1970s (Caccio` and Putignani, 2014). Among the 38 species of the parasite currently recognized, *Cryptosporidium hominis* and *Cryptosporidium parvum* are responsible for most human infections (Feng, *et al.*, 2018).

Infection with the enteric protozoan parasite *cryptosporidium spp.* is common in the developed and developing world (Joyce and Annett, 2014). Transmission is by the faecal-oral route (Fayer, 2008), and household animals, such as dogs, cats, and birds, may contribute to the transmission because of their close association with their owners (Bajer, 2008).

Both humans and animals may be exposed to *C. parvum* through consumption of contaminated water and food as well as by direct contact with contaminated soil and infected hosts (Fayer, 2004). *C. parvum* is released into the environment through the fecal matter of infected hosts in the form of oocysts and it remains potentially infectious for several months depending upon the environmental conditions and stresses (Fayer, 2004).

The epidemiology of the infection involves both direct transmission from animals to humans or from person to person, as well as indirect transmission through ingestion of water and food contaminated with infectious oocysts (Caccio`, *et al.* 2005; Smith, *et al.* 2006b). With increasing amount of diarrhoea and gastroenteritis among the populace, there is a dire need to investigate the causes and the causative agents of the infection.

MATERIALS AND METHODS

Study area

The study was conducted in Mayo-Belwa Local Government Area of Adamawa State Nigeria. The area is located in the Southern part of the state and lies between latitude $9^{\circ}03' N$ and longitude $12^{\circ} 03' E$. It has land mass of $14,561,120 \text{ km}^2$ (Adebayo and Tukur, 1999). It covers an area of 1768 km^2 . It has an estimated population of 212,534 inhabitants with vast majority of the inhabitants being of Chamba, Yandan, Mummuye, and Fulani ethnic groups.

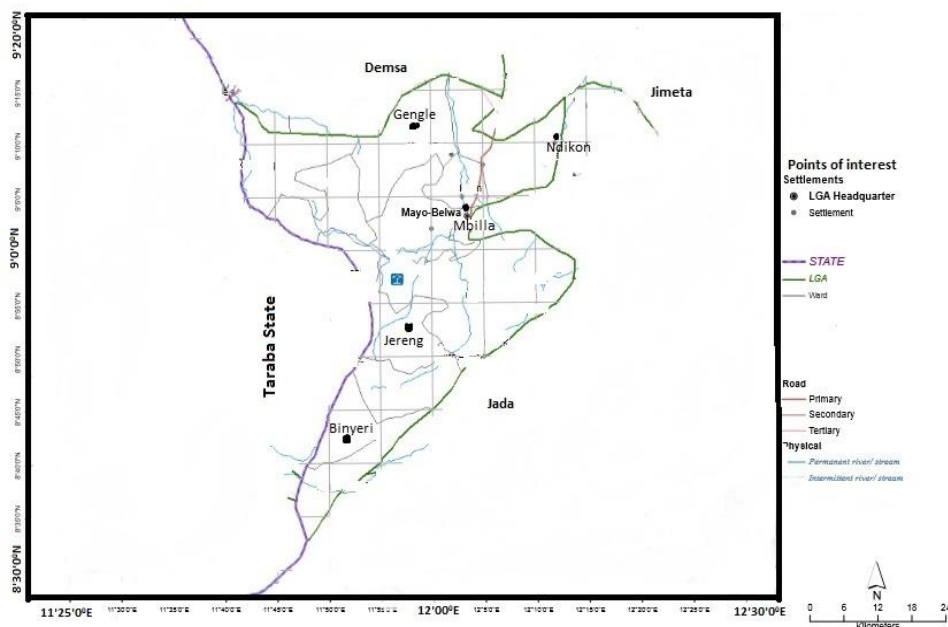


Figure 6: Map of Mayo Belwa Local Government Area showing sampling sites

Source: Google maps

Participants and specimens

A total of 150 children comprising males and females of different age groups who presented with diarrhoea and/or abdominal pains at the selected communities between August 2022 and November 2022 participated in the study. The samples collected for investigation included diarrhoeic samples. Specimens were also collected from patients with normal stools and/or without abdominal pain and symptoms of diarrhoea.

Sample Collection

Stool samples from each of the five communities were collected from randomly selected children in screw cap universal containers. Before sample collection, each parent from whom consent was earlier received was instructed on how to do the collection.

Examination of Faecal Samples

Each faecal sample was concentrated by sedimentation. Thereafter, faecal smears from the concentrates were made. The smears were stained using Modified Ziehl-Neelsen technique after which the slides were examined for *Cryptosporidium* oocysts under the microscope at $\times 100$ magnification. Stained oocysts will appear pinkish to reddish and would be identified using morphological characteristics with reference to standard keys.

Statistical Analysis

The results obtained were analysed using the SPSS version 23.00 statistical software. Results were reduced to percentages and presented in tables. Chi-square test was used to test for significant association between infection and various variables at 95% confidence level.

Ethical Considerations

A letter of introduction was obtained from the Head, Department Biological Sciences Federal University Wukari and submitted to the Director of Health Mayo Belwa Local Government Area, for approval before the samples were collected.

RESULTS/DISCUSSION

The gender based prevalence of infection among children from the five communities examined is shown in Table 1. The highest prevalence was observed among the males than the females from the five communities. From the individual communities, the male children from Binyeri and Dikong had higher prevalence of 33.33% and 58.33% respectively followed by the Gengle and Jereng with 23.81% and 23.67%. The male children from Mbilla had the least prevalence (8.33%). On the other hand, the female children from Binyeri and Dikong also had higher prevalence followed by Gengle and Jereng. Mbilla female children also had the least prevalence. This was also not statistically significant ($P>0.05$)

Table 1.0 Distribution of Cryptosporidium by Sex among children (age 05 to 15years) from five communities in Mayo-Belwa.

Location	Sex	No Examined	Positive cases(%)	CH	p-value
Binyeri	M	21	7(33.33)	0.33	0.56
	F	18	5(27.78)		
Dikong	M	12	7(58.33)	0.82	0.37
	F	10	4(40.00)		
Gengle	M	21	5(23.81)	0.50	0.48
	F	14	3(21.43)		
Jereng	M	15	4(26.67)	0.67	0.41
	F	10	2(20.00)		
Mbilla	M	14	1(7.14)	0.00	1.00
	F	12	1(8.33)		

The results for the total number of children that were positive for cryptosporidium are shown in the figure below. The highest prevalence is observed in Binyeri community followed by Dikong. Mbilla had the lowest prevalence. This might be due to the different locations of the community.

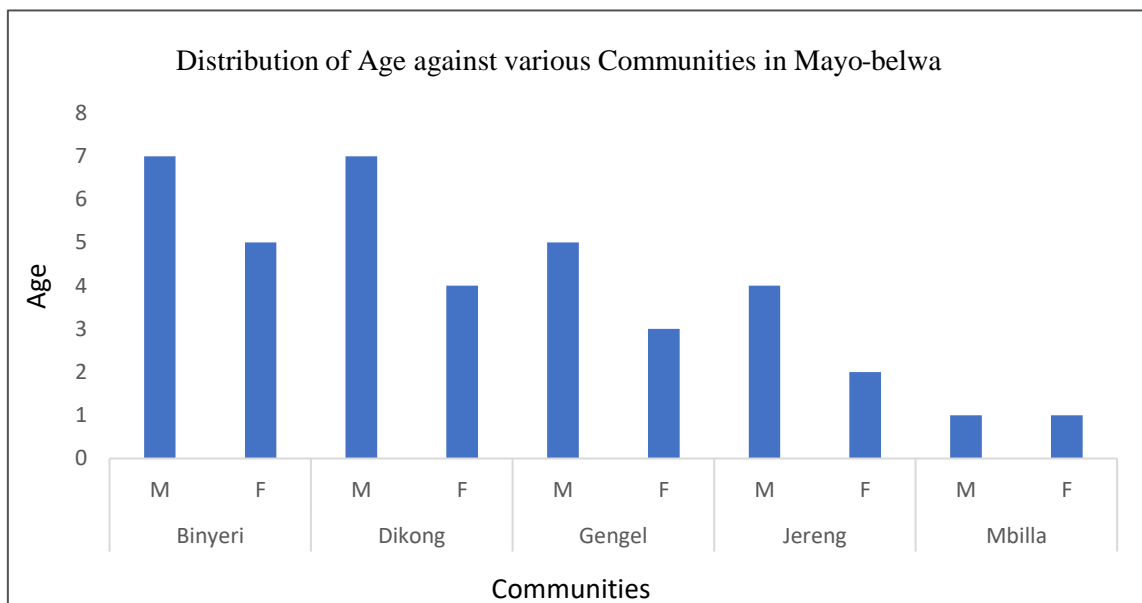


Fig 1. Bar chart distribution showing the prevalence percentage in children from the five communities in Mayo-Belwa

Table 2.0 below shows the positive cases of cryptosporidium infection among different age range from the five communities. The age range 9-11years show considerably high prevalence of the infection compared to the lower age group.

Table 2.0 Distribution of Cryptosporidium infection among children from five communities in Mayo-Belwa.

Variable	Binyeri	Dikong	Gengle	Jereng	Mbila	P value
Age						
5-8	3.00	1.00	1.00	2.00	0.00	0.00
9-11	6.00	7.00	4.00	3.00	2.00	
12-15	4.00	2.00	2.00	1.00	0.00	

The results obtained from the five communities in Mayo-Belwa showed relatively high rates of *Cryptosporidium* infection in children, with a significantly higher infection rate in the communities Binyeri and Dikong than in Jereng, Gengle and Mbilla. The difference in *Cryptosporidium* infection rate among the five communities is probably due to the fact that residents of Binyeri and Dikong have more frequent contact with bodies of water, such as streams and rivers, which are commonly contaminated by sewage and domestic wastewater, as transmission of *Cryptosporidium spp.* has been shown to be commonly associated with human and animal faecal contamination of water sources (Xiao, 2010; Widerstrom, *et al.*, 2014). Among the various age groups no significant difference was observed though age group 9-11years show slight difference over the remaining age groups. This could be because these group are more exposed to the risk factors of this infection due to their more exposure to the environment.

Cryptosporidiosis from several researches, tend to vary from one locality to another and from one country to the other depending on the level of contamination of water, food stuff and contacts with animals which are important factors in dissemination of the parasite. Cryptosporidiosis in Nigeria has been reported from tertiary institutions mainly among children in North-central Nigeria (Banwat *et al.*, 2003 and Akujobi and Oguniola, 2005).

CONCLUSION

The present study has demonstrated a high prevalence of *Cryptosporidium* in faeces of children in Mayo-Belwa community compared to studies carried out in other parts of the country. Also, higher prevalence of *Cryptosporidium* was observed in males than females among children. This study appears to be the first from Mayo-Belwa in North eastern Nigeria. It is recommended that information/findings obtained from this study be used in establishing baseline information and for implementing control/prevention intervention against parasitic opportunistic infections or related infections affecting the vulnerable group (HIV patients) in Mayo-Belwa Adamawa State.

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