

PREVALENCE OF GASTROINTESTINAL PARASITIC INFECTION AMONG PRIMARY SCHOOL PUPILS IN ABUJA MUNICIPAL AREA COUNCIL ABUJA, NIGERIA

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ABSTRACTS

A study on the prevalence of gastrointestinal parasites was carried out among pupils in some selected primary school in Abuja Municipal Area Council Abuja, Nigeria. The study was carried out among 620 pupils comprised 264 males and 356 females age 5-16 years. Single stool samples were collected from the pupils and examined for the presence of gastrointestinal parasites using the direct wet mount microscopic examination and the formol-ether concentration technique. Pre-tested questionnaire was used for collection of data on socio-demographic and personal health habits of the pupils. Chi square statistical tests were used to analyse the data. Overall prevalence of pupils examined 107 (17.2%) had the gastrointestinal parasites in their stool. The results show that females were more infected 59 (9.5%) than males 48 (7.7%). The infection rate varied according to age group, 9-12 years had the highest prevalence rate 58 (8.2%), followed by 13-16 years 42 (6.7%) and age group 5-8 years had the least prevalence 7 (1.1%). The parasites isolated are *Ascaris lumbricoide* which had the highest prevalence of 60 (9.6%), *Entamoeba histolytica* 36 (5.8%) was the second and *Schistosoma mansoni* had the least prevalence rate 11 (1.7%). The prevalence in relation to school shows that Karshi had the highest prevalence of 34 (5.5%), followed by Orozo 29 (4.7%), Jikwoyi 17 (2.7%), Gidamangoro 15 (2.4%), Azhata 7 (1.1%) and Karu had the least prevalence 5 (0.8%). The distribution of gastrointestinal parasite in relation to toilet facilities used by the pupils sampled revealed those that used pit toilet had the highest prevalence rate of 55 (8.8%), followed by pupils that used bush 28 (4.5%), those pupils that used water closet system had the least prevalence rate of 24 (3.8%). Distribution of Gastrointestinal parasites in relation to sources of drinking water by the pupils sampled. Those that used well water had the highest prevalence rate 40 (6.4%), followed by Borehole 32 (5.2%), Sachet water 28 (4.5%), Tap water 7 (1.1%), and river/stream recorded zero prevalence rate. There was no statistically significant relationship between age, sex, schools, type of toilet system and sources of drinking water and prevalence of gastrointestinal parasites infection ($p > 0.05$). This result shows that gastrointestinal parasites were prevalent in the study area. This study strongly recommended that the reduction in gastrointestinal parasites infection could be achieved by public health enlightenment campaign on its causes, mode of transmission and prevention should be promoted and strengthened. Good personal hygiene, improved environmental sanitary condition, regular deworming, regular hand washing, provision of adequate clean water will significantly reduce the burden of the infection. An integrated approach involving all stakeholders on health should be adapted by the government health policies on gastrointestinal parasites should be implemented in the area.

Key words: Gastrointestinal, Parasites, Pupils, Primary, Abuja, Schools, Municipal.

INTRODUCTION

Intestinal parasitic infection caused by helminthes and protozoan are serious public health problems in developing countries (Lwambo et al., 1999; Bethony et al., 2002; Handzel 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; Skeketee, 2003). Current estimates by World Health Organization (WHO) show that about 3.5 billion people are infected with intestinal parasites, 450 million are ill, majority of these are children (WHO, 2002).

The Gastrointestinal parasites flourish in settings characterized by warm temperature, humidity, poor sanitation, dirty water and crowded housing (Micheal et al., 2010).

Brooker et al., (2006) stated that the global prevalence of intestinal parasitic infection rate are highest in children living in Sub-sahara Africa, followed by Asia and then Latin America and Caribbean.

Common symptoms of parasitic infections include diarrhoea, abdominal pain, vomiting, weight loss, anorexia, abdominal distention, iron deficiency anaemia, lack of appetite and nausea (Workneh et al., 2014).

The public health importance of gastrointestinal parasites includes high morbidity in school age children and may have an adverse effect on growth and in women during their child bearing years (Mbanugo and Abaziri, 2002; Nematian et al., 2008).

Unavailability of clean and safe drinking water, highly populated density, inappropriate disposal of waste, noncompliance with health standards, lack of adequate washing of food substances (vegetables and fruits), and consumption of improperly cooked meat lead to high prevalence of intestinal parasites (Damen et al., 2007; Soleimnnpoor et al., 2013).

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 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).

Most of parasitological survey of common parasitic infections in Nigeria has been confined to rural villages, where poor sanitation and hygiene as well as a general ignorance of the disease, provide optimal environment for transmission (Damen et al., 2010).

In small villages of Nigeria, the parasitic disease burden on school children has been shown to be high even though many of the infections may not cause disease or mortality (Onyish and Okafor, 2005).

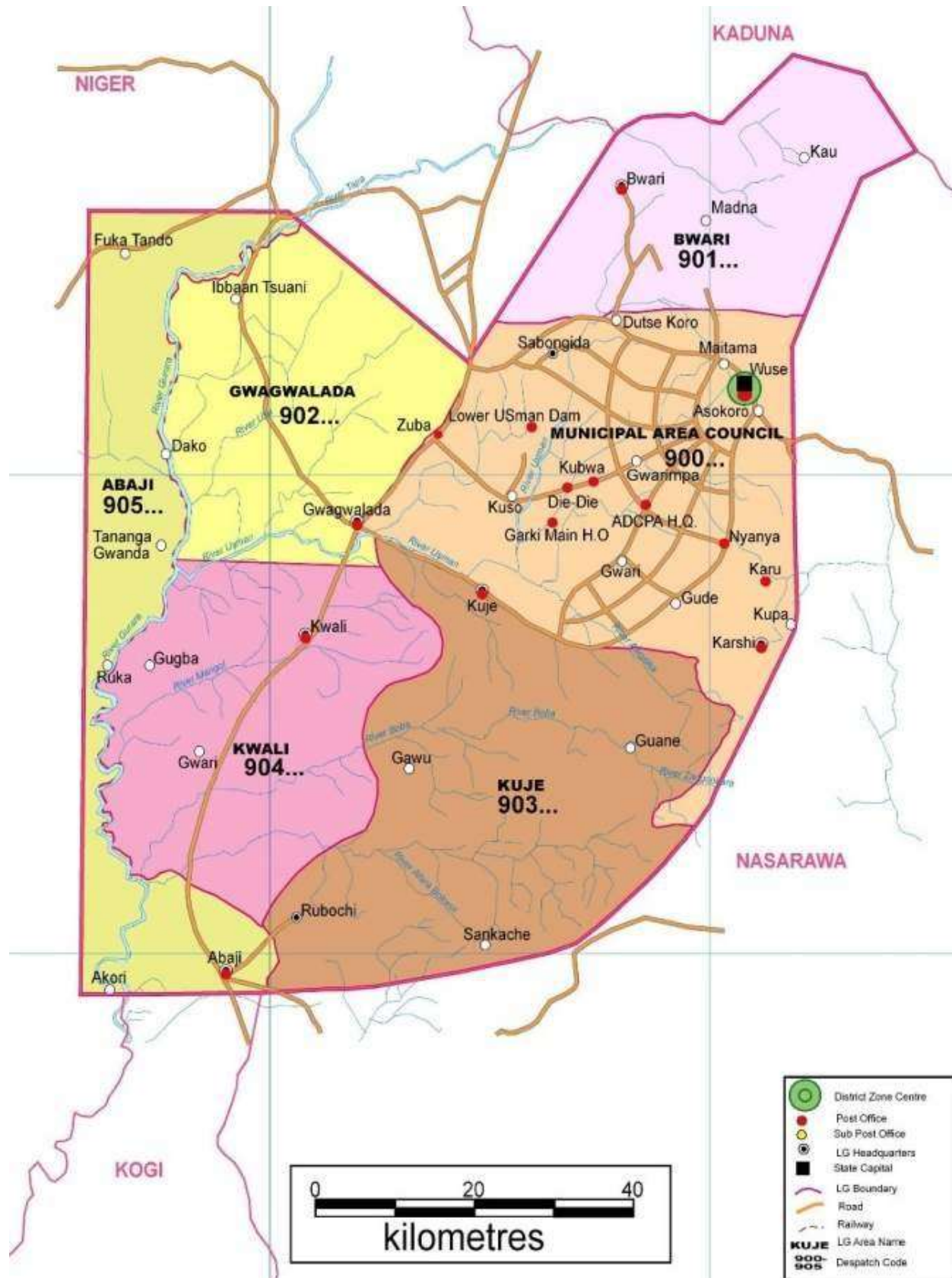
Epidemiological data often reveal the disease to be more prevalent in school aged-school and therefore this group is often targeted for control. It has estimated that school-aged children experience a considerable burden of gastrointestinal parasites which may have both immediate and long-term consequence on their health, growth and education.

Gastrointestinal parasite is a neglected disease and no study have described gastrointestinal parasite epidemiology in the study locality. Information on infection prevalence is useful to plan the prevention and control of gastrointestinal parasites and to assess progress in control programmes. This study was carried out to determine the prevalence of gastrointestinal parasitic infection among primary school pupils in Abuja Municipal Area Council, Abuja, Nigeria.

MATERIALS AND METHOD

STUDY AREA

The study area include Karu, Jikwoyi, Azhata, Gidamangoro, Orozo and Karshi all in Abuja Municipal Area Council, Abuja Federal Capital Territory Abuja. Abuja Municipal Area Council is one of the six area Council that made up of Federal Capital Territory Abuja, Nigeria. The last demographic report by the National Population Commission indicated that the population of the area Council stood at 776298. Abuja geographical coordinate are 8° 49' 40" North, 7° 33' 0" East. Commission puts the population figure of Abuja at about 1.4million with annual growth rate of 13%. The indigenous inhabitants of Abuja are the Gbagyi (Gwari), with the Gbagyi language formerly the major of the region language, and others in the area being Bassa, Gwadar, Gade, Dibo and Koro, Abuja is Nigeria Federal Capital, it covers an area of 800 square kilometres bounded to the north by Kaduna state, to the west by Niger state and on the east and south by Nassarawa and Kogi States respectively [NPC, 2006; 2015].



STUDY POPULATION. MAP OF ABUJA, SHOWING THE STUDY AREA

The study population was composed of 620 school children who were randomly selected using convenience sampling method. Two hundred and sixty four (264) males and 356 females. The ages were between 5 to 16years. This study was a cross-sectional descriptive study.

QUESTIONNAIRES

The questionnaire was designed to obtain information on the children, demographic data like age and sex. The school name and source of drinking water supply such as well, pipe borne river/stream, tap water and sachet water and type of toilet system used. Immediately after the filled questionnaires from children parent were returned, the specimens were collected from the subject by a medical laboratory scientist.

ETHICAL APPROVAL

Ethical approval for the study was obtained from Abuja Municipal Area Council Local Education Authority. Written informed consents were given by parents/guardians of the children prior to the study.

SAMPLE COLLECTION AND ANALYSIS

A total of 620 Stool sample were collected into a wide mouthed transparent, dry, clean, leak proof and disinfectant free plastic universal container about a large teaspoon or 10ml of fluid stool, one to each of the sampled children for their faecal samples. The collected samples were transported to the laboratory department of Decency Amana Medical Laboratory Karshi Abuja for analysis using the direct wet mount microscopic examination and the formol-ether concentration technique as described by [Oche and Kolhatkar, 2007; Cheesbrough, 2005; Arora and Arora, 2005]. The results were recorded, represented in tables and analyzed using simple percentages.

STATISTICAL ANALYSIS

Chi square test was used to determine the level of significant between age, gender, schools, type of toilet system and sources of drinking water. P value <0.05 was considered significant at 95% confidence interval.

RESULT

This study showed that out of the 620 pupils tested the overall prevalence of Gastrointestinal parasites was 107(17.2%). The distribution among the pupils based on gender showed that female had the highest prevalence of 59(9.5%) and male 48(7.7%), although there was no statistical significant difference between the gender (Table.1).

The distribution of Gastrointestinal parasites in relation to age showed that high prevalence of 58(8.2%) was recorded among the age group 9-12years, followed by 13-16years 42(6.7%) and 5-8years had the least prevalence 7(1.1%). The result shows that there is no statistically significant relationship between the prevalence and age group (Table.2).

Prevalence of gastrointestinal parasite found in children sampled. The prevalence of intestinal parasite among the overall children studied is 107(17.2%). The parasites isolates are *Ascaris lumbricoide* which had the highest prevalence of 60 (9.6%), *Entamoeba histolytica* 36 (5.8%) was the second and *Schistosoma mansoni* had the least prevalence rate 11(1.7%) (Table.3).

The distribution of Gastrointestinal parasites in relation to schools, showed that Karshi had the highest prevalence of 34(5.5%), followed by Orozo 29(4.7%), Jikwoyi 17(2.7%), Gidamangoro 15(2.4%), Azhata 7(1.1%) and Karu had the least prevalence 5(0.8%) there is no statistically significant relationship between the prevalence and school (Table.4).

The distribution of gastrointestinal parasite in relation to toilet facilities used by the pupils sampled. The study revealed those that used pit toilet had the highest prevalence rate of 55 (8.8%). followed slightly high in pupils that used bush 28 (4.5%), those pupils that used water closet system had the least prevalence rate of 24 (3.8%). The result showed that there is no statistically significant relationship between the prevalence and the type of toilet facility used by the pupils (Table. 5).

Distribution of Gastrointestinal parasites in relation to sources of drinking water by the pupils sampled. Those that used well water had the highest prevalence rate 40(6.4%), followed by Borehole 32(5.2%), Sachet water 28(4.5%), Tap water 7(1.1%), and river/stream recorded zero prevalent rate (Table. 6).

Table.1. Distribution of Gastrointestinal Parasites in relation to Gender

S. No	Gender	No. Examined	No. Positive	Positive (%)
1	Male	264	48	7.7
2	Female	356	59	9.5
3	Total	620	107	17.2

P -value <0.05 was considered as significant. P -value = 0.908

Table.2.Distribution of Gastrointestinal Parasites prevalence based on Age

S. No	Age	No. Examined	No. Positive	Positive (%)
1	5-8	70	7	1.1
2	9-12	448	58	8.2
3	13-16	102	42	6.7
4	Total	620	107	17.2

P -value<0.05 was considered as significant, P -value=0.000

Table.3. Prevalence of Gastrointestinal species parasites in the study area

S. No	Species	Frequency	Percentage (%)
1	<i>Ascaris lumbricoide</i>	60	9.6
2	<i>Entamoeba histolytica</i>	36	5.8
3	<i>Schistosoma mansoni</i>	11	1.7
Total		107	17.2

Table.4.Prevalence of Intestinal Parasites in relation to school/location

S. No	Name of School /Location	No. Examined	No. Positive	Positive (%)
1	Karu	100	5	0.8
2	Jikwoyi	120	17	2.7
3	Azhata	90	7	1.1
4	Gidamangoro	80	15	2.4
5	Orozo	130	29	4.7
6	Karshi	100	34	5.5
7	Total	620	107	17.2

P -value<0.05 was considered as significant, P -value=0.000

Table.5. Distribution of Gastrointestinal Parasites based on the Type of Toilet System Used

S. No	Type of Toilet Used	No. Examined	No. Positive	Positive (%)
1	Pit Toilet	161	55	8.8
2	Water System	370	24	3.8
3	Bush Toilet	89	28	4.5
4	Total	620	107	17.2

P -value<0.05 was considered as significant, P -value=0.000

Table.4.Distribution of Gastrointestinal Parasites according to source of drinking water

S. No	Source of Drinking Water	No. Examined	No. Positive	Positive (%)
1	Tap(Pipe borne)	20	7	1.1
2	Borehole	130	32	5.2
3	Well	80	40	6.4
4	Sachet water	390	28	4.5
5	Rivers/Stream	0	0	0.0
6	Total	620	107	17.2

P-value<0.05 was considered as significant. P-value=0.000

DISCUSSION

This findings revealed that out of the 620 pupils tested 107(17.2%) where positive for gastrointestinal parasites infection.The prevalence of 17.2% in this study was lower than the 58.5% reported by Houmsou et al.,(2009) among primary school children in Makurdi,Benue State,Nigeria,32.8% reported by Agbo et al.,2019 among children in selected primary schools in Katsina-AlaLocal Government Area of Benue State.52.5% reported by Odo et al.,(2016) among school children in Uzo-Uwani Enugu State,24.8% reported by Micheal et al.,(2017) among school children in PortHarcourt City Local Government Area,Nigeria50.4% reported by Adeeba and Akinlabi,(2002) among primary school children in South West,Nigeria.This report is also lower 22.2% in Northern districts of West Bank Palestine reported by Hussein,(2011).

The lower percentage rate of infection recorded in this study could be due to a combination of factors such as increased awareness of environmental and personal hygiene; and due to no river waters as sources of drinking water around the area.

The prevalence of the infection with respect to gender was found high in females 59(9.5%) than the males 48(7.7%). However, there was no statistically significant difference between the sexes ($p > 0.05$). This finding is consistent with the finding of Udensi et al., (2015) and Agbo et al., (2019) that reported more females than males. This report disagreed with Micheal et al., (2017) and Biu et al., (2012) who reported that intestinal parasites were significantly higher in males than females, this shows that sex is not a risk factor.

In relation to age high prevalence of 58(8.2%) was recorded among age group of 9-12 years, followed by 13-16 years 42(6.7%) while those between 5-8 years had the least of 7(1.1%). This finding agreed with Agbo et al., (2019) who reported highest prevalence age group 8-12 years and Odo et al., (2016) reported 8-10 years and Odu et al., (2013) who reported that intestinal parasites were not age dependent. However, this disagreed with Akingbade et al., (2013) who reported higher prevalence in age group 4-5 years. Although, no statistically significant difference was observed between age group $p > 0.05$.

This study shows that the distribution of the gastrointestinal parasites recovered in the study are *Ascaris lumbricoide*, *Entamoeba histolytica* and *Schistosoma mansoni* having a prevalence of 9.6%, 5.8% and 1.7% respectively. *Ascaris lumbricoide* had the highest prevalence, followed by *Entamoeba histolytica* and *Schistosoma mansoni* had the least. The predominance of *Ascaris lumbricoide* in this study is in consonance with the report of Eneanya and Anikwue (2005), Onyeniran et al., (2014) in Osogbo, Nigeria, Agwu, (2001) in Aba Urban city Abia STATE AND Emmy-Igbe et al., (2011) in Ihiala Anambra State and Mordi and Paul, (2007) in Edo State. This disagreed with Eleni et al., (2014) in Wukro Town, Eastern Ethiopia, Padmaja et al., (2014) in India, Odo et al., (2016); Agbo et al., (2019) who reported *Entamoeba histolytica* as the most prevalent parasites.

Distribution of the intestinal parasites in relation to schools shows that Karshi had the highest prevalence rate 34(5.5%), followed by Orozo 29(4.7%), Jikwoyi 17(2.7%), Gidamangoro 15(2.4%), Azhata 7(1.1%) and Karu had the least prevalence 5(0.8%). There is no statistically significant relationship between the prevalence and school.

The study reveals that those pupils that used water closet system had the least prevalence of 24(3.8%), followed by those used bush toilet 28(4.5%) while the highest were among those used pit toilet 55(8.8%). This agreed with Bigwan et al., (2012) who reported in Jos. Also, disagreed with Amaechi et al., (2013) reported high prevalence among those who defecated in bush.

The distribution in relation to sources of drinking water shows that high infection rate recorded on well 40(6.4%), followed by borehole 32(5.2%), sachet water 28(4.5%), tap(pipe borne) 7(1.1%), Rivers/stream had zero prevalence. This agreed with Agbo et al., (2019) who reported high prevalence among children whose sources of water is from well. This disagreed with Micheal et al., (2017) who reported high prevalence from stream water.

CONCLUSION

This study showed that gastrointestinal parasitic infection are prevalent among school children in Abuja Municipal Area Council. Therefore, it is recommended the reduction in gastrointestinal parasites infection could be achieved by public health enlightenment campaign on its causes and prevention should be promoted and strengthened. Provision of clean portable drinking water, regular deworming, regular hand washing, good personal and environmental hygiene will significantly reduce the burden of the infection. An integrated approach involving all stakeholders on health should be adapted by the government health policies on gastrointestinal parasites should be implemented in the area.

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REFERENCE

Adeyeba O.A and Akinlabi A.M. 2002. Intestinal Parasitic Infections Among School Children in a Rural Community, South West Nigeria, Nigerian Journal of Parasitology, 23: 11-18.

- Agbo O. J , H. I. J. Agere, B. M. Dawuda, T. D. Agatsa and Alfred A.A.2019.Prevalence of Intestinal Parasites among Children IN Selected PRIMARY Schools in Katsina –Ala Local Government Area of Benue.FUW trends in Science and Technology Journal,4(2):478-482.
- Agwu N.A.2001. Incidence of Intestinal Helminths in School Children in Aba urban city, Abia State, Nigeria”. International Journal of Environmental Health and Human Development, 2:47-52.
- Akingbade O, Akinjinmi A, Ezechukwu U, Okerentugba P. and Okonkwo I .2013. Prevalence of intestinal parasites among children with diarrhoea in Abeokuta, Ogun state, Nigeria. *Researcher*, 5(9): 66-73.
- Amaechi, E.C, Ohaeri, C. C , Ukpai, O. M.2013.Prevalence of Helminthiasis among school children in some rural communities of Abia State,Nigeria. *Animal Research International*, 10(3): 1817 – 1825.
- Arora, D.R.and Arora, B. 2009.Medical Parasitology 2nd edition. CBS Publishers and Distributor. New Delhi, India,: 217 – 221.
- Bethony J, Chen J, Lin S, Xiano S, Zhan B, et al.2002. Emerging pattern of hookworm infection:Influence of aging on the intensity of Nectar infection in Hainan Province,Peoples Republic of China.Clinical Infection Disease,35:13361344
- Bigwan I. Emmanuel, Okezie C. Gabriel, Sheyin Z. 2012. Prevalence of gastrointestinal parasitic in a secondary health facility in dadin kowa community, jos metropolis, central Nigeria. *International journal of current reserch*,4(7):092-095,.
- Biu, A. A., Kyari, F. and John, W. M. 2012. Prevalence of intestinal parasites in school aged pupils in Mafa Local Government Area of Borno State, Nigeria. *Journal of Medicine and Applied Biosciences*,4:54 – 55.
- Brooker, S., Clement, A. C. and Bundy, D. A. 2006. Global epidemiology, ecology and control of soil- transmitted helminth infections. *Advance in Parasitology*, 62: 221 – 261.
- Cheesbrough Monica. 2005. Parasitology section. District Laboratory Practice in Tropical Countries part (1).Cambridge University Press,: 191-218.
- Damen J.G, Banwat E.B, Egah D.Z, Allanana J.A .2007. Parasitic contamination of vegetables in Jos, Nigeria. *Ann Afr Med* 6: 115-118
- Damen, J. G., Lar, P., Mbaawuga, E. M. and Nyary, B. W.2010. A comparative study on the prevalence of intestinal helminthes in de-wormed and non-dewormed students in rural area of North-central Nigeria. *Laboratory Medicine*, 41: 585 – 589.
- Eleni, K., Sissay, M., Ameha, K. and Mulugeta, D. 2014. Prevalence of intestinal parasitic infections and their association with anthropometric measurements of school children in selected primary schools, Wukro Town, Eastern Tigray, Ethiopia. *International Journal of Current Microbiology and Applied Sciences*, 52: 43 - 48.
- Emmy-Igbe I.O, E. O. Ekwesianya, C. N. Ukaga, C. I. Eneanyi, and C. M. Ajaero C.M. 2011. Prevalence of Intestinal helminths in Students of Ihiala L. G. A of Anambra State”. *Parasitology*, 3:247-249.
- Eneanya C.I and Anikwue C.2005.A school based intestinal helminthiasis programme in Nigeria:Perceptions,attitude and acceptibility to communit members.*Nigeria Journal of parasitology*.26:55-60.
- Handzel T, Karanja DM, Addiss DG, Hightower AW, Rosen DH, et al. 2003.Geographic distribution of schistosomiasis and soil transmitted helminths in Western Kenya: Implication for anthelminthic mass treatment. *Am J Trop Med Hyg* 69: 318323?
- Houmsou R, E Amuta and Olusi T.2009. *Prevalence of intestinal parasites among primary school children in Makurdi, Benue State-Nigeria*. The Internet Journal of Infectious Diseases. 8:1.
- Hussein A .2011. Prevalence of intestinal parasites among school children in northern districts of West Bank- Palestine. *Tropical and International Health*, 16(2): 240- 24.
- Lwambo NJ, Siza JE, Brooker S, Bundy DA, Guyatt H.1999 Patterns of concurrent hookworm infection and schistosomiasis in school children in Tanzania. *Trans R Soc Trop Med Hyg*, 93: 497-502.
- Mbanugo J.I, and Abaziri.O.C.2002.A Comparative Study of Intestinal Infection of Pregnant and Non-Pregnant Woman in Nkpor, Anambra State, Nigeria,” *Nigeria Journal of Parasitology*, 23: 19-26.

- Michael, O. H., John, H. and Pierol, O. 2010. Epidemiology and control of human gastrointestinal parasites in children. *National Library of Medicine and National Institute of Health*, 8: 219 – 234.
- Michael Emmanuel I, Austin Abah and Peace Marcus.2017.Prevalence of Gastro-Intestinal Parasitic Infection among School Children in Port Harcourt City Local Government Area, Nigeria.*Journal of Bacteriology and Parasitology* 8(5):323.
- Mehraj VJ, Hatcher S, Akhtar G & Rafique MA, 2008. Prevalence and Factors Associated with Intestinal Parasitic Infections Among School Children in an Urban Slum of Karachi.
- Mordi R.M and Paul O. 2007. A Study of Blood and Gastro- intestinal Parasites in Edo State,” *African Journal of Biochemistry*, 6: 2201-2207.
- National Population Census. 2015. Projected population, 2015–2020. Abuja:National Population Commission Office.
- National Population Commission 2006.[population.gov.ng/coreactivities/surveys/dataset/2006-phc-priority-tables/\(port](http://population.gov.ng/coreactivities/surveys/dataset/2006-phc-priority-tables/(port)
- Nematian JA, Gholamrezanezhad E & Nematian G. 2008. Giardiasis and other intestinal parasitic infections in relation to anthropometric indicators of malnutrition: A large, population-based survey of school children in Tehran. *Ann Trop. Med. Parasitol.*, 102(3): 209 – 214.
- Ochei J and Kolhatkar. A. 2007. Parasitology section.*Medical Laboratory Science Theory and Practice*, 1st edition, Tats McGraw-Hill. New York. :918-949.
- Odo G.E , J.E Agwu, F.N Ekeh C.O Ezea, Aguoru G.C, Anya C, Omeje, K.O, Ubachukwu P.O.2016.Prevalence of Intestinal Parasites among School Children in Uzo- Uwani Local Government Area of Enugu State.*International Journal of Research Studies in Microbiology and Biotechnology*,2(2): 7-14.
- Odu N, Elechi V and Okonko I .2013. Prevalence of intestinal helminthes infection among primary school in urban and semi- urban area in Port-Harcourt, Rivers State, Nigeria. *World Rural Observation*, 5(1): 52-61.
- Okon O.E and Oku E.E. 2001. Prevalence of intestinal parasites among school children in two contrasting communities in Cross-River State, Nigeria. *Nigerian Journal of Parasitology*, 22(1&2): 115-120.
- Onyeniran O. A., Ogurongbe O., Oladipo, E. K., Afolabi, A. Y. and Ajayi, O. O.2014. Intestinal parasitic infection among primary school pupils in Osogbo, Nigeria. *Journal of Dental and Medical Sciences*, 13: 96, -,101.
- Onyishi G. C and Okafor F. C. 2005. Helminth Parasitic diseases status of school children within the Anambra river basin irrigation project area. *Biological Research Doirnal* 3(1): 93 - 98.
- Padmaja, N, Sai swaroop, P. and Nageswararao, P. 2014. Prevalence of intestinal parasitic infections among school children in and around Amalapuram. *Journal of Public Health and Medical Research*, 2(2): 36 - 38.
- Steketee R.W .2003. Pregnancy, Nutrition and Parasitic Disease America Society for Nutrition Sciences, pp. 1661 – 1667.
- Soleimnanpoor H, Zohor A, Ebrahimzadeh A, Biranvand L, Dabirzadeh M.(2013).The survey of parasitic contamination of vegetables in Zabol city during 2011-2012. *Zabol Uni Med Sci* 3: 40-47.
- Udensi Justina Ugochi, Mgbemena Ifenyinwa C., Emeka-Nwabunnia Ijeoma, Ugochukwu Mmasi Godson, Awurum Ivy Nwaku.2015. Prevalence of Intestinal Parasites Among Primary School Children in Three Geopolitical Zones of Imo State, Nigeria. *Science Journal of Public Health*. Special Issue: Who Is Afraid of the Microbes. 3(5-1):25-28. doi:10.11648/j.sjph.s.2015030501.15(2015;3(5-1):25-28)
- WHO.2002. Report on Intestinal Helminths Infection in World Health Organization, Technical Report Series: , vol. 789: 345-356.
- Workneh T, Esmael A and Ayichiluhm. M.2014. Prevalence of intestinal parasitic infections and associated factors among Debre Elias primary school children, East Gojjam Zone, Amhara Region, North West Ethiopia. *J. Bacteriol. and Parasitol.*, 5: 181.