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PREVALENCE OF INTESTINAL PARASITIC INFECTIONS AMONG INTERNALLY DISPLACED PERSON'S AND HOST COMMUNITIES IN MUBI NORTH LOCAL GOVERNMENT AREA, ADAMAWA STATE, NIGERIA

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ABSTRACT

A study on the Prevalence of Intestinal Parasitic Infections was carried out among Internally Displaced Persons and the host community in Mubi North Local Government Area of Adamawa State. 400 stool samples were collected from three communities namely, Barama,Yelwa and Wuro Hande. The Stool samples was processed using formol ether concentration technique and examined under microscope for the cyst of parasites with the aid of identification manual..121 were infected with a Prevalence rate of (30.3%). Eight Parasites species were encountered namely, *Ascaris lumbricoides*(36.1%), *Schistosoma mansoni* (22.5%), *Ancylostoma duodenale* (12.6%), *Entamoeba histolytica* (5.3%), *Hymenolepis nana* (2.6%), *Enterobius vermicularis* (3.0%), *Entamoeba coli* (6.0%) and *Giardia lamblia* (7.0%.). *Ascaris lumbricoides* was the most prevalent parasite while *Hymenolepis nana* was the least encountered. Internally Displaced Persons were more infected (34.5%) compared to the host community (26.0%), though statistically not significant P>0.05. Males were more infected among the IDPs (41.1%) than females 29.1%, while females (27.2%) were more infected than males (24.4%) in the host communities.. The study showed that infection was wide spread within the communities irrespective of settlement status. This could be attributed to poor personal hygiene, and indiscriminate dumping of waste, coupled with the challenges of portable water supply. There is the need for improvement in the availability of portable water supply and proper waste management in mubi and environs.

Keywords: Intestinal parasites, Infection, Transmission and Prevalence

INTRODUCTION

Intestinal parasitic infection is a condition in which a parasite infects the gastrointestinal tract of humans and other animals. Such parasites can live anywhere in the body, but most prefer the intestinal wall.These Infections are amongst the most common infections worldwide caused by protozoa and helminths. It is estimated that about 3.5 billion people are infected, with the majority being children (Harhay *et al*., 2010). The prevalence of intestinal parasites is attributed to many factors among which are poverty, poor environmental conditions, overcrowding, limited access to clean water and improper faecal disposal (Bethony *et al*., 2006).

Entamoeba histolytica, the causative agent of amoebiasis, is estimated to infect 40–50 million people and kills up to 100, 000 people annually, thus ranked as the second deadliest parasitic infection worldwide second only to malaria (Harhay *et al*., 2010). *Giardia lamblia*, the causative agent of giardiasis, is the most prevalent protozoan parasite worldwide with over 200 million people being infected, and East Africa is considered to be among the most endemic regions (Ignatius *et al*., 2012). Humans becomes infected through the ingestion of the cysts, or larvae either by touching contaminated soil or eating unwashed fruit and vegetables grown in such soil. Humans are predisposed to acquiring infection through eating uncooked infected meat. Hookworm, S*trongyloides* spp and Schistosomes infective larvae enter the body by burrowing through the skin, most commonly when barefooted individuals walk on infected soil or when human spends time in cercariae-infested water.

Internally displaced persons as the name imply refer to individuals or communities that had to move or were forced to move to places other than their normal place of abode and had to make do with conditions met in the new place of abode be it temporary or permanent shelter.. The advent of insurgency and the general insecurity in the northeast region has created a wide range of instability and human movement across the region and this has led to the creation of internally displaced persons camps in various parts of the states in the North Eastern Nigeria. The insurgency in Maiduguri impacted heavily on Mubi local government area of Adamawa state being one of the closest local government area to Bama, Gwoza, Madagali and even Maiduguri. Displaced persons from these communities as a result of the insurgency many relocated to Mubi some in Internally Displaced Persons Camps established by the Adamawa State Government. while some secured houses and settled within the host communities. Hence this research was carried out to assess the prevalence of intestinal parasitic infection among internally displaced persons and members the host communities in Mubi North LGA of Adamawa State.

MATERIALS AND METHODS

Study Area

Mubi North lies between latitudes $10^{0}06$ - $10^{0}29$N, and Longitude $13^{0}07$ - $13^{0}30$E of the Greenwich Meridian in Adamawa State. It is bordered by Michika to the North, Borno State to the North West, Hong Local Government to the West, Maiha Local Government in the South and the Cameroon Republic in the East. It has an estimated population of 214,580 with an average density of 232 people per square kilometer (Adebayo *et al*., 2020), The main ethnic groups in the area are Fali, Gude, Nzanyi, Fulani, Kilba, Marghi and Higgi (Adebayo *et al.*, 2020). The study was carried out among internally displaced persons and members of the host communities in Barama, Yelwa and Wuro Hande of Mubi North Local Government Area. The sample size was determined using the standard formula by Sarmukaddam and Garad (2006).

Sample Collection

A total of 400 stool samples (200 each from IDPs and Host communities) were collected randomly from three communities of Barama, Yelwa, and Wuro Hande Samples were collected only from persons who consented to participate in the study. The number of samples collected from each ward differs based on the population of the ward. Samples from IDPs were; Yelwa (80), Barama (70), and Wuro Hande (50). While samples from the host community members' were; Yelwa 80, Barama70, and Wuro Hande 50. Samples collected were analyzed in IIDP Research Laboratory in Modibbo Adama University Yola

Laboratory Analyses

The samples were analyzed for the cysts, eggs and larvae of parasites using Formal-ether concentration techniques as described by Cheesbrough (2005). The parasites were identified based on morphological characteristics using the Atlas of Medical Helminthology and Protozoology (Chiodini *et al*., 2005) and Medical Parasitology (Arora and Arora, 2011).

Data Analysis

The data generated was analyzed using Statistical Package for Social Sciences (SPSS) Version 2010. The prevalence of different intestinal parasites was calculated and expressed in percentage. Chi-square was used to analyze the association among the variables at a significant level $P<0.05$

RESULT

Out of the 400 stool samples examined from both the IDPs and Host communities, 121 (30.3%) were infected with one or more parasites. Eight parasites species were encountered namely *Ascaris lumbricoides* (36.1%), *Schistosoma mansoni* (22.5%), *Ancylostoma duodenale* (12.6%), *Entamoeba histolytica* (5.3%), *Hymenolepis nana* (2.6%), *Enterobius vermicularis* (3.0%), *Entamoeba coli* (6.0%) and *Giardia lamblia* (7.0%) with a total parasite load of 302(Table 1).

Internally Displaced Persons were more infected (34.5%) compared to members of the host communities 26.0%. Infection in relation to gender showed that among the IDPs males (41.0%) were the most infected compared to the females (29.1%). Whereas in the host communities females(27.2) were more infected than their male counterpart (24.4%). Distribution of infection in relation to age showed that among the IDPs persons between the ages 6-11 years (48.3%) and 36-44 years (37.0%) were the most infected, though statistically not significant $P<0.05$). While among the host communities those between the ages 12-17years (38.9%) and 6-11years (35.1%) were the most infected. χ^2 analysis showed significant association between infection ,age and sex($P>0.05$) Table 2.

Prevalence of infection in relation to occupation and educational level among the IDPs and host communities. Showed that among the IDPs, infection was highest among the traders(50.0%), followed by students and farmers(35.3).Whereas in the host communities also students (32.1%) and traders (25.9%) were the most infected.Infection in relation to education level showed that in both the IDPs and members of the host communities infection was highest among those that attended only primary school,out of schools persons and those without formal education (Table 3).

Assessment of the parasites loads in both the IDPs and Host communities showed that members of the host communities had a parasite loads of 172 parasites with *Ascaris lumbricoides* (56) being the most reoccurring followed by *Schistosoma mansoni* (40) and the least was *Giardia lamblia* (8) While the parasites loads among the IDPs was 132 parasites with *Ascaris lumbricoides* (53) and *Schistosoma mansoni* (40) being the most reoccurring parasites. While the least was *Entamoeba histolytica* (7) (Tables 4 and 5).

DISCUSSION

Intestinal parasites will always thrive where the environmental condition favours the transmission of such parasites. Among other factors that favours the transmission of intestinal parasitic infection are poor personal and community hygiene, overcrowding, poor waste management and lack of portable water supply. These factors coupled with human behavior can sustain the transmission of intestinal parasites within communities.Whenever there is mass movement of peoples from different regions to another area, there is likelihood of change in diseases dynamics in the host communities. Mubi North LGA in Adamawa state is one of the communities that play host for peoples that fled from insurgent attack in Gwoza,Bama,Madagali, Michika communities. This led to to influx of displaced persons from such places into Mubi town and environs.The study showed that both the IDPs and members of the host communities were infeted with wide range of intestinal parasites though the prevalence of infection varies.Parasites encountered were *Ascaris lumbricoides*, *Schistosoma mansoni*, *Ancylostoma duodenale*, *Entamoeba histolytica*, *Hymenolepis nana Enterobius vermicularis*, *Entamoeba coli* and *Giardia lamblia.* This finding was similar to studies conducted elsewhere by Adebote *et al*. (2004), Houmsou *et al.*(2010), Adefioye *et al*. (2011) and Pukuma *et al*. (2022).They all attributed the presence of these parasites to a number of factors which includes poor personal hygiene,overcrowding, poor waste management and human behavior.The high prevalence of infection among IDPs compared to the host community could be attributed to the fact that IDPs are displaced persons coming from diverse backgrounds with different exposure coupled with the fact the IDP camps lacks basic amneties such as adequate toilet facilities and water supply is usually not sufficient. Unlike the members of the host community where most are in their houses with assess to basic infrastructure both in terms of housing,water supply and improved personal hygiene.. The prevalence of infection (30.3%) recorded in this study was however very low compared to findings by Houmsou *et al.* (2010), who recorded 58.5% among primary school children in Markudi, Benue State. Damen *et al.* (2011), 80.9% Intestinal Parasitism among the Almajiris, Adefioye *et al*. (2011),52% infections among school children and Egbuobi *et al*. (2013), 64.1% infections among pupils in Umuezeaga community,. But the finding was similar to that of Ahmed *et al*. (2013), 30.8%, Adabara *et al*. (2011), 46% among primary school children in Bosso The prevalence of infection among both the IDPs and host communities in Mubi North Local Government could be attributed to a number of factors among which is the improper management of organic waste,indiscriminate dumping of refuse, inadequate water supply , poor drainages and use of dumping sites for defecation. Coupled with the influx of the IDPs from Borno has further streached the available infrastructure for use..

Ascaris lumbricoides was the commonest intestinal parasite observed, this could be attributed to the infectious nature of the parasite. The well-protected eggs of Ascaris can withstand drying and can survive for very long periods (Mordi and Ngwodo, 2007). Hookworm was the second most prevalent observed. This was similar to the observation of Ahmed *et al*. (2013), in Katsina, Egbuobi *et al*. (2013), in Akokwo Imo State, Damen *et al.* (2010), Doi village Plateau State,

Houmsou *et al.* (2010), in Makurdi, Benue State and Obiukwu *et al.* (2008), in Mbaukwu, Anambra State..The high prevalence of hookworm recorded in this study may be due to favourable conditions for the development of the infective stage and exposure to risk factors such as contaminated soil,fuits vrgatables and the act of walking bare footed which are all risk factors.

Entamoeba histolytica, *Entamoeba coli* and *Giardia lamblia* were the most reoccurring protozoans in both the IDPs and members of the host communities.This was similar to the findings of Amazigo *et al*. (2010), in a survey on the prevalence of intestinal parasitic infections among patients attending Bugando Medical Center in Mwanza, north-western Tanzania reported a high prevalence of protozoans. Adebote *et al.* (2004), reported a high prevalence of protozoans in pre-school children in three villages in Zaria, and Adabara *et al*. (2011) in Bosso Town, Niger State. The prevalence of protozoans could be a result of poor water supply. Buying water from water vendors , fetching water from wells and drinking directly without boiling as well as poor personal hygiene and eating contaminated food, fruits and vegetables are all the predisposing factors which were common practice in the IDP camp and host communities in Mubi.

The prevalence rate in relation to gender showed that males had a higher prevalence rate of 33% than females with 28.1%. This was similar to the findings of Pukuma *et al.* (2022), who was of the view that the males were more susceptible to infection than the females because males mostly engaged in outdoor activities such as recreational activities, animal husbandry, fishing and swimming. But Obiukwu *et al*. (2008) and Amazigo *et al.* (2010); reported that both males and females have the same chances of being infected by these parasites. The diffrences in infection rates could be attributed differeces in behaviour between the two groups (Hotez *et al.*, 2004). Gelaw *et al.* (2013), reported that females had higher prevalence rate in study in North-western Ethiopia.

The prevalence according to educational level showed that prevalence rate was highest among the participants who attended only primary school level in both the IDPs and the Host community. The high prevalence rate among these groups could be as a result of ignorance about the mode of transmission and exposure to the risk factors of acquiring the infection.

The age group 6–11 years and 12-17 years recorded the highest prevalence in both the IDPs and the Host community respectively, this agrees with; Pradhan *et al.* (2014), who reported that Intestinal parasitic infections were highest among children in primary level (42.3%) in rural village in Kathmandu, Nepal The high prevalence rate within these age group could be as a result of exposure to transmission. Traders and Students had high prevalence rate in both the IDPs and the Host community respectively.This could be due to similar exposure factors among these groups Generally, the transmission of infection can be attributed to high level of outdoor activiies, walking bear footed, contact with soil contaminated faeces among other numerous factors.

The mass movement of people from one region to another has long been associated with spreading of infectious diseases (Teitelbaum *et al*., 2018; Peacock *et al*., 2018). Evidences from studies by Mekonnen (2014), Hoch *et al.* (2015) and Jone *et al.* (2016) were all of the view that displaced humans, immigrants, refugees, and adoptees are not only experiencing a shift in their personal health experience, but also impact negatively on the environmental health of the new communities into which they come to reside. Two of the most important factors directly related to the epidemiology of disease due to mass movement are the degree of difference between origin and the destination and the size of the mobile population that moved between the different disease prevalence patterns

CONCLUSION

In conclusion, the study showed that Intestinal Parasitic Infections was prevalent among the people in Mubi North Local Government Area irrespective of their residence status . Maintenance of proper personal hygiene and proper health education is imperative in the management of Intestinal Parasitic Infections in the communities .Hence the following recommendation

i. There is the need for Sustained efforts to provide portable water in IDPs camp and within the host communities.
ii. The Health Services Unit of the Local Government Area should embark on massive public health education to improve on the personal and communityknowledge on the risk factors for infection in the area.
iii. There is the need scale up de-worming campaigns in all the communities in the Local Government.

ETHICAL APROVAL

Ethical approval was obtained from the Adamawa State Ministry of Health for the conduct of the research and we hereby declare that there was no competing or conflicting interest at any point in the course of the conduct of this reaearch. Identity of all participants was not in anyway disclosed.

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Table 1: Prevalence of Intestinal Parasitic Infections among IDPs and Host Community in the Study Population

People Examined	No. Examined	No. Infected	Prevalence (%)
IDPs	200	69	34.5
Host Community	200	52	26.0
Total	400	121	30.3

Table 2: Prevalence of Intestinal Parasitic Infections in relation to gender and age among the IDPs and Host Community in the Study Population

Parameter	IDPs		Host Community	
	No. Examined	No. Infected (%)	No. Examined	No. Infected (%)
Gender				
Male	90	37 (41.1)	86	21 (24.4)
Female	110	32 (29.1)	114	31 (27.2)
Age				
6-11	60	29 (48.3)	57	20 (35.1)
12-17	43	14 (32.6)	36	14 (38.9)
18-23	32	8 (25.0)	28	4 (14.3)
24-29	15	3 (20.0)	19	3 (15.8)
30-35	18	5 (26.8)	24	5 (20.8)
36-41	27	10 (37.0)	26	5 (19.2)
42>	5	0 (0.0)	10	1 (10.0)
Total	200	69 (34.5)	200	52 (26.0)

For gender in IDPs $\chi^2 = 5.27$, p = 0.547Host community$\chi^2 = 5.27$, p = 0.166
For age in IDPs $\chi^2 = 5.27$, p = 0.0002.Host community$\chi^2 = 5.27$, p=0.0008

Table 3: Prevalence of Intestinal Parasitic Infections in relation to occupation and educational level among IDPs and the Host Community in the Study Population

Parameter	IDPs		Host community	
	No. Examined	No. Infected (%)	No. Examined	No. Infected (%)
Occupation				
Civil servants	15	4 (26.7)	35	8 (22.9)
Traders	16	13 (50.0)	27	7 (25.9)
Students	68	24 (35.3)	84	27 (32.1)
Farmers	62	22 (35.5)	31	7 (22.6)
Artisans	29	6 (20.7)	23	3 (13.0)
Educational Level				
No formal education	25	10 (40.0)	17	5 (29.4)
Primary school	66	28 (42.4)	66	30 (45.5)
Secondary school	70	21 (30.0)	69	12 (17.4)
Tertiary level	10	0 (0.0)	34	3 (8.8)
Out of school	19	10 (52.6)	14	2 (14.3)
Total	200	69 (34.5)	200	52 (26.0)

For occupation in IDPs $\chi^2 = 5.27$, p = 0.0008 Host community $\chi^2 = 5.27$, p = 0.0001
For educational level in IDPs $\chi^2 = 5.27$, p = 0.0006 Host community $\chi^2 = 5.27$, p = 0.0001

Table 4: Parasite Load Distribution among IDPs in the Study Population

Parameter	*A.l* (%)	*S.m* (%)	*A.d* (%)	*E.h* (%)	*E.c* (%)	*G.l* (%)	Total
Gender							
Male	26 (41.94)	18 (29.03)	2 (3.22)	9(14.52)	5 (8.06)	2 (3.22)	62
Female	27 (38.57)	25 (27.78)	7 (7.78)	0	5 (5.56)	6 (6.67)	70
Age (years)							
6-11	15 (37.50)	17 (42.50)	4 (10.00)	0	4 (10.00)	0	40
12-17	15 (41.67)	4 (11.11)	2 (5.56)	9 (25.00)	3 (8.33)	3 (8.33)	36
18-23	4 (22.22)	8 (44.44)	0	0	1 (5.56)	5(27.78)	18
24-29	6 (66.67	3 (33.33)	0	0	0	0	9
30-35	7 (38.89)	9 (50.00)	0	0	2 (11.11)	0	18
36-41	6 (54.55)	2 (18.18)	3 (27.27)	0	0	0	11
42>	0	0	0	0	0	0	0
Occupation							
Civil servants	8 (100)	0	0	0	0	0	8
Traders	10 (47.61)	6 (28.57)	2 (9.52)	0	0	3 (14.29)	21
Students	14 (29.17)	16 (33.33)	3 (6.25)	5 (10.41)	6(12.5)	4 (8.33)	48

Farmers	14 (37.84)	15 (40.54)	2 (5.40)	4 (10.81)	2 (5.40)	0	37
Artisans	7 (38.89)	6 (33.33)	2 (11.11)	0	2 (11.11)	1 (5.56)	18
Educational Level							
No formal edu.	19 (61.29)	12 (38.70)	0	0	0	0	31
Primary school	14 (33.33)	16 (38.09)	3 (7.14)	2 (4.76)	4 (9.52)	3 (7.14)	42
Secondary sch	14 (30.43)	10 (21.74)	6 (13.04)	5 (10.87)	6 (13.04)	5 (10.87)	46
Tertiary level	0	0	0	0	0	0	0
Out of school	6 (46.15)	5 (38.46)	0	2 (15.38)	0	0	13
Total	53	43	9	9	10	8	132

Keys: *A.l= Ascaris lumbricoides, S.m = Schistosoma mansoni, A.d= Ancylostoma duodenale, E.h = Entamoeba histolytica, E.c= Entamoeba coli,* and *G.l= Giardia lamblia*

Table 5: Parasite Load Distribution among Host Community in the Study Population

Parameter	***A.l* (%)**	***S.m* (%)**	***A.d* (%)**	***E.h* (%)**	***H.n* (%)**	***E.v* (%)**	***E.c* (%)**	***G.l* (%)**	**Total**
Gender									
Male	23(35.38)	13(20.00)	11(16.92)	3(4.62)	0	3(4.62)	4(6.15)	8(12.31)	65
Female	33(30.84)	27 (25.23)	18 (16.82)	4 (3.74)	8 (7.47)	6 (5.60)	4 (3.74)	7 (6.54)	107
Age (Years)									
6-11	16(23.19)	19 (27.54)	12 (17.39)	0	0	9 (13.04)	0	13 (18.84)	69
12-17	7 (18.92)	7 (18.92)	10 (27.03)	5 (13.51)	8 (21.62)	0	0	0	37
18-23	5 (29.41)	10 (58.82)	0	0	0	0	2 (11.76)	0	17
24-29	12(60.00)	2 (10.00)	6 (30)	0	0	0	0	0	20
30-35	10(55.56)	1 (5.56)	0	2 (11.11)	0	0	3 (16.67)	2 (11.11)	18
36-41	6 (54.55)	1 (9.09)	1 (9.09)	0	0	0	3 (27.27)	0	11
42>	0	0	0	0	0	0	0	0	0
Occupation									
Civil servants	8 (28.57)	12 (42.86)	8 (28.57)	0	0	0	0	0	28
Traders	14(58.33)	1 (4.16)	6 (25.00)	1 (4.16)	0	0	0	2 (8.33)	24
Students	28(29.47)	21(22.10)	12 (12.63)	4 (4.21)	8 (8.42)	9 (9.47)	2 (2.11)	11 (11.58)	95
Farmers	4 (22.22)	3 (16.67)	3 (16.67)	2 (11.11)	0	0	4 (22.22)	2 (11.11)	18
Artisans	2 (25.00)	3 (37.50)	0	0	0	0	2 (25.00)	0	4
Educational Level									
No formal edu.	15(46.88)	9 (28.13)	(3.13)	2(6.25)	0	0	3 (9.38)	2(6.25)	32
Primary school	26(40.63)	7 (10.94)	8 (12.50)	0	3 (4.69)	9(14.06)	0	11 (17.19)	64
Secondary sch	6 (10.53)	14 (24.56)	20 (35.09)	5 (8.77)	5 (8.77)	0	5 (8.77)	2 (3.51)	57
Tertiary level	3 (23.08)	10 (76.92)	0	0	0	0	0	0	13
Out of school	6 (100)	0	0	0	0	0	0	0	6
Total	56	40	29	7	8	9	8	15	172

Keys:
A.l= Ascaris lumbricoides, S.m = Schistosoma mansoni, A.d= Ancylostoma duodenale, E.h = Entamoeba histolytica, H.n= Hymenolepis nana, E.v= Enterobius vermicularis, E.c= Entamoeba coli, and *G.l= Giardia lamblia*

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