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Research Paper

Assessment of Polyparasitism and Impact of Treatment in Lafia Community of Nasarawa State, Nigeria

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ABSTRACT
Polyparasitism is defined as the concurrent presence of different parasitic species in a single host and is a term that is generally associated with the high prevalence and overlapping endermicity of parasitic infections among certain communities, especially in developing countries. Polyparasitism with intestinal parasites and schistosomiasis now globally recognized to be a phenomenon in which a single individual is infected with multiple concomitant parasitic species at a given time with each species exerting its clinical or physiological manifestations concurrently. This cross-sectional study aimed to investigate the current prevalence, dynamics of intestinal parasite infection, impacts of treatment and drugs administration among some communities in Lafia of Nasarawa State, Nigeria. Stool specimen were examined for intestinal parasites, using direct smear, formalin-ether sedimentation and floation techniques. Demographic, socio-economic, environmental and personal hygiene information was collected by using pretested questionnaire. Overall, the result shows moderate prevalence intestinal parasites infection with an infection rate of 80(10.33%). The most prevalent intestinal helminthes specie was Taenia signata 27 (11.89%), followed by Entaemoeba hystolytica 22(18.64), Girdia lamblia 17(10.49%) and hookworm 14 (5.24%). However, there was significant association between the prevalence of species-specific of the intestinal parasites and the participants (P<0.05). More females 54 (54.88%) were infected than male 41(43.15%). There was statistical different in the prevalence of intestinal parasites in relation to gender (P<0.05). The highest-infection rate, 34(34.78%) was observed in age 3 – 5, followed by the least infection rate in age group 13 and above, there was statistical difference between intestinal parasites infections in relation to age (P<0.05). There was also significant difference between the respondents response on the risk factors of intestinal parasitic infection (x2 = 0.119, df 2, p=0.021). This study conclude that the high prevalence rate of intestinal parasites among participants within, the study area significantly affects children because it affects their academic performance and over all wellbeing. The study recommend increased access to health care facilities for early diagnosis and treatment.

***Keyword**: Infection, infestation, Polyparasitism, Prevalence, Lafia, Treatment.*

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I. INTRODUCTION

Polyparasitism is defined as the concurrent presence of different parasitic species in a single host and is a term that is generally associated with the high prevalence and overlapping endermicity of parasitic infections among certain communities, especially in developing countries (Steinmann *et al.,* 2008, Bhattacharya *et al.,* 2010). Multiple parasitic infections is usually ignored in epidemiological surveys and the findings are presented mostly on a per species basis (Cox, 2001). However, previous study have highlighted the public health burden of polyparasitism; clinical entities in the developing countries have demonstrated that even light or mild infections with multiple parasites result in significant morbidity and increased nutritional and organism pathology (Ezeamama *et al,* 2008, Pullan, and Booker, 2007).

Recent studies have revealed that polyparasitism may increase the severity of some diseases as well as the hosts susceptibility to other infections by driving immune response towards non-protective, non-cytophillic anti body formation (Druilhe *et al.,* 2005 and Dogarege *et al.,* 2016). Moreover, multiple parasites has been reported to be associated with chronic infections, especially in children who suffer difficulties in physical growth, physical fitness, cognition, school attendance and performance and micronutrient statue (Iron and Vitamin A) (King, 2006 Ahmed *et al.,* 2012).

Intestinal parasitic infections (IPI) are still public health problems in many communities, particularly among children in rural areas of developing countries. It is estimated that more than 2 billion people worldwide are infected with IPI and more than half of the world's population are at risk of infection (WHO, 2002; Hotez, *et al.,* 2009). These infections are caused by helminth parasites such as soil-transmitted helminths (*Ascaris lumbricoides*, *Trichuris trichiura*, *Strongyloides stercoralis*, and hookworm, *Taenia spp*. and *Hymenolepis nana*) or by protozoa such as *Entamoeba histolytica*, *Giardia duodenalis*, and *Cryptosporidium spp*.

IPI are associated with high morbidity particularly among young children and women of childbearing age, and have been termed as 'the cancers of developing nations' by Haque *et al.* (2003). IPI can occur in silence as chronic infections and infected individuals are either asymptomatic or suffering from mild diseases. However, acute and severe IPI, especially with pathogenic *Entamoeba* and *Giardia*, may cause fatal diarrhea especially among children and both are commonly associated with travelers' diarrhea (Haque *et al.,* 2003, Faustini *et al.,* 2006). Moreover, *Entamoeba* can cause invasive intestinal infection or disseminate to the liver (and rarely to the lung and the brain) causing amebic liver abscess with about 100,000 deaths annually, making amebiasis the second leading cause of death from protozoal diseases, after malaria (Petri *et al,* 2000, Stranley, 2003). On the other hand, opportunistic IPI such as *Cryptosporidium*, *Isospora belli*, Microsporidia, and *Strongyloides* infections are commonly reported among immunocompromised individuals with significant morbidity and mortality (Karp and Auwaerter, 2007).

Schistosome species infect an estimated 200 million people worldwide, causing severe morbidity in several million (WHO, 2008). Each year, due to *Schistosoma haematobium* infection, 70 million people suffer from haematuria, 18 million from bladder wall pathology, 10 million from hydronephrosis, and 150,000 people die from kidney failure (Vander Werf *et al*., 2003). Eight-five percent of schistosomiasis cases occur in Africa (Chitsulo, *et al.,* 2000). *Wuchereria bancrofti,* the parasite responsible for 90 percent of the world's lymphatic filariasis cases, infects 120 million people in various parts of the world, 40 million of whom suffer incapacitating, disfiguring, and stigmatizing morbidity. One third of those affected reside in Africa.

II. Aim and Objectives

The main aim of this study is to investigate prevalence, rate and influence of treatment of polyparasitism in Lafia community of Nasarawa State. To this end however, the specific objective of the study are;

The objectives are:

1. To determine the prevalence and intensity of intestinal parasitic infections.
2. To determine the effectiveness of mass drugs administration for the community

Justification of Study

Studies on the level of poly-parasitism will help predict the level of infection with intestinal helminths and urinary schistosomiasis (Uneke *et al.,* 2009). Majority of research on polyparasitism and related morbidity focuses on single species infections. To date, there are no estimate for the entire population, on global burden of diseases due to intestinal parasitic infection caused by helminthes and intestinal protozoa (Hotez *et al.,* 2009 and Pullan *et al*., 2014).

The true importance of polyparasitism as a public health problem is unrecognized in this areas either because of defective data collection or insufficient recognition at the community level of morbidity due to the diseases. Many studies also pointed out that a lot of work can still be done to discover new endemic areas and to harness the predictive potentials of polyparasites indicator.

The research on polyparasitism allows the identification of common risk factors for multiple infections that could help stream line prevention and control efforts. Similarly, concrete example of the effects of multiple infections on health outcomes might help to motivate intervention. Due to great burden of disease imposed by parasites in tropical locations, determining the most effective ways of intervention has the potential to preserve the health of thousands of individuals. Accordingly, the research will contribute additional knowledge towards these important goals. This study also attempts to provide base line data on rural and urban communities and environs where there is information available in Nigeria and will help in the plan for control.

Research Questions

The following research questions are raised to guide the researcher in the course of study.

1. What is the prevalence rate of types of intestinal parasites infection among the community members
2. What is the age specific prevalence of intestinal infection among the population.
3. What is the gender specific prevalence of intestinal parasite among the community members of Lafia LGA of Nasarawa State.
4. What are risk factors of intestinal parasite infection among the community of Lafia LGA Nasarawa State .
5. What are the possible ways of prevention and control of intestinal helminth infections among the population of Lafia community of Nasarawa State.

Research Hypothesis
The following hypothesis are being formulated to guide the research in the course of this study;

i. Ho: There is no significant effect on the prevalence rate of specific intestinal helminthes parasite among the population of Lafia community of Nasarawa State
ii. Ho: There is no significant effect on the age and gender specific prevalence of intestinal helminthes infection on this community.
iii. Ho: There is no significant effect on the risks factors of intestinal parasites infection among the community of Lafia LGA of Nasarawa State.

III. LITERATURE REVIEW

There has been a general renaissance in the epidemiological investigation of polyparasitism, with a particular focus on multiple helminth species (Nacher *et al.,* 2001) and more recently, on Plasmodium and helminth co-infection (Brooker *et al.,* 2007).

Interactions between parasites in humans can be synergistic or antagonistic (Ezeamama, *et al*., 2008). Studies have demonstrated a positive association between intensity and concurrent infection of helminth species, suggesting that individuals harbouring multiple helminth species also harbour the most intense infections (Ezeamama, *et al*., 2008).

Morbidities are also likely to be compounded in people harbouring multiple parasites. For example, co-infections with helminthes and Plasmodium species have been shown to increase negative health effects, including organomegaly (Pullan and Brooker (2008), low birth weight (Nacher, *et al.,* 2001) and anemia (Muhangi, *et al.,* 2007) as compared to single infections. The morbidity associated with coinfection is also likely to depend on parasite load (Hillier, *et al.,* 2008) as is seen in single species Plasmodium infections and *Schistosoma haematobium* (*S. haematobium*) infections (Brooker, *et al.,* 2007).

Helminth infections (e.g soil-transmitted helminths, *Schistosoma mansoni* and *Schistosoma haematobium*) are rarely fatal, but cause long term chronic morbidity (King, *et al.*, 2005; Knopp, *et al.,* 2012). This may include anaemia due to blood loss from intestinal or urinary tract bleeding, iron-deficiency linked to nutritional impairment such as malabsorption and other digestive disorders like diarrhea (WHO, 2011). Nutritional impairment and competition for nutrients with intestinal parasites further affect the nutritional status leading to malnutrition and impaired child growth (Stephenson *et al.,* 2000). *Schistosomia spp* infections may cause tissue damage, and hence have been associated with organ pathology mainly driven by migrating parasite eggs in the human body.

To date, most research on parasitic disease-related morbidity focused on single species infections, whilst the health impact due to polyparasitism remains poorly understood (Steinmann, *et al.,* 2010). For countries where polyparasitism is still widespread (Keiser, *et al*., 2002; Coulbaly, *et al.,* 2012), a deeper mechanistic understanding of multiple species parasite infections is crucial for disease control and the reduction of the burden due to these (co-) infections. Findings from recent studies in different parts of the world are conflicting. For instance while some studies reported a higher frequency of anaemia in individuals co-infected with Plasmodium and helminths, other studies found high anaemia rates in individuals with single species P. falciparum infections (Brooker, *et al.,* 2007; Naing, *et al*. 2013). Intensity of infection plays an important role in shaping morbidity patterns (Ezeamama, *et al.,* 2008) showed strong additive or even multiplicative effects on anaemia in children with high intensity hookworm and *Schistosoma japonicum* co-infections in the Philippine. In another study carried out in Senegal, light-intensity infections of *S. haematobium* were associated (Briand, *et al.,* 2005; Florey, *et al.,* 2012). Thus, associations and possible inhibitory or favouring mechanisms between different parasite species are of considerable interest and new research is needed to shed additional light on these issues.

Health effects from multiple species infections are complex due to associations between parasites and possible synergism/antagonism on disease outcome. Additionally, associations are further complicated due to a diversity of proximal and distal risk factors (e.g socioeconomic status and poor nutrition), as well as demographic, exposure and immunological factors.

Intestinal parasitic infections are among the most prevalent infections in humans in low- and middle-income countries. They can be largely categorized into two groups, i.e. helminthic and protozoan infections. Intestinal parasitic infections can cause significant morbidity. Especially children—who are generally more prone to heavy worm burdens—suffer from the sequelae of intestinal parasitic infections, such as diarrhea, malabsorption and anemia (Guerrant, *et al.,* 2008). The most important intestinal helminths, both in terms of abundance and disease burden, are soil-transmitted helminths (STHs) such as hookworms, *Ascaris lumbricoides, and Trichuris trichiura* (Hotez and Kamath, 2009). It is estimated that STHs infect more than two billion people or more than a third of the world's population (Bethony, *et al.,* 2006). Also, the *Schistosoma spp*. blood flukes are of great public health importance, with more than 250 million people infected worldwide (Colley, *et al.,* 2014) and an estimated global disease burden of 4.0 million disability-adjusted life years (DALYs) (WHO 2016).

The diagnosis of intestinal parasites typically relies on the microscopic detection of egg, larval, trophozoite, cyst, and/or oocyst life stages in human feces samples (Garcia, 2007). The sensitivity of stool microscopy is generally low, and for a reliable diagnosis it is important to choose the appropriate microscopic technique (van Lieshout and Roestenberg, 2015). For example, relatively simple techniques such as the direct smear are known to detect high *A. lumbricoides* loads while underestimating the presence of other helminths such as *Schistosoma mansoni* (van Lieshout and Yazdanbakhsh, 2013). Ideally, the technique with the highest diagnostic accuracy for the parasite of interest should be selected. In practice however, this is difficult to achieve since many different parasite species may occur in a given population, or even in a single individual, and resources are generally limited in countries where most of these infections are endemic, so not all appropriate microscopic techniques can be used.

IV. RESEARCH METHODOLOGY

Study Area

This study was carried out in Lafia community of Nasarawa State, Nigeria. It is located in the north central of Nigeria. The climate of the area is tropical and the vegetation is predominately guinea savannah with an annual rainfall of 1,090cm. there are two distinct seasons, the rainy season and the dry season; the former last from April to October and latter from to March. The minimum temperature range of 27ºC – 28ºC and maximum of 32ºC – 36ºC. The population of Lafia is estimated to be 950, 808. Lafia being in the guinea savannah is typified by vary high temperature and low rainfall.

Research Ethics and Permission

A detailed explanation of the purpose, nature and all the processes involved in the study was made to the heads of the participating households. They were informed that their participation along with their families members was voluntary; they were free to decline from participating or withdraw from partaking at any stage of the research, and their identities would not be disclosed to anyone. Also, the permission for this study was approved by the Nasarawa State Ministry of Health. The approval was on the agreement that participants anonymity must be maintained, good laboratory practices/quality control ensured, and every findings was treated with utmost confidentiality and for purpose of this research only.

Research Design

The research design used for this study is the survey research design. Survey research design involves the selection of sample from a target population Backshon (2001) and the study of theses samples to discover relative incidences, distribution and interrelations of variable. This is design is appropriate determine the prevalence of intestinal parasite to determine the prevalence of intestinal parasites in a different population at a specific point. In time, the study involves collection and analysis of stool sample in selected household to identify the presence of intestinal parasite using sedimentation, direct mean and floating method.

Parasitological Examination of Feacal Sample
Two methods were used in the examination and identification of these parasites.
A total of 300 stool samples were randomly collected in a clean bottle from the participants in the study area of Lafia. The age and gender of participant were be recorded.

1. Direct Wet Mount for preliminary investigation and detection of heavy infection (intensity):- The direct wet mount techniques involved placing a drop of fresh physiological saline at the centre of a clean grease-free glass slide. With the aid of applicator stick, little amount of the fecal specimen would be picked and placed on the saline preparation. It was be emulsified thoroughly removing any debris. The entire preparation was then covered with cover-slip taking care that no air bubbles would be trapped. The preparation was observed under x 10 objective and x 40 objective.
2. Concentration method for the confirmation of eggs and larvae in light infection:- The Formol-Ether concentration method was also employed to increase the probability of finding the parasites in fecal samples. One gram of faeces was suspended in 10ml of 10% formol-saline solution and mixed with a glass rod. The suspension was passed through a funnel covered with a wire gauze pad into a centrifuge tube. Then 3ml of ether was added and the suspension was mixed for 1min. The tubes was centrifuged for 2 minutes at 1000rpm by 800 – B Electronic Centrification, after which the supernatant was discarded and the sediment examined for ova or larvae. After mixing the sediment with the aid of a Pasteur pipette, a drop was placed on a glass slide. The deposit was then examine using x10 and x40 objectives.

Identification of Parasites
The parasites were identified and classified in respect to their morphology through parasitological manual of (Cheesbrough, 2006).

Method of Data Analysis
The data collected in this study was analysis using simple percentages and chi square that is, demographical characteristics of the respondents were analysed using percentages. The response collected from the respondents on the research problem was analysed using chi-square to test hypothesis, statistical significance was set at P<0 level of significance.

V. RESULT

The sample size was determined using a formula based on the estimated prevalence of intestinal parasites in similar populations. A total of 300 participants were randomly selected from different communities in the study area of Lafia Local Government of Nasarawa State. These communities were chosen based on the size, accountability and willingness to participate in the study. The sample population for this study will be (300) respondents selected from the five (5) community under the target area of the study. They include;

Table 1: Sample Population

S/No	Communities	Samples	Percentage (%)
1	Ciroma	72 both	24
2	Tudun Gwndara	66	22
3	Tudun Kori	62	20.66
4	Shabu	53	17.66
5	Kwandere	42	15.6
Total		300	32.8

The table 2 below is the prevalence of specific of multiple intestinal parasite among the communities population in Lafia LGA. The overall frequency of 774 intestinal parasites were observed at the positive rate of 80(10.33%). The highest number of intestinal parasite observed was *Taenia Signata* 27(4.88%), followed by *Entamoaba histolytica* 22(18.64%), *Girdia Lamblia* 17(10.49%) and Hook worm 19 (5.24%). There was significant association between the prevalence of species-specific of parasite in the population.

Table 2: Prevalence of specific of intestinal parasite among com in Lafia community

Types of parasite found	Frequency	No. of positive (%)	Chi-square	Df	p-value
Entamoeba histolytica	118	22(18.64)			
Taenia signata	227	27(11.89)			
Girdia lamblis	162	17(10.49)	0.00a	1	0.000
Hook worm	267	14(5.24)			
Total	774	80(10.33)			

Table 3 shows the prevalence and multiple intestinal parasites among the communities of Lafia LGA in relation to age specification. Out of the 95 (31.66%) infected populations, the highest infected age group was age 3 – 5 with 34 (35.78%) followed by 6 – 8 with 26 (27.36%) age 9 – 12 with 22 (23.15%) and age 13 and above with 13(13.68%). However, there was a deference between the multiple intestinal parasite in relation to age group (P<0.05).

Table 3: Prevalence of multiple parasites among age specification

Age	Infested (%)	Non infected (%)
3 – 5	34(35.78)	66(32.19)
6 – 8	26(27.36)	62(30.24)
9 – 12	22(25.15)	61(29.75)
13 and above	13(13.68)	16(7.80)
Total	95(31.66)	5(68.33)

Table 4 below shows the prevalence of intestinal parasites among the population of communities in relation to sex in Lafia LGA. Out of 95(31.66%) infected population, the highest prevalence were females with 54(54.88%), while 4 (43.15%) were male with the least infection rate. There was statistical difference in the prevalence of intestinal parasite infection in relation to sex (P<0.05).

Table 4: Prevalence of intestinal parasite among the communities in relation to sex

Gender (sex)	Infected (%)	Non infected (%)	Chi-square	Df	p-value
Male	41(43.15)	82(40)			
Female	54(54.88)	123(60)	0.00a	1	0.000
Total	95(31.66%)	205(68.33)			

Table 5, below shows the respondents response on the risk factors of multiple intestinal parasites among the communities of Lafia LGA. A total number of 205 (97.01%) has yes while 95 (95.77%) has a No. 25(12.19%) of the population use borehole as a source of drinking water, while 23(11.21%) use well as source of drinking water, 21(10.24%) of the communities use pit latrines, while 20(7.75%) defecate openly in bushes 16(7.80%) do not wash hand before eating while 15(6.82%) do wash fruits or vegetables before eating, 13 (6.34%) walk bare footed within the community. However, there was significant differences between the respondents response on the risk factors of multiple intestinal parasites infection (X^2 0.106, df = 2, P>0.21).

Table 5: Respondents response on the risk factors of intestinal parasites among the communities of Lafia LGA

Risk factors	Category	Yes (%)	No (%)	Total (%)
Sources of drinking water supply	Borehole	25(12.19)	13(6.34)	38(12.66)
	Well	23(11.57)	11(11.57)	34(11.33)
Type of latrine/toilet	Pit latrine, bush	21(10.24)	10(10.52)	31 (10.37)
		20(7.75)	9(9.47)	19(6.33)
How often do you take de-worming tablets	Monthly, non-interval,	10(4.87)	10(10.52)	20(6.34)
	yearly, not at all	16(7.80)	11(11.57)	27(9%)
		18(8.78)	12(12.62)	26(8.66)
Do you always wash your hands before and	Yes	16(7.80)	4(4.21)	18(6%)
after eating	No	14(6.82)	6(6.31)	20(6.33)
Do you wash fruits and vegetables before	Yes	15(8.82)	2(2.10)	17(5.66)
consumption	No	13(6.34)	4(4.24)	17(5.66)
Do you walk bare footed within the compound	Yes	12(5.36)	3(3.15)	14(4.4.66)
	No	13(6.34)	3(3.15)	16(5.33)
Total		205(97.01)	95(95.77)	300(8.61)

Table 6, below show the impact of treatment and response to treatment data in the study community. In Ciroma, 9 out of 72 were infected with parasites and out of which the 9 were treated with Albendazole, Flagyle and Praziquneyles. The post treatment result shows 7(8.43%) after the whole treatment exercise. The result in Tudun Gwandara shows that out of66 examined, 19(22.89%) respondent to treatment. The result in Tudun kori shows 62 examined and treated out of which 8(21.68%) responded to treatment of Albendazole, Flagyle and Prazequantel. The same with Shabu out of 53 examined 11(13.25%) responded to treatment. Result in Kwandare also shows 3 (33.73%) responded to treatment after the whole exercise statistical analysis show positive significant difference at (x = 6.52, df = 1, p<0.95).

Table 6: Impact of treatment and post treatment data in the study communities

Communities	No exam	On infect.	No treated	No that respond to treatment	No not respond to treatment	% after treatment
Ciroma	72	9	9	72	2	7(8.43)
Tudun Gwadara	66	23	24	194	4	19(22.89)
Tudun kori	62	19	19	184	1	14(21.68)
Shabu	53	13	13	118	2	11(12.25)
Kwandere	47	31	31	28	3	3(33.73)
Total	30	95	95	85	12	83(99.98)

VI. DISCUSSION

The result of this study shows prevalence of polyparasitism in the study areas. Factors predisposing to infections include poor sanitary conditions, inadequate water supply unhealthy cultural practices and ignorance. Most of the participants included in the study had no toilet facilities and so defecated in nearby bushes. So also children playing in dirty or flirty environment, playing and swimming in natural water bodies, esophagus habit of children and involvement of women in subsistence agriculture are habits that facilitate the transmission of the parasites (Odelowo, 1990 and Ighoboja *et al*., 1997).

The presence of some species of intestinal parasites in this study area suggests that the prevailing environmental conditions supports the transmission of a wide range of parasites. *Ascaris lumbricoides, Hookworm, Trichuris trichiura, Entamoeba histolytica, Giardia lamblia* and *Schistomiasis* were the commonest intestinal parasites in the study areas. This observation is in accordance with findings by (Nwosu 1981) which showed that the triad of *Hookworm/Ascaris/Trichuris* is common throughout most part of Nigeria.

There is moderate level of polyparasitism infections among the participants. This may be due to differences in level of education, sanitation and personnel hygiene. Despite the fact, the prevalence rates of infection observed were considerably lower than prevalence rate observed in similar studies conducted in some rural areas of south-eastern Nigeria Asford (1993), the rates of the infections are however, of public health significance.

Polyparasitism isolated according (sex), male had the highest prevalence of (51.81%) than the female 51.63%. This implies that males slightly suffer polyparasitism infections than the females. A study by Florey (2009) reported a prevalence of 31.8% of polyparasitism. This study have associated higher prevalence to poor environmental and personal hygiene, storage of food and water supply and indiscriminate defecation.

The distribution of polyparasitic infection according to age groups shows that there was significant differences in the rate of infection among the youth and adults. This shows a common pattern of behavior and susceptibility for this age groups. They probably spend more time playing on polluted more time in and working bare footed. They may also spend more time in cercaria infected waters as reported by findings of (Asford *et al*, 1993). They may also have more contact with soils and eats indiscriminately with unwashed hands. The adults group recorded the least prevalence due to the fact that individuals in group may be less exposed to epidemiologic factors that enhances sustainability to co-infection by parasites. They are also conscious of their personal hygiene, hence they are able to avoid as much as possible what would lead to one being infected. This report agrees with the findings o similar study conducted by Oyeniran et al (2014) where the reported that parasitic infestation decreased progressively with increasing age limited to age 16 and above.

According to Florey (2009) portable drinking water is associated with less prevalence of play parasitism. The result from this study show that participants level of infection vary according to source of drinking water. It means therefore that infection of multiple parasites among females is determined by source of their drinking water.

The differences in co-infection of parasites according to toilet used showed that the female 76 (50.66%) had the highest prevalence than the male 67 (44.66%). This means that the toilets types determines the rate of infection among sexes tested. Another reason for the observed prevalence of parasites is the practice of open-air defecation which was common in all the communities. The absence of house hold toilets facilities is epidemiologically significant as the environment continue to be seeded with parasites eggs. Prevalence rate of infections among participants based on occupation showed that the females farmers had the highest prevalence as compared to males. Higher prevalence rate of between 50% - 77% have been reported in parts of Africa (Keiser *et al.,* 2002 and Florey, 2009).

The synergistic effects of concomitants parasitic infections in the individuals reveals that these infections interacts biochemically to influence morbidity and other human growth parameters with in the communities (Ezeamama, *et al,* 2008). Earlier studies in neigbouring part of Benue state revealed that parasitic infections lead to stunted growths in children (Omudu, *et al*, 2012). Studies have demonstrated a positive association between intensity and concurrent infection of different parasite species, suggesting that individuals harbouring multiple helminthes species also present with the most intense nutrient deficiency and growth impairments (Florey, 2009, Pullan and Brooker, 2008, and Omudu, *et al*, 2003). Polyparasitism may therefore have a greater impact on morbidity than single species infections, since morbidity is typically related to infection intensity for most parasites as reported by Pullan and Brooker (2008). Multiple species infections is also believed to increase susceptibility to other serious life threatening infections especially tuber culosis and HIV/AIDs (Hillier, *et al*., 2008; Ibrahim, *et al*, 2006 and Elias, *et al*., 2006).

Children within the age bracket of 1 – 10 years were significantly more infected in this study with both single and multiple parasite species. This may be as a result of higher level of exposure to the epidemiological factors that increase risk and enhance susceptibility. Studies elsewhere have also reported similar bias to this age group (Keiser *et al*., 2002; Uneke, *et al.,* 2009 and Sagin *et al*; 2002). The high infection rate of 80(40%) recorded among students could be attributed to the fact that school children normally play in or around defecation sites and most of the school lack proper toilet facilities. Ascaris occurred in age group 0 – 20 years and prevalence in the study areas is significant because it flourism in the temperate zone where probably every child has been infected not once but many times in childhood (Smyth, 1976). The mode of the parasite, which is mainly through infected singers after scratching the peri-anal region, is a habit found mostly in young people.

The vectors of *S. haematobium, planorbid snails, Bulinus spp* are found in natural bodies of water used for drinking, domestic purposes and recreation by these communities in the study areas. The prevalence of *Schistosomiasis* was found among very few males compared to females that have none can be attributed to the fact that males in the area are more frequently exposed to infected water bodies, where they usually play swim, bathe or wash (Akogun and Badaki, 1998) reported similar findings and attributed it to the fact that males have fewer restrictions than females.

VII. CONCLUSION

The result from this study clearly reveals that the dynamics of polyparasitism exist in this communities of Nasarawa state. It is pertinent to state that simple interventions, such as people based deworming programme and health education, have the potential to improve human health and educational achievement especially for those affected by intestinal parasites and urinary *Schistosomiasis*. The World Health Organization states that the control of *Schistosomiasis* and intestinal parasitic infections has to be an integrated effort which includes methodologies and managerial tools to improve preventive strategies and emphasize health education, information and communication. There is therefore need for a more praginatic approach to parasite control among youths and adults in orders to enhance their overall being.

RECOMMENDATIONS

Based on devastating impact of polyperasitism on the physical and mental health of individuals, the following are therefore recommended to control it.

1. Government is encourage to provide basic social amenities such as safe drinking water affordable toilets facilities for proper disposal of human wastes be provided in endemic communities to slow the rate of infection on the individuals of such populations in endemic areas.
2. Health education on the consequences of parasites infection mode of transmission of multiple parasites and prevalence should be intensified particularly in primary schools government and non-governmental organizations (NGOs).
3. Government and religious leaders should provide chemotherapy for individuals infected in the communities through agents of socialization such as schools, prayer places, market etc. Deworming exercise should be intensified because it is flexible and appropriate approach to the control of associated morbidity in endemic communities.
4. Government and private hospitals should ensure modern diagnostic equipments to pare way for intensive and reliable test for diseases.

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