Original Research Article

PREVALENCE OF SOIL-TRANSMITTED HELMINTH INFECTION IN UMUNZE, ANAMBRA STATE.

ABSTRACT

Aims: The aim was to determine the prevalence of soil-transmitted helminthiasis in Umunze, Anambra State, Nigeria.
Study Design: This study is a cross-sectional, community-based, descriptive study.
Place and Duration of Study: The study was carried out in Umunze, headquarters of Orumba south L.G.A of Anambra State, Nigeria. The laboratory investigations and analysis were done in the Parasitology and Entomology Laboratory, Department of Parasitology and Entomology, Nnamdi Azikiwe University, Awka, between May, 2023 to August 2023.
Methodology: A total of three hundred and ninety-seven (397) individuals of all age groups from Umunze community were randomly sampled for the study. Stool samples were collected and analyzed using katokatztecnique and examined under the microscope for STH eggs. Data obtained were analysed using Chi-square test of statistical package for social sciences (SPSS) version 25.0.
Results: A total of 112 (28.2%) individuals were positive with at least one STH parasite. Hookworm was the most prevalent (42.9%); followed by *Ascaris lumbricoides* (36.6%) and *Trichuris trichiura* (10.7%). There was no significant difference among the species of STH parasite (P=0.80). Individuals of the age group 36-40years had the highest prevalence (42.3%) with no significant difference (P=0.191). while Farmers had the highest prevalence (48.8%) among the other occupational groups with a significant difference (P=0.000).
Conclusion: Improvement in sanitation, preventive chemotherapy for all age groups, health education and provision of toilets facilitesare needed for effective control and possible elimination of STH in Umunze.

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Keywords: Prevalence; Soil-transmitted helminth; Umunze; Hookworm; *Ascaris lumbricoides*; *Trichuris trichiura.*

1. INTRODUCTION

Soil-transmitted helminth infections are neglected, poverty-related diseases with higher prevalence in developing and under developed countries [1]. The most common species are roundworm (*Ascaris lumbricoides),* whipworm *(Trichuris trichiura),* the hookworms (*Ancylostoma duodonale* and *Necator americanus*) and threadworm (*Strongyloides stercoralis)* [2]. Transmission of *A. lumbricoides* and *T. trichiura* is primarily through faecal-oral route (usually by ingestion of parasite eggs in faeces), whereas hookworm species and *Strongyloides stercoralis* are through active skin penetration of infective larva [3].

The burden of disease from soil-transmitted helminths is mainly associated with morbidity rather than mortality, which is attributed to their chronic and insidious impact on the health and quality of life of the affected population [4]. Generally soil-transmitted helminth infections have a major impact on the social and economic development of communities where prevalence rates are high, since they affect adults' ability to work and cause school absenteeism among children. Mildly infected people are usually asymptomatic. More severe infections can cause a variety of symptoms, including diarrhoea, abdominal pain, general malaise, and weakness [5].

Soil-transmitted helminths infections are among the most common chronic human infections in most regions of the world; with more than 1.5 billion or 24% people infected globally. Infections are widely distributed in tropical and subtropical areas, with the greatest numbers occurring in East Asia, the Americas, China and Sub-Sahara Africa [6]. It accounts for a global burden of 3.3 million of disability-adjusted life years [7]. Approximately 270 million preschool-aged children (PSAC) and 600 million school-age children (SAC) that live in areas where transmission of these parasites are intense and in need of treatment and preventive interventions are at risk of infection [3].

In developing countries, including Nigeria, the populace is still ravaged by mass poverty, thereby leading to lack or scarcity of portable water, poor sewage disposal, unhygienic environments, and proliferation of parasitic diseases including soil transmitted helminths [8]. Hence, the prevalence of soil-transmitted helminths in Nigeria has remained high and endemic.

In Anambra State, there has been an establishment of soil transmitted helminth as reported by various researchers showing endemicity in the State [9, 10, 11]. However, there is paucity of data on the epidemiology of STH infections in Umunze, Anambra State. Umunze community possesses ecological features likely to promote soil-transmitted helminth infections. Rural parts of Umunze have little access to health care service, have no means of electricity or running water. Majority of Umunze community are farming communities where children and adults are fully exposed to risks of helminth infection. Practices such as walking on bare feet, open defecation, eating of fallen fruits and raw unwashed vegetables with unwashed hands in farmlands could predispose individuals to soil-transmitted helminth infections. Understanding the prevalence and distribution of STH infections in Umunze community is needed for designing effective control strategies and improving the health and well-being of the population.

2. MATERIALS AND METHODS

2.1 Study Area

This study was carried out in Umunze, the headquarters of Orumba South Local Government Area in Anambra State, Southeast Nigeria. Umunze has seven villages. Namely: Nsogwu, Ugwunano (Ugwuagbada), Lomu, Ubaha, Ururo, Ozara and Amuda. Umunze lies between latitude 5° 58′ 0″ north and longitude 7°13′ 0″ east. It occupies a land area of about 1.206 square kilometers. The area has distinct rainy (March to October) and dry seasons (November to

February). The relative humidity falls between 60% - 80% and a temperature of about 28°C-30°C [12]. The area experiences high volume of rainfall and warm temperature which result in lush vegetation and good conditions for cultivation of food crops such as vegetables, yam, cassava, maize etc. According to the National Population Comission [13], the population projection of Umunze as at 2020 was 28,165. The major occupation of the people is farming with some of them taking to trading activities to earn income for themselves. Only few of them are civil servants. The area suffers from poor infrastructural facilities such as absence of good road networks, electricity, pipe-borne water, healthcare centres and communication network.

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2.2 Study Design

A cross sectional study design was adopted for the study. This research involved laboratory examination of feacal samples using kato katz technique. Random sampling technique was adopted as participants were drawn from each the seven villages of Umunze.

2.3 Study Population

The study population consisted of both male and female adult and children, who are resident in Umunze, Anambra State.

2.4 Sample Size

Sample size was estimated using the sample size estimation formula by [14]:

$n= N/ (1+N (e)^2)$

Where: n is the sample size

N is the population under study

e is the margin error (it could be 0.10, 0.05 or 0.01)

Therefore the sample size of the population under study is:

n= 28,165/ (1 + 28,165 $(0.05)^2$) = 28,165/ (1 + 28,165 (0.0025)) = 28,165/ (1 + 70.4125) = 28,165/ 71.4125 = 394.

Therefore, the minimum sample size is 394. However, a total of 397 samples were recruited.

2.5 Ethical Considerations

The Ethical approval with reference number COOUTH/CMAC/ETH.C/Vol.1/FN:04/273 was obtained from the Ethical Committee of Chukwuemeka Odumegwu Ojukwu University Teaching Hospital. Signed Informed Consent form was also obtained from participants.

2.6 Advocacy for the research

Prior to commencement of the study, advocacy visits were carried out in Umunze. The traditional ruler of Umunze was visited and briefed on the study objectives. Written permission was obtained from the traditional ruler indicating his consent on behalf of the entire community. The village heads and school heads were also visited and briefed on the objectives of the study and their verbal permission was obtained. Each study participant was given a consent form to indicate interest to participate in the study. Consent for children was obtained through their parents/care-givers.

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The objectives of the study were briefed to the village heads and school heads, and verbal permission was obtained.

2.7 Collection of Stool Samples

Each participating individual was supplied with a labeled plastic container, water proof paper and applicator stick and instructed on how to bring proper stool sample in order to ensure that no urine, water, soil or other contaminants entered the container. The containers with samples were

retrieved the next day, 10% formalin was immediately added to the stool samples for preservation and subsequently transported and examined for helminth parasites at the Parasitology and Entomology Laboratory, Nnamdi Azikiwe University, Awka.

2.8 Determination of Soil-transmitted helminth Parasitic Infections

Stool specimen was processed using the Kato-Katz technique to determine STH parasites [15]. The presence of soil-transmitted helminth parasites eggs in any of the stool samples was noted as positive. A labeled glass slide with the sample number and a plastic template placed on top of it was used. A small amount of faecal sample was placed on a newspaper with a piece of nylon screen pressed on top. A spatula was used to scrape the sieved faecal material through the screen so that only the debris remained. Some of the sieved faeces were scrapped up to fill the hole in the template. Air bubbles were avoided and excess faeces removed. Care was taken while lifting off the template which was afterwards placed in a bucket of water mixed with concentrated detergent so that it could be reused. After this, a piece of cellophane which had been soaked overnight in glycerol malachite green was placed over the faecal sample. Then a clean slide was placed over the top and pressed evenly downwards to spread the faeces in a circle and then the slide was carefully removed by gently sliding it sideways to avoid separating the cellophane strip or lifting it off. The slide was placed on the bench with the cellophane upwards. Water evaporates while glycerol clears the faeces. When clarified, it was possible to read newspaper print through the stool smear and observed under a microscope using x10 and x40 objectives. For clearing and examination the slide was kept for only 30 minutes to avoid clearing of Hookworm eggs.

2.9 Data Analysis

The data obtained were analysed using Statistical Package for Social Sciences (SPSS) version 25.0. The prevalence of the infection among individuals was computed as proportion of individuals infected to total number examined, presented in percentages and was tested with Chi-square analysis at 0.05% level of significance. The results are presented in tables as appropriate

3. RESULTS

3.1 Prevalence of Soil-transmitted helminth Infections in Umunze

The result on prevalence of STH infections showed that out of 397 participants sampled, 112 people were positve with at least one helminth parasite giving an overall prevalence of 28.2%. The helminth parasites identified were *A. lumbricoides* 36.6% (41/112), Hookworm 42.9% (48/112), *T. trichiura* 10.7% (12/112). The result also showed a mixed infection of *A. lumbricoides* and hookworm 8.0% (9/112) and *A. lumbricoides* and *T. trichiura* 1.8% (2/112) as shown in Table 1. There was no significant difference among the species of the STH parasites identified (P=0.806).

On the prevalence by village, the highest prevalence was observed in Amuda 41.4% (24/58), followed by Ururo 35.6% (21/59), Ubaha 33.9% (19/56), Ozara 30.4% (17/56), Nsogwu 25.5% (14/55), Ugwuagbada 16.1% (9/56) and Lomu 14.0% (8/57) also as shown in Table 1. There was a significant difference in the prevalence of STH infections among the villages in Umunze (P=0.008).

Table 1: Prevalence of Soil-transmitted helminth infections in Umunze, Anambra State

Communities	**No Examined**	**No Positive**	***A. lumbricoides***	**Hookworm**	***T. trichiura***	***Ascaris+ Hookworm***	***Ascaris + Trichuris***
Nsogwu	55	14 (25.5%)	6 (42.9%)	6 (42.9%)	1 (7.1%)	1 (7.1%)	0 (0.0%)

Ugwuagbada	56	9	(16.1%)	2	(22.2%)	5	(55.6%)	1	(11.1%)	1	(11.1%)	0 (0.0%)
Lomu	57	8	(14.0%)	4	(50.0%)	3	(37.5%)	1	(12.5%)	0	(0.0%)	0 (0.0%)
Ubaha	56	19	(33.9%)	8	(42.1%)	6	(31.6%)	2	(10.5%)	3	(15.8%)	0 (0.0%)
Ururo	59	21	(35.6%)	5	(23.8%)	9	(42.9%)	4	(19.0%)	3	(14.3%)	0 (0.0%)
Ozara	56	17	(30.4%)	7	(41.2%)	8	(47.1%)	1	(5.9%)	1	(5.9%)	0 (0.0%)
Amuda	58	24	(41.4%)	9	(37.5%)	11	(45.8%)	2	(8.3%)	0	(0.0%)	2 (8.3%)
Total	397	112	(28.2%)	41	(36.6%)	48	(42.9%)	12	(10.7%)	9	(8.0%)	2 (1.8%)

x^2=17.522[a], df=6 P=0.008

3.2 Prevalence of Soil-Transmitted Helminth Infections by Sex

The result also showed that females had more prevalence 30.1% (59/196) than in males 26.4% (53/201) as shown in Table 2. It was observed that *A. lumbricoides* and *T. trichiura* occurred more in females with 40.7% (24/59) and 16.9% (7/59) prevalence, respectively, than in males. Hookworm infection occurred more in males 49.1% (26/53). There is no significant difference in the prevalence of STH infections between males and females (P=0.436).

Table2: Prevalence of Soil-transmitted helminth infections by Sex in Umunze, Anambra State

Gender	**No Examined**	**No Positive**	***A. lumbricoides***	**Hookwoom**	***T. trichiura***	***Ascaris*+ Hookworm**	***Ascaris +Trichuris***
Males	201	53 (26.4%)	17 (32.1%)	26 (49.1%)	5 (9.4%)	5 (9.4%)	0 (0.0%)
Females	196	59 (30.1%)	24 (40.7%)	22 (37.3%)	7 (16.9%)	4 (6.8%)	2 (3.4%)
Total	397	112(28.2%)	41 (36.6%)	48 (42.1%)	12(10.7%)	9 (8.0%)	2 (1.8%)

x^2=0.683[a], df=1 P=0.436

3.3 Prevalence of Soil-transmitted helminth Infections by Age

The result also showed that the highest prevalence of 42.3% (11/26) occurred in individuals of the age group 36-40 years, followed by 0-5 years 38.1% (16/42), 31-35 years 36. 6% (15/41), 6-10 years 35.8% (19/53), 41-45 years 30.0% (6/20), 51-55 years 27.6% (8/29), 11-15years 27.5% (11/40), 66-70 years 25.0% (1/4) , 46-50 years 22.7% (5/22) , 26-30 years 21.1% (8/38) , 56-60 years 18.2% (2/11) , 21-25 years 16.0% (4/25) , while the least prevalence of 15.4% (6/39) was recorded in age group 16-20 years. *A. lumbricoides* was most prevalent in age group 66-70 years (100%) followed by age group 16-20 years, 83.3% (5/6) while the least prevalence of 16.7% (1/6) was in age group 41-45 years. Hookworm was most prevalent in age group 41-45 years, 83.3% (5/6), followed by age group 21-25 years and 26-30 years, 75.0% (3/4), while the least prevalence of 6.3% (1/16) occurred in age group 0-5. *T. trichiura* had the highest prevalence of 100% (2/2) in age group 56-60 years, followed by age group 46-50 years with the prevalence of 20% (1/5), while the least prevalence of 6.7% (1/15) occurred in age group 31-35 years. Co-infection of *Ascaris* and Hookworm had the highest prevalence of 20% (1/5) in age group 46-50 years and least prevalence of 6.3% (1/16) in age 0-5years, while the highest prevalence of *Ascaris* and *Trichuri*s was found in age group 0-5 years, 6.3% (1/16), and least prevalence of 5.3% (1/19) was found in ages group 6-10 years. However, there is no significant difference in the prevalence of STH infections among the age groups (P=0.191).

Table 3: Prevalence of soil-transmitted helminth Infections by age in Umunze, Anambra State

Age groups	**No examined**	**No Positive**	***A. lumbricoides***	**Hookworm**	***T. trichiura***	***Ascaris*+ Hookworm**	***Ascaris* + *Trichuris***

(years)											
0-5	42	16	(38.1%)	11	(68.8%)	1	(6.3%)	2	(12.5%)	1	(6.3%)	1	(6.3%)
6-10	53	19	(35.8%)	9	(47.4%)	4	(21.1%)	2	(10.5%)	3	(15.8%)	1	(5.3%)
11-15	40	11	(27.5%)	4	(36.4%)	4	(36.4%)	2	(18.2%)	1	(9.1%)	0	(0.0%)
16-20	39	6	(15.4%)	5	(83.3%)	0	(0.0%)	0	(0.0%)	1	(16.7%)	0	(0.0%)
21-25	25	4	(16.0%)	1	(25.0%)	3	(75.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
26-30	38	8	(21.1%)	0	(0.0%)	6	(75.0%)	1	(12.5%)	1	(12.5%)	0	(0.0%)
31-35	41	15	(36.6%)	3	(20.0%)	10	(66.7%)	1	(6.7%)	1	(6.7%)	0	(0.0%)
36-40	26	11	(42.3%)	2	(18.2%)	8	(72.7%)	1	(9.1%)	0	(0.0%)	0	(0.0%)
41-45	20	6	(30.0%)	1	(16.7%)	5	(83.3%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
46-50	22	5	(22.7%)	0	(0.0%)	3	(60.0%)	1	(20.0%)	1	(20.0%)	0	(0.0%)
51-55	29	8	(27.6%)	4	(50.0%)	4	(50.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
56-60	11	2	(18.2%)	0	(0.0%)	0	(0.0%)	2	(100.0%)	0	(0.0%)	0	(0.0%)
61-65	7	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
66-70	4	1	(25.0%)	1	(100.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
Total	397	112	(28.2%)	41	(36.6%)	48	(42.9%)	12	(10.7%)	9	(8.0%)	2	(1.8%)

$x^2=17.185^a$, df =13 P=0.191

3.4 Prevalence of Soil-transmitted helminth Infections by Occupation

It was observed that farmers had the highest prevalence of soil transmitted helminthes 48.8% (40/82) followed by pupils 41.2% (35/85), business people 20.5% (16/78), Student 16.9% (14/83) and Civil servants 11.5% (7/61) as shown in Table 4. It was also observed that Hookworm had the highest prevalence 90.0% and this was seen in farmers followed by *A. lumbricoides* with a prevalence of 57.1% in pupils. There was significant difference in the prevalence of STH infections by occupation (P=0.000, P<0.05).

Table 4: Prevalence of soil-transmitted helminth infections by Occupation in Umunze, Anambra State

Ocupation	No Examined	No Positive	*A. lumbricoides*	Hookworm	*T. trichiura*	*Ascaris*+ Hookworm	*Ascaris* + *Trichuris*
Infant	8	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Pupil	85	35 (41.2%)	20 (57.1%)	6 (17.1%)	4 (11.4%)	3 (8.6%)	2 (5.7%)
Student	83	14 (16.9%)	7 (50.0%)	3 (21.4%)	2 (14.3%)	2 (14.3%)	0 (0.0%)
Farmer	82	40 (48.8%)	2 (5.0%)	36 (90.0%)	0 (0.0%)	2 (5.0%)	0 (0.0%)
Business	78	16 (20.5%)	9 (56.3%)	3 (18.8%)	2 (12.5%)	2 (12.5%)	0 (0.0%)
Civilservant	61	7 (11.5%)	3 (42.9%)	0 (0.0%)	4 (57.1%)	0 (0.0%)	0 (0.0%)
TOTAL	397	112(28.2%)	41 (36.6%)	48 (42.9%)	12(10.7%)	9 (8.0%)	2 (1.8%)

$x^2=43.322^a$, df=5 P=0.000

4. DISCUSSION

The results of this study showed that out of 397 persons examined for STH infection in Umunze, Orumba South LGA in Anambra State, 112(28.2%) were positive for STH infections. The prevalence is higher than 9.86% recorded by [16] in Awka but lower than 44.2% recorded by [11] in Awa and Omogho communities in Orumba North, 54% recorded by [17] in Ihiala and 45% recorded by [18] in Ebenebe, Awka North LGA, all in Anambra State. In contrast to this

study, other studies in Nigeria had revealed high prevalence of STH infections which ranges from 45.3% recorded by [19] in Umuahia South LGA, Abia State; 46% recorded by [20] in Ogoja, Cross River State, and 59.1% recorded by [21] in Kastina State. The prevalence recorded is relatively comparable to findings by [22] with an overall prevalence of 21.7% in Nimo, Njikoka LGA of Anambra State, and [23] with the overall prevalence of 30.3% in Imo State. These differences/variations in the prevalence of soil-transmitted helminth infections may be as a result of factors such as time of study, type of study, methodology, environmental and socio-economic factors [10].

The prevalence of soil-transmitted helminthiasisfound in the study population classifies the community as a "moderate risk area" for preventive therapy by WHO standards [5]. Furthermore, it was above the WHO recommended 20% intervention threshold for introduction of annual mass deworming [18]. Hookworm, *A. lumbriocoides* and *T. trichiura* were the three STH parasites documented in this study. This is in line with those reported in studies of the same kind conducted in Nigeria by [17] and [3] and other sub-Saharan African nations including Malawi [24], and Cameroon [25].

Hookworm was the most prevalent among the soil-transmitted helminths. This is similar to what was reported by [17] who also recorded a higher prevalence of hookworm infection compared to other infections in Ihiala, Anambra State. The preponderance of hookworm infection could be attributed mainly to the sustainability of microclimate, soil type and humid environment favourable for parasite development as seen in the study area. It has been reported that under favourable ecological conditions larvae of hookworm can survive a period of three weeks (21days) [17]. Moreso the penetrative infective pattern of Hookworm makes it to be more common in this study as majority of the individuals in the study area move about bare-footed and

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even children play naked or half-naked in the heavily infested soil. Again most people that engage in farming activity do not wear protective shoes while working in the farm which is very common in a rural area. Since the villagers are constantly having contact with these contaminated sites, this accounts to the more occurrence of hookworm than other geohelminths. Reports have also shown that individuals in agrarian communities are at a greater risk of Hookworm infection [3]. The *Ascaris* prevalence recorded could be attributed to their high survival strategy which is conferred on it by the outer chitinous layer of egg shell and the laying of numerous eggs of about 2000 per day by the female. *Ascaris* eggs are very resistant to harsh environmental conditions and also airborne. This longevity of *Ascaris* ova contribute to the infections dynamics of the parasite species as it has been shown that egg kept for 10 years in the soil could still be infective [17]. As a result of such longevity it is difficult to prevent infection and re-infection when hectares of farmland surrounding human habitation as found in the study area are likely to be polluted with *Ascaris* ova as a result of indiscriminate defecation and dumping of refuse waste. The high *Ascaris* prevalence can be attributed to indiscriminate defecation and poor personal and communal hygiene in the study area.

In this study, females were observed to be more infected than males. However, the difference in prevalence by sex is not statistically significant (P=0.436). This means that the high prevalence is not influenced by sex, but could be by mere chance or because of their exposures to the contaminated environment in the area as a result of their domestic workload such as food preparation, cleaning of surroundings, fetching of water from polluted streams, carry out market hustles and errands, engaging in farm work amongst other things. This report agrees with findings of [11] who reported a prevalence of 22.7% in females than 21.4% prevalence in males and [22] who reported a prevalence of 23.3% in females than 20% in males. Out of the 7 villages

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sampled, Amuda has the highest prevalence of 41.4% with Lomu having the least pravalence of 14.0%. This could be attributed to variation to risk factors.

The difference in prevalence by age is not statistically significant. However it is worthy to note that the adults had higher prevalence of soil transmitted helminth infections. Age 36-40 recorded the highest prevalence. Similar findings have been reported by other researchers like [3] and [26] who equally found higher prevalence of STH infections among the adults. This further emphasizes need for an extension of preventive chemotherapy to other at-risk groups. Soil transmitted helminth advisory committee (STHAC) recommendation corroborates this view, by stating that eliminating soil-transmitted helminthiasis as a public health problem has to go beyond preventive chemotherapy for SAC alone, as other groups at risk also serve as a reservoir of infection, e.g., hookworm infections frequently predominate in adult populations [27].

Farming occupation was associated with increased risk of infection with Hookworm as engagement in agricultural pursuit remains a common denominator of Hookworm infection. This is in agreement with [26] and [28] who also reported a high prevalence of Hookworm among farmers in Kaduna and Abia State respectively. Soil transmitted helminth infections was significantly higher among farmers (P=0.000) than the other occupational groups probably due to the fact that farmers are more exposed to the source of infection which include soil (serving as reservoir of infection) as they usually walk and work barefooted on the soil using crude tools (hoes and matchet) that bring their hands in contact with the soil. They may also eat with unwashed hands during their stay in the farm. Civil servants have the least level of exposure to contaminated soil as they spend most time in their offices and coupled with their generally high level of awareness to the aetiology of STHs, infection is generally low among this group. A measure of infection rates were also observed in the different occupational groups since they

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were all involved in one form of farming practices such as small scale farming (cultivation of vegetables) around their homes.

5. CONCLUSION

The prevalence of STH infections is moderate according to WHO but it is still of public health concern in the goal of elimination of STH. The risk factors associated with the prevalence and intensity of STH infections in Umunze were mainly poor personal and environmental hygiene. An integration of actions aimed at STH transmission control is recommended. This should include provision of basic amenities such as adequate toilet facilities for schools, adequate source of water, preventive chemotherapy for all age group and health education.

CONSENT AND ETHICAL APPROVAL

Ethical approval for the study was obtained from the Chukwuemeka Odumegwu Ojukwu Teaching Hospital, Amaku, Awka (COOUTH/CMAC/ETH.C/Vol.1/FN:04/273). Permission was also obtained fromthe traditional ruler of Umunze community and head of schools. Informed consent was obtained from participants after they weremeant to understand the procedures and benefitof participation in the study. They were equally informed that the data generated from the study will be kept confidential and used for academic purposes and their identity will not be disclosed for any reason.

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