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Prevalence of enteric parasitic infections in Agulu community, Anaocha L.G.A Anambra State, Nigeria

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ABSTRACT

A study was undertaken to determine the prevalence of helminth and infections in Agulu town, Anaocha local government Area , Anambra State Nigeria between July 2023 and June 2024. Informed consent was obtained from the authorities and the participants. Fresh stool specimens were collected and examined parasitologically using direct wet mount technique and formol ether concentration technique for intestinal parasites using 10x and 40x objective lens. Of a total of 400 fecal samples examined, 152 (38.00%) was positive including 91 (22.75%) helminthes infections and 61 (15.25%) protozoan infections. The females and the males were equally infected, 76(38.58%). Entamoeba histolytica 51 (12.75%), recorded the highest prevalence, followed by *Ascaris lumbricoides* 48 (12.00%), Hookworm, 17(4.25%); *Trichuris trichiura* 10 (2.50%); *Strongyloides stercoralis* 9(2.25%) *Gardia lamblia* 7(1.75%), *Taenia* sp 7(1.75%) and the least being *Isospora belli* 3(0.75%). The age groups 21-30 years recorded the highest prevalence of 50.00% followed by 11-20 years , 41.03%, and the least being the age group >40 years 28.57%. Amorji village recorded higher prevalences, 79(39.00%) than the Nneohia village, 73(36.50%). The villages did not differ significantly in the rate of infection (P>0.05). The sexes did not differ significantly in their rate of infections(P>0.05). The age groups did not differ significantly in the rate of infection (P>0.05). This study has provided baseline epidemiological data needed in the control and elimination of IPIs as neglected tropical diseases. Free medical tests and periodic de-worming of Anambrarians with albendazole, benzimidazole antihelminthic should be carried out and sustained to remove the intestinal parasitic infections.

Key words: Prevalence, Parasite, Agulu, hygiene, helminthes, protozoan

INTRODUCTION

In developing countries, intestinal parasitism is a primary public health hazard that is frequently omitted. In these less developed countries, poor environmental and personal hygiene, negative nutrition, overcrowding and climatic situations that prefer the development and survival of those parasites are some of the elements contributing to the high degree of intestinal parasite transmission (Emmy-Egbe *et al.,* 2012; Igbodika and Ekesiobi 2012; Chukwubude *et al* ., 2024; Ekesiobi (2025). School kids bring the heaviest burden of the associated morbidity (Nematian *et al.,* 2004), due to their dirty conduct of playing or dealing with of infested soils, eating with soiled palms, unhygienic restroom practices, ingesting and consuming of contaminated water and food (Nwosu, 1981). Intestinal parasites are one of the main health problems in developing countries, and3.5 billion people around the world are affected, including 450 million believed to be infected by these infections (WHO, 2016). These parasitic infections cause thousands of unnecessary deaths every year and are one of the most common infectious diseases in the world. People of all ages are affected by parasitic infections but children are the most affected. Through out history, human have been infected by parasite from single cell protozoa to large worms living in the gastrointestinal tract In Nigeria, gastrointestinal parasitic infections persist due to low standards of living, poor environmental hygiene, ignorance of simple health-promoting behaviours, lack of drinking water, overpopulation, proximity to animals and social and cultural practices related to food supply and consumption (Sufiyan *et al.,* 2011). Intake parasite transmission methods are the consumption of contaminated foods and water, skin penetration and contact between individuals (Feleke *et al.,*2017). Approximately one quarter of the world's population is at risk of getting affected by intestinal parasitic infections (IPIs) (WHO, 2016). These people with IPIs are at high risk of iron deficiency, anaemia, gastrointestinal disorders and growth retardation, which adversely affect them. Ingestion of infective eggs from soil contaminated vegetables and water is the primary route of infection. Transmission also comes through municipal recycling of waste water into crop fields (Baird *et al.*, 2002). People became infected with *Taenia solium* and *Taenia saginata* by eating under cooked meat or drink unpasteurized milk. *Giardia lamblia* and *Entamoeba*

histolytica are spread by fecal contamination of drinking water and foods as well as direct contact with infected dirty hand. *Ascaris lumbricoides* can be contacted and spread by eating infected faecal contaminated food, unwashed vegetables or raw fruits. Penetration of intact skin by infective stage is a means of transmission employed by Hookworm and *Strongyloides stercoralis*. Swimming in contaminated water can also result in infestation by parasite such as Schistosoma sp. (Nematian *et al.,* 2004) In view of these, there is a need for the development of good preventive and control measures adaptable for the parasitic infections in Agulu town, Anaocha Local government Area of Anambra state. This cannot be done effectively without baseline information on the prevalence of the parasitic infections within the study area. Lots of works have been done on the prevalence of intestinal parasitic infection in Nigeria as indicated by available literature (Ekesiobi, A. O. 2025; Igbodika *et al*., 2014; Oluwaseun *et al*., 2025; Chukwubude, *et al.,* 2024; Emmy-Egbe *et al.,* 2012; Abiodun *et al.,* 2024; Igbodika, *et al.,* 2012); however Information in the study area Agulu is very scanty. To fill this gap therefore this study was undertaken to determine the prevalence of intestinal parasitic protozoan and helminth parasites in Agulu town.

MATERIALS AND METHODS

Study population

The study population were 400 individuals of all ages randomly selected from the study area. This included 200 participants from each village.

Samples and sampling techniques

A total of 203 males and 197 females were recruited and examined using the Yaro Yamane's formular given by $n = N/1+N(e^2)$ according to Uzoagulu, (2011) where n = the minimum sample size; N = The population size; e = level of significance or limit of tolerance (0.05); 1 = unity (a constant). After a preliminary survey of the study area was carried out. Record of the villages was obtained. In the community, 2 villages were randomly selected. Fecal samples were collected from 100 males and 100 females) randomly selected from the households in Nneohia village whereas 103 males and 97 females were randomly from the households in Amorji Village. Households were selected by systematic random technique according to Asika, (1991).

Sample collection periods

The study was carried out between the months of July 2023 and June, 2024. Samples when collected were taken to a private laboratory for parasitological examinations.

Faecal collection

The individuals were instructed on how to collect the fecal. Samples were labeled appropriately and then transported to the Laboratory parasitological examinations. Oral interview and Structured questionnaire were administered to each individual respondent.

Stool samples were collected into wide mouthed grease free and clean specimen containers and taken to the laboratory.

Parasitological techniques

Methods described by Cheesbrough (2000) and WHO (1991) were used for fecal processing, analysis, examination and identification of parasites.

Macroscopic examination

All fecal specimens were examined macroscopically for appearance, consistency, colour, and presence of mucus, blood, adult worms, or segment.

Microscopic examination

Direct stool smear

A drop of physiological saline was placed on one end of the grease free clean glass slide and a drop of iodine on the other end. Using an applicator stick, a small amount of the fecal sample was collected from different sides and mixed with the saline and the iodine drop separately. This was covered with cover slip and examined under the microscope for larvae, eggs, cysts. The results obtained was recorded.

Concentration technique

Formol ether concentration technique as described by Cheesbrough (2000) was used. Using a rod or stick about 1g of fecal specimen was emulsified in 4ml of 10% formol water contained in screw cap bottle or tube. A further 3-4ml of the formol water was added and mixed well by shaking. The emulsified fecal sample was sieved into a beaker. The fecal suspension was transferred into a centrifuge tube and 3-4ml of ethyl acetate added and was mixed very well.

It was centrifuged at 750-1000g for I minute.

Using a stick, the layer of faecal debris from the side of the tube was loosen and inverted to discard the ether, faecal debris and formol water such that the sediment remained in the tube.

The bottom of the tube was tapped to resuspend and mixed with the sediment.

The sediment was transferred to a slide and covered with a cover slip.

This was examined microscopically using 10x and 40x objective lens.

Ethical considerations

Letter of introduction was secured from the department of Biological sciences Anambra state university. Approval was sought from the transition committee chairman of the selected LGAs and from the Igwe and the President general of the selected towns. Verbal and written informed consent were sought from all recruited individuals/respondents. Those people positive for gastrointestinal helminth and protozoan parasites were assisted in the procurement of anti-helminthic drugs.

Statistical analysis

The results were recorded, represented in tables and Figures and prevalence were calculated. Data obtained were analyzed using statistical package for the social sciences-SPSS software version 2.0. Chi-square (χ^2) test and one way ANOVA was used to determine if there is any statistical significant difference between prevalence of parasites in relation to the sex and the age of the individuals. Level of significance was set at 95% confidence interval, $p<0.05$ was considered statistically significant

RESULTS

Table 1: Prevalence of intestinal parasitic infections in relation to sex, age and village in Agulu Town, Anaocha LG.A.

Age group (years	Number examined			Number Positive			Number positive (%) NNEOHIA VILLAGE									
							Helminthes						Protozoa			Total
	Males	Females	Total	Males	Females	Total	AS	HW	TR	ST	T	Sub total	EA	GL	IB	Sub total	
1 – 10	22	20	42	4(18.18)	6(30.00)	10)23.81)	3(7.14)	2(4.76)	1(2.38)	0	0	6(14.29)	4(9.52)	0	0	4(9.52)	10(23.81)
11 – 20	24	23	47	10(41.67)	8(34.83)	18(38.30)	5(10.64)	3(6.38)	2(4.26)	2(4.26)	0	12(25.53)	5(10.64)	1(2.13)	0	6(12.77)	18(38.30)
21 – 30	26	28	54	11(42.31)	12(42.86)	23(42.59)	7(12.96)	3(5.56)	1(1.85)	2(3.70)	2(3.70)	15(27.78)	6(11.11)	1(1.85)	1(1.85)	8(14.81)	23(42.59)
31 – 40	20	19	39	8(40.00)	8(42.11)	16(41.03)	4(10.26)	2(5.13)	2(5.13)	1(2.56)	1(2.56)	10(25.64)	5(12.82)	1(2.56)	0	6(15.38)	16(41.03)
> 40	8	10	18	2(25.00)	4(40.00)	6(33.33)	2(11.11)	0	0	0	2(11.11)	4(22.22)	2(11.11)	0	0	2(11.11)	6(33.33)
Total	100	100	200	35(35.00)	38(38.00)	73(36.50)	21(10.50)	10(5.00)	6(3.00)	5(2.50)	5(2.50)	47(23.50)	22(11.00)	3(1.50)	1(0.50)	26(13.00)	73(36.50)
Age group (years	Number examined			Number Positive			Number Positive (%) AMORJI VILLAGE									
							Helminthes						Protozoa			Total
	Males	Females	Total	Males	Females	Total	AS	HW	TR	ST	T	Sub total	EA	GL	IB	Sub total	
1 – 10	17	21	38	8(47.06)	7(33.33)	15(39.47)	5(13.16)	1(2.63)	1(2.63)	2(5.26)	0	9(23.68)	6(15.79)	0	0	6(15.79)	15(39.47)
11 – 20	26	23	49	10(38.46)	9(39.13)	19(38.78)	7(14.29)	24.08)	1(2.04)	1(2.04)	0	11(22.45)	7(14.29)	1(2.04)	0	8(16.33)	19(38.78)
21 – 30	28	24	52	13(46.43)	13(54.17)	26(50.00)	9(17.31)	3(5.77)	2(3.85)	1(1.92)	1(1.92)	16(30.77)	7(13.46)	2(3.85)	1(1.92)	10(19.23)	26(50.00)

31 – 40	19	21	40	6(31.58)	7(33.33)	13(32.50)	4(10.00)	1(2.50)	0	0	1(10.00)	6(15.00)	5(12.50)	1(2.50)	1(2.50)	7(17.50)	13(32.50)
> 40	13	8	21	4(30.77)	2(25.00)	6(28.67)	2(9.52)	0	0	0	0	2(9.52)	4(19.05)	0	0	4(19.05)	6(28.57)
Total	103	97	200	41(39.81)	38(39.18)	79(39.50)	27(13.50)	7(3.50)	4(2.00)	4(2.00)	2(1.00)	44(22.00)	29(14.50)	4(2.00)	2(1.00)	35(17.50)	79(39.50)
Grand Total	203	197	400	76(37. 44)	76(38.58)	152(38.00)	48(12.00)	17(4.25)	10(2.50)	9(2.25)	7(1.75)	91(22.75)	51(12.75)	7(1.75)	3(0.75)	61(15.25)	152(38.00)

KEY: AS= *Ascaris lumbricoides*; HW= Hookworm,; TR= *Trichuris trichiura*; ST= *Strongyloides stercoralis* ;T=*Taenia* spp ; EA= *Entamoeba Histolytica*; GL= *Giardia lamblia;* IB =*Isospora belli*

The prevalence of intestinal parasitic infections in Agulu, Anaocha L.G.A. is shown in Table1. An overall prevalence of 152(38.00%) out of 400 participants examined 91 (22.75%) were positive for helminth parasites and protozoa parasites 61 (15.25%). The most prevalent parasite recorded was *E. histolytica* 51(12.75%) followed by *Ascaris lumbricoides,* 48(12.00%). Amorji village recorded higher prevalence 79(39.50%) than Nneohia village, 73(36.50%). The age group 21-30 years recorded the highest prevalence 23(42.59%) in Nneohia village and 26(50.00%) in Amorji village. The age groups differed significantly in the rate of infection (P<0.05). overall the females were more infected 76(36.58%) than the males 76(37.44%). in Amorji village the males were more infected 41(39.81%) than the females 38(39.18%) while in Nneohia village the females were infected 38(38.00%) more than the males 35 (35.00%).Statistical analysis of the difference in the rate of infection between the villages and sexes was not significant (P>.0.050)

DISCUSSION

Intestinal parasitic infections remain an important cause of morbidity and sometimes mortality in developing countries. A growing body of evidence obtained through epidemiological surveys suggests that intestinal parasitic infections are associated with household environment and sanitation (Mahfouz *et al*., 1997). This study assessed the prevalence of gastrointestinal parasitic infection Agulu Town Anaocha Local government area, Anambra state. The results of this study revealed that gastrointestinal parasitic infections are still a public health problem in Anambra State. The overall prevalence of 38.00% recorded in this study is a pointer to the fact that intestinal parasitic infections have not drastically reduced in some parts of Anambra state. This prevalence is comparably higher than the 31.76% reported by Chukwubude *et al*., (2024) in Anambra state; 23.95% reported in Bayelsa by Gbonhinbor, (2022); 18.31% Oluwaseun and Ekesiobi (2024) in Anambra state; 34.2% recorded in north-west-Ethiopia (Gelaw *et al* .(2013); 35.2%by Aribodor *et al* ., (2025). The result of this study is lower than 63.16% recorded by Arumba *et al* (2016) in Anambra state; 57.2% by Alo *et al* ., (2013) Ebonyi state; 52.5% by Odo *et al*., (2016) in Enugu state; 75.7% in Abia state by Nwosu and Onyeabor (2014); 69.6% in Ogun state by Idowu *et al*., (2022); 72%reported by Igbodika *et al* (2014). 43.0% recorded in Imo state by Kamalu *et al*. (2013)

These difference in prevalence could be attributed to differences in geographical settings, sanitary facilities and practices,

hygiene practices and access to safe water as observed by Ekesiobi (2025); Dambie *et al*., (2021); Gupta *et al*., (2013); Nzeukwu *et al*., (2024).

Eight parasites species were identified in this study. Eight parasites species were identified in this study. This included five (5) heminths parasites and three (3) protozoan parasites included *Entamoeba histolytic* 12.75% *Ascaris lumbricoides* 12.00%; ; Hookworm 4.25%; *Gardia lamblia* 1,75%, *Trichuyris trichuiura* 2.50%; *Strongloides stercoralis,* 2.25%; *Taenia* 1.75% *and Isospora belli* 0.750%. These species significantly differed from one another ($P<0.05$) in their prevalences. The ages overalls prevalences varied significantly among the age groups ($P<0.05$) whereas the sexes did not significantly vary within the and across the villages examined ($P>0.05$). The result of this study agrees with that by Chukwubude *et al*., (2024) Idowu *et al*., (2022); Udensi *et al*., (2015); Ihejirika *et al*., (2023). These parasites transmit favourably where poor fecal disposal and open defecation as well poor hygiene status are major contributory factors. Flies particularly house flies, are capable of mechanically transmitting the infections due to the behavior and association with man and his food including fruits and vegetables. This is a very important epidemiological factor because the egg of *Ascaris lumbricoides, Trichuris trichiura,* the cysts of *Entamoeboa histolytical* and that *Gardia lamblia* can easily be spread by house flies and cockroaches from fecal materials openly deposited on soil. The present study corroborates with previous studies that recorded no significant difference in the infection rate between sexes implying that intestinal parasitic infections are not sex related. These previous studies include Balarak *et al*., (2016), Oluwaseun and Ekesiobi (2024); Igbodika *et al* (2014), Ekesiobi (2025),, Emmy-Egbe *et al., (*2012); Emmy-Egbe, I.O. (2007); Emmy-Egbe, I.O., (2013).

REFERENCES

Abiodun, M.O., Ekesiobi, A.O. And Onyenweife, L.C. (2024). Pattern Of Occurrence Of Human Intestinal Geohelminthiasis Infection In Tropical Communities' Schools Of Anambra State Nigeria. *Custech International Journal of Education,1,(1):*402-409. http://custechijoe.org.ng

Alo, M., Ugah, U. and Elom, M. (2013). Prevalence of Intestinal Parasites from the Fingers of School Children in Ohaozara, Ebonyi State, Nigeria. *American Journal of Biological, Chemical and Pharmaceutical Sciences*, *1(5):* 22 -27.

Anumba, J. U. Onyido, A. E. Eneanya, C. I. Umeaneto, P. U. Iwueze, M. O. Okafor, E. N. and Chukwuekezie, O. C. (2016). Gastro-intestinal parasites among

children in some orphanages of Anambra State, Nigeria. *Nigerian Journal of Parasitology*, *37(2)*: 135-141.

Aribodor, O. B., Jacob, E. C., Azugo, N. O., Ngenegbo, U. C., Obika, I., Obikwelu, E. M., & Nebe, O. J. (2025). Soil-transmitted helminthiasis among adolescents in Anaocha Local Government Area, Anambra State, Nigeria: Insights and recommendations for effective control. *PLOS ONE, 20(1*): e0292146.

Baird, J.K., Mistrey, M.O., Primsler, M.A. & Connor, D.H. (2002). Fatal human Ascariasis following secondary massive infection. American Journal of Tropical Medicine 1391): 314−31.

Balarak, D., Modrek, MJ, Bazrafshan, E., Ansari, H, Mostafapour, F.K. (2016). Prevalence of intestinal parasitic infection among food handlers in Northwest Iran. *Journal of Parasitology Research;* Article ID 8461965.

Chessbrough, M. (2000). District Laboratory Practice in Tropical Countries. Cambridge University Press, pp 209-211, 212, 215.

Chukwubude, C. B., Emmy-Egbe, I.O., **Ekesiobi, A.O.**, and Nwankwo, A. (2024). Association Of Intestinal Parasitic Infections With Haemorrhoid Among Adults In Anambra State Tropical Journal of Applied Natural Science, 2 (3):1-13.

Chukwubude, C. B., Emmy-Egbe, I.O., Ekesiobi, A.O., and Nwankwo, A. (2024). Distribution Pattern of intestinal parasitic infections in Anambra state. *Tropical Journal of Applied Natural Science Vol. 2 Issue 3 (2024).*

Damtie, D., Sitotaw, B., Menkir, S., Kerisew, B., & Hussien, K. (2021). Human Intestinal Parasitic Infections: Prevalence and Associated Risk Factors among Elementary School Children in Merawi Town, Northwest Ethiopia. *Journal of Parasitology Research,* 1–10.

Ekesiobi, A. O. (2025). Prevalence of Soil Transmitted Helminth Infections among School Children in Umunze, Orumba South LGA, Anambra State. IPS Journal of Basic and Clinical Medicine, 2(2): 44-50. DOI: https://doi.org/10.54117/ijbcm.v2i2.10

Emmy-Egbe, I. O., Ekwesianya, E. O., Ukaga, C. N., Eneanya, C. I. and Ajero, C. M. U. 2012. Prevalence of intestinal helminth in students of Ihiala Local Government Area of Anambra State. Journal of Applied Technology in Environmental Sanitation, 2: 23-30.

Emmy-Egbe, I. O., Ukaga, C. N., Nwoke. B. E. B., Eneanya, C. I., Ajera, C. M. U. (2012). Prevalence of Human Intestinal Helminthiasis in Njikoka Area of Anambra State, Nigeria. N*igerian Journal of Parasitology*, 33 [1]; 15-19.

Emmy-Egbe, I.O. (2007). Prevalence of Intestinal Helminthes parasite in relation to age and occupation in Ihiala, Anambra state, Nigeria. Natural and Applied Science Journal,11: 2-6.

Emmy-Egbe, I.O., (2013). Faecal disposition methods and incidence of intestinal helminth parasites among school children in Ihiala Local Gove rnment Area, Anambra State, Nigeria. International Science Journal, 4(2): 42-44.

Gbonhinbor, J., Abah, A.E and Awi-Waadu, G. (2022). Prevalence of Intestinal Parasitic

Infection and Associated Risk Factors Among Primary School-Aged Children (5 - 15 years) in Southern Nigeria. *International Journal of Infection. 9(3):e123721.*

Gelaw, A., Anagaw, B., Nigussie, B., Silesh, B., Yirga, A., Alem, M., Endris, M. and Gelaw, B. (2013). Prevalence of intestinal parasitic infections and risk factors among schoolchildren at the University of Gondar Community School, Northwest Ethiopia: a cross-sectional study. *BMC Public Health* 13:304.63. https://doi.org/10.1186/s13071-020-04449-9

Gupta, R., Rayamajhee, B., Sherchan, S.P. (2020). Prevalence of intestinal parasitosis and associated risk factors among school children of Saptari district, Nepal: a cross-sectional study. *Trop Medicine Health* 48, 73 . https://doi.org/10.1186/s41182-020-00261-4.

Idowu, O. A., Babalola, A. S., & Olapegba, T. (2022). Prevalence of soil-transmitted helminth infection among children under 2 years from urban and rural settings in Ogun state, Nigeria: Implication for control strategy. *Egyptian Pediatric Association Gazette, 70(1)*: 5.

Igbodika M.C., Ekesiobi, A.O. and Emmy-egbe, I.O. (2014). Prevalence of Intestinal Parasites among School Children in a Rural Community of Anambra State, Nigeria. *American Academic and Scholarly Research Journal. 6(4)*: 135-143.

Igbodika M.C**.,** Ekesiobi, A.O**.** and Emmy-egbe, I.O. (2014). Prevalence of Intestinal Parasites among School Children in a Rural Community of Anambra State, Nigeria. *American Academic and Scholarly Research Journal. 6(4)*: 135-143**www.aasrc.org/aasrj**.

Igbodika M.C., Ekesiobi, A.O. and Emmy-egbe, I.O. (2014). Prevalence of Intestinal Parasites among School Children in a Rural Community of Anambra State, Nigeria. *American Academic and Scholarly Research Journal. 6(4)*: 135-143.

Igbodika, M.C. and Ekesiobi, A.O. **(**2012). The role of hygiene and sanitation in the prevalence and transmission of soil-transmitted helminth parasite infection in a tropical rural community. *African Journal of Sciences 13(1)*: 3017-3026

Ihejirika, O. C., Nwaorgu, O. C., Nguma, C. J., Kenechukwu-Dozie, Q. O., Anyanwu, E.O., Uwakwe, F. E., Egbom, E. S., & Ihejirika, C. E. (2023). Prevalence and Management Strategies of Perceived Intestinal Parasitic Infections by Households in Imo State Nigeria. *African Journal of Health Sciences, 36(1),*53–63.

Kamalu, N. A., Uwakwe ,F. E. and Opara, J. A. (2013). Prevalence of Intestinal Parasite Among High School Students in Nigeria. *Academic Journal of Interdisciplinary Studies 2(7):* 9-16.

Nematian, F., Nematian, E., Gholamrezanezhad, A. and Asgari, A.A. (2014). Prevalence of intestinal parasitic infections and their relation with socio-economic factors and hygiene habits in Tehran primary school students. Acta Tropica. 92(3):179–186.

Nematian, J.C., Gholamrezanhad, A.O. & Asgari, A.A. (2004). Prevalence of intestinal parasites and their relation with socio-economic factors and hygiene habit. American Journal of Health 13(2): 171–186.

Nzeukwu, C. I., Ubaka, U. A., Okwuonu, E. S., Imakwu, C. A., Nnanna, C. E., Irikannu, K. C., Ezeamii, P. C. and Ukonze C. B. (2024). Prevalence of human intestinal helminths in Nnewi South Local

Government Area, Anambra State, Nigeria. *Nigerian Journal of Parasitolog,y 45(1) 10-20.*

Odo, G. E., Agwu, J. E., Ekeh, F. N., Ezea, C. O., Aguoru, G. C., Anya, C., Omeje, K. O. and Ubachukwu, P. O. (2016). Prevalence of intestinal parasites among school hildren in Uzo-Uwani Local Governemnt Area of Enugu State. *International Journal of Research Studies in Microbiology and Biotechnology, 2(2)*: 7-14.

Oluwaseun, A. M, Ekesiobi, A. O. and Onyenweife, L. C. (2024). Pattern of Occurrence of Human Intestinal Geohelminthiasis Infection in Tropical Communities' Schools of Anambra State, Nigeria. *Custech International Journal of Education,1(1*): 402- 409.

Oluwaseun, A. M., Ekesiobi, A. O., Olarewaju, S. O., & Akinleye, C. (2025). The Effect of Water Sanitation and Hygiene on the Occurrence of Helminthiasis Infection in Tropical Communities of Nigeria. *African Journal of Pure and Applied Sciences, 6(1):* 84–89. https://journal.ku.ac.ke/index.php/AJPAS/article/view/648

Sufiyan, M.B., Sabitu, K. and Mande, A.T. (2011). Evaluation of theeffectiveness of deworming and participatory hygiene education strategy in controlling anemia among children aged 6-15 years in Gadagau community, GiwaLGA, Kaduna, Nigeria. Annals of African Medicine10: 6-12.

Udensi, J. U., Mgbemena, I., C., Emeka-Nwabunnia, I., Ugochukwu, G. J. and Awurum, I. N. (2015). Prevalence of Intestinal Parasites among Primary School Children in Three Geopolitical Zones of Imo State, Nigeria. *Science Journal of Public Health*, *3(5)*: 25-28.

Ukoli FMA.(1981). *Introduction to Parasitology in Tropical Africa.* John Wiley and Sons, UK;

WHO (2016). Intestinal protozoa and Helminths infection. WHO Technical Report Series, 916.

WHO, (2012). *Technical Report Series-972*. Research Priorities for Helminth Infections: Technical Report of the TDR Disease Reference Group on Helminth Infections World Health Organisation; (2012).

WHO, (2013). Sustaining the drive to overcome the global impact of neglected tropical diseases: among School Children in a Tropical Rainforest Community of Southeastern Nigeria. *Journal of Animal Science Advance*, 4(8): 1004-1008.

WHO,(1991). Basic laboratory methods in medical laboratory. World Health Organization, Geneva, Pp. 110.

WHO,(2002). Report on Intestinal Helminthes Infection in World Health Organization," Technical Report Series, 789: 345-356

World Health Organization, (1991). Basic Laboratory Methods in Medical Parasitology. World Health Organization, Geneva, 1: 16-17

World Health Organization. www.who.int WHO, (2017). Progress on drinking water, sanitation and hygiene: 2017 update and SDG baselines. World Health Organization, UNICEF. Geneva. http://www. who.int

Wosu, M. I. and Onyeabor, I. A. (2014). The Prevalence of intestinal parasite Infections among School Children in a Tropical Rainforest Community of Southeastern Nigeria. *Journal of Animal Science Advance*, 4(8): 1004-1008.