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Survey of Parasites in Water Sources in Ishieke and Its Environs Ebonyi State, Southeastern Nigeria

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ABSTRACT

Water is a natural resource that covers about 70% of the earth surface, yet humans lack potable water for both domestic use and drinking. The study area; Ishieke and its environs are located in Ebonyi state, south eastern Nigeria. A total of 200 water samples were analyzed to know the types of parasites found in the water sources within the study area. The water samples were collected from streams, hand-dug wells, boreholes (private) and taps (pipe borne water). The water samples were analyzed in the Applied Biology laboratory in Presco campus of Ebonyi state University. Centrifugation and microscopy method were used in the analysis of the water samples. Parasites analyzed included nematodes, cestodes, trematodes and protozoa. A total number of 310 parasites were observed with *Strongyloides stercoralis larvae* having highest occurrence (108) in almost all the water samples analyzed, followed by *Ascaris lumbricoides* (49), Hookworm (54), *Taenia spp* (32), *Trichuris trichiura* egg and larva (23), *Fasciola hepatica* (21), *S.mansoni* (17), *E. histolytica* (13) and *Giardia lamblia* (11) respectively. From the research carried out, there was high occurrence of *Strongyloides stercoralis larvae* which was observed in almost all the water sources. It is recommended that water that will be used for domestic purposes that is from these water sources should be treated properly and also boiling before use. Wells should not be dug close to septic tanks. Survey should be carried out before drilling borehole so as to know the appropriate place to sink borehole. The Ebonyi state water board should ensure steady water supply and they should also monitor the pipe that the water flow through from time to time and the once that is bad should be repaired immediately to prevent parasite from penetrating into the water.

Keywords: Parasite, Water, Protozoa, nematodes and trematodes.

INTRODUCTION

Background of the Study

Water is an essential resource for life. Water is used by everyone, every day. Not only do all people need drinking water to survive, but water plays an important role in almost every aspect of our lives from recreation to manufacturing computers to performing medical procedures. When water becomes contaminated by parasites, however, it can cause a variety of illnesses. The significance of water to human and other biological systems cannot be over emphasized, and there are numerous scientific and economic facts that, water shortage or its pollution can cause severe decrease in productivity and deaths of living species (Garba *et al*., 2008; Garba *et al*., 2010). Reports by Food and Agricultural Organization (FAO) of U.S.A revealed that in African countries, particularly Nigeria, water related diseases had been interfering with basic human development (FAO, 2007). The common sources of water that are available to local communities in Nigeria are fast being severed by a number of anthropogenic factors of which pollution remain the most dominant problem. Water pollution occurs when unwanted materials with potentials to threaten human and other natural systems find their ways into rivers, lakes, wells, streams, boreholes or even

reserved fresh water in homes and industries. The pollutants are usually pathogens, silt and suspended solid particles such as soils, sewage materials, disposed foods, cosmetics, automobile emissions, construction debris and eroded banks from rivers and other waterways. Some of these pollutants are decomposed by the action of micro-organisms through oxidation and other processes. The major problem is the re-concentrations of these harmful substances in natural food chain (Osuide, 1990).

Over the recent years however, concerns have been raised over the microbial quality of drinking and domestic usage of water (Fewtrell *et al*., 1997; Rosenberg, 2003; Khaniki *et al*., 2010). Recently in Nigeria, water source is commercially available (Umeh *et al*., 2005; Okonko *et al*., 2008b). Many people in rural and urban communities rely on sachet water and/or borehole water as the sources of their drinking water supply. Simply because the well water which is available is prone to various disease and also have taste which tends to make the water not good for drinking. Waterborne parasite infections are considered re-emerging threat. In civilized countries waterborne parasites and protozoan pathogens such as cryptosporidium parvum, Giardia lamblia, Entamoeba histolytica and many others are frequently associated with morbidity particularly in children. These parasites are the most common cause of infections worldwide. (Pickering *et al* 1984; Curry and Smith, 1998; Tanyukel *et al*., 2001). Most of the, studies on epidemiology of human Cryptosporidiosis, Giardiasis and Amoebiasis have been carried out in developed countries and there is little data on the occurrence of these infections in other areas (Bakir *et al*., 2003). Recently, it has been reported that two parasites have been responsible for more than 600 million infection worldwide (Smith and Lloyd, 1996). For example 60% of Gardia cases were estimated to be waterborne in the United States (Bennett *et al*., 1987) with a point estimate of the animal incidence of Giardiasis of 260,000 cases. Until recently, Giardiasis was the most frequently reported waterborne disease (Rose *et al*., 1991 and Marshall *et al*., 1997).

Amoebiasis is yet another waterborne disease that is gaining prevalence in the world. The prevalence of infections with the causative agent, *Entamoeba histolytica* worldwide is estimated to be 50 million cases each year (Ravdin, 1999). The World Health Organization estimates that 88% of that burden is attributable to unsafe water supply, sanitation and hygiene.

Aims and Objectives

The aim of this study is:

- To examine the different kinds of parasites found in the study area.

The objectives are

- To identify various type of parasite found in surface and groundwater sources in Ishieke and its environs.
- To make recommendations on how the outbreak of waterborne disease could be averted in the study are
- To investigate the level of parasite contamination of such drinking water sources.

LITERATURE REVIEW

Parasites are organisms which have adapted themselves in or on another organism which is called a host, and lives at the expenses of the tissue and fluid of the host deriving their nutrient and protection from the host, thereby harming or being of no advantage to the host (Crew, 1999). They increase their fitness by exploiting host for food, habitat and dispersal. Parasites may be transmitted from animals to humans, from humans to humans, or from humans to animals. Several parasites have emerged as significant cause of food borne and water borne disease in the whole world. This is achieved through consumption of contaminated food and water or by eating any raw fruits that has been contaminated

with water or food. Parasites are of different types and ranges in size from tiny-single-celled, microscopic organisms (protozoa) to large multi-cellular worms, (helminths) that may be seen with a microscope.

Some of the parasites are *Giardia lamblia (intestinalis) G. duodenalis* formally called G. *lamblia causes giardiasis*. It is one celled microscopic parasites that can live in the intestine of animals and people. It is found in every region throughout the world and may cause chronic diarrhoea, malabsorption, and weight loss with symptoms for several months (Hill, 1993). Giardiasis is mainly acquired by transmission of cysts of *G. Intestinalis* via soiled hands, contaminated with faeces (pentersen, 1988). Consumers get this disease by consuming food or water contaminated with *G. duodenalis* cysts (infective stage of the organism) and by putting anything into the mouth that has touched the stool of a person or animal with giardiasis. This occur usually 1-2 weeks after ingestion of *G. duodenalis* cysts, which is the environmental survival form and infecting stages of the organism but may last for 4 to 6 weeks in healthy person.

There are cases of chronic illness lasting months or even years. People exposed to public places including those with HIV/AIDS infection are at risk for contracting giardiasis (WHO, 2010). Giardiasis can be prevented by washing hand with hot, soapy water before handling foods and eating, and after using the toilet diapering young children, and handling animals also by making sure infected individuals wash their hands frequently to reduce the spread of infection, and drinking water only from the treated municipal water supplies. When traveling to countries where the water supply may be unsafe to drink, either avoids drinking the water or boil to kill parasite fruits and vegetables before eating. Do not use untreated manure to fertilize fruits and vegetables. Giardiasis is more prevalent in children than in adults, possibly because many individuals seem to have a lasting immunity after infection and is implicated in 25% of the cases of gastrointestinal diseases and may be present asymptomatically about 40% of those who are diagnosed with giardiasis demonstrate disaccharide intolerance during detectable infection. Drinking bottled beverages or hot coffee and tea are safe alternative. Do not swallow water while swimming especially in community pools where there might be people child or people suffering giardiasis. Drink only pasteurizes milk, juice or cider. Wash, peel, or cook raw fruits and vegetables before eating. Do not use untreated manure to fertilize fruits and vegetables. Giardiasis is more prevalent in children than in adults, possibly because many individuals seem to have a lasting immunity after infection and is implicated in 25% of the cases of gastrointestinal diseases and may be present asymptomatically about 40% of those who are diagnosed with giardiasis demonstrate disaccharide intolerance during detectable infection and about six months after, the infection can no longer be detected (John and Wily, 1999). Chronic cases of giardiasis in immunodeficient and normal individuals are frequently retractile to drug treatments (Nichole and Smith, 2002). Five outbreaks have been traced to food contamination by infected or infested food handlers, and the possibility of infections from contaminated fruits and vegetables that are eaten raw cannot be excluded. Cryptosporidiosis; it is a celled microscopic parasite, and a significant cause of water borne illness worldwide. It is found in the intestine of many herd animals people get cryptosporidiosis by the following:

Chronic cases of giardiasis in immunodeficient and normal individuals are frequently retractile to drug treatments (Nichole and Smith, 2002). Five outbreaks have been traced to food contamination by infected or infested food handlers, and the possibility of infections from contaminated fruits and vegetables that are eaten raw cannot be excluded. Cryptosporidiosis; it is

a celled microscopic parasite, and a significant cause of water borne illness worldwide. It is found in the intestine of many herd animals people get cryptosporidiosis by the following:

1. Consuming food or water contaminated with *C. parvum* oocysts, (infective stage). The oocytes are the environmental resistance stage of the organisms and are shed in the feaces of a host into soil.
2. By putting anything into the mouth (faecal oral route) that have touched stool of infected person. The symptoms of this disease are watery diarrhea, stomach cramp, upset stomach and light fever. Some case may be without symptoms. Symptoms appear to ten days after ingestion of *C. parvum* oocysts. The illness usually goes away without medical intervention in three to four days. But in some outbreaks in day care centers diarrhea has lasted one to four weeks. In people with weakened immune system, *cryptosporidiosis* can be serious, long lasting and sometimes fatal. However, there is no known effective drug or medication whatsoever for the treatment of cryptosporidiosis (Millard, Gensheimer and Addis, 1994). *Cyclospora cayetanensis*, causes of *cyclosporidiasis* is a one celled microscopic parasite. Currently little is known about this organism, although cases of *cyclosporiasis* are reported from various countries with increasing frequency.

Consumption of contaminated fruits and food in general with *C. cayetanesis* causes this disease. Symptoms includes; watery-diarrhea sometimes. Stomach cramps, nausea, vomiting, muscle ache, low grade fever and fatigue. Some cases are more severe in persons with weakened immune system and appear about one week after the ingestion of *C. cayetanensis* oocysts. Persons of all ages are at risk for infection. Untreated manure should not be used to fertilize fruits. The parasite that are mainly found in fruits more than vegetables are *cryptosporidium*, *cyclospora*, and *Giardia* (Nichols and Smith, 2002). Outbreaks linked to these protozoa and multi-cellular worms - has been associate with fruits. Fruits and vegetables normally carry a non-pathogenic epiphytic micro-flora. Hence, there are certain factors which contribute the microbiological contamination of these products with pathogens. Consequences of treating soil with organic fertilizers such as manure, and savage sludge from irrigation water harvesting, cutting, slicing, etc the inner tissues of fruits are usually regarded as sterile (Lund, 1992). Bacteria can be present in low numbers as a result of the uptake of water through certain irrigation or washing procedures or contaminated with human pathogens. Fruits and vegetables can become contaminated while growing in fields or during harvesting, handling processing, distribution and use (Beuchat, 1995). At the point when an intact part of a plant is marketed e.g. carrot, lettuce etc. any microbial contamination present is likely to reflect the environment through which the product has passed, information compiled by Beuchat (1998) provides an overview of food borne pathogens. In different fruits products, a conclusion of the report is that the presence of pathogenic microorganisms on raw fruits varies considerably. Surveys of the presence of parasite are fewer because of the lack of adequate detection methods that can be applied to fruits. Fresh fruits continue to respire consuming oxygen and producing carbon dioxide and water vapour. The increasing use of waste water for irrigation in the 1970s and early 1980s prompted a series of literature reviews and investigations into the global extent of waste water re-use and its association with human health risk.

MATERIALS AND METHODS

Materials: The materials used in this research are:

Sterile sample bottles, hand gloves, tissue paper, hand towel, detergent, plastic bowl, beakers, glass slide, cover slip, binocular microscope, centrifuge, formalin, test tubes, centrifuge tubes and pipette.

Study Area: Ishieke community is under the Ebonyi local government area. This community is dominated majorly by farmers and petty traders. The people of Ishieke community has four water sources which are hand dug well, borehole, tap water and stream which dry up during the dry seasons. Majority of the well also dry up during dry season making the people of the community to suffer untold hardship of water during dry seasons, this make them get water from any available sources regardless of the unhygienic state. The population density of the community is low but due to the situation of two campuses close and within the study area there is a large population of student in the area. There is inadequate infrastructure and social amenities in the community.

Sample Collection: Water samples were collected with a sample bottle from each location in the study area. 50 samples were collected from Agalagu ishieke, 60 samples from Ishieke, 20 samples from Mbeke Ishieke, another 40 samples were collected in Ndiegu Ishieke, while 30 samples were collected from Ndiebor Ishieke. A total of 200 water samples were collected in 10 trips, 20 water samples was examined daily. The sample collection was carried out within the space of six months, 154 samples were collected from hand-dugs wells as shown Plate 1- 9 respectively, 34 boreholes, 9 samples from Ebonyi state water board, 3 samples from streams.

Plate 1-Well water collected from Eskay lodge

Plate 2-Well water collected from Federal lodge 1

Plate 3-Well water collected from Divine grace hostel

Plate 4-Well water collected from IK's compound

Plate 5: Well Water collected from Ferderal Lodge II

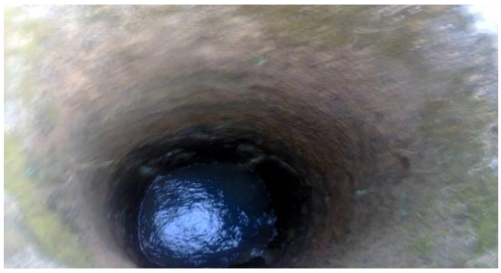

Plate 6: Well water collected from Ukpo's compound

Plate 7:Well water collected from In his presence lodge

Plate 9: Well water collected from Family compound

METHODS

The method used was centrifugation and microscopy, the samples was collected from the sample sites and left to stand for eight hours after which it will be taken to the laboratory for the analysis. Carefully we decanted the supernatant from the deposit after which the deposit will be put in the centrifuging tubes using the pipette to ensure that the water is on equal levels on the tubes and also for proper balancing in the centrifuge, in case of any remaining deposit in the sample bottles carefully add a little solution of detergent and water to rinse it out. Then after balancing on the centrifuge and setting the centrifuge at 3000rpm for 5minutes after which the centrifuge was put on. After the spurning turn off the centrifuge and allow it to stop by itself then carefully remove the centrifuge tubes from the centrifuge and decant gently living only the deposit.

With the pipette tip bring out the deposit and place on a clean slide, then mount it on the microscope that is after turning on the microscope, using 10×, and 40× objective lens to view under the microscope. Formalin was also used in the process of the research in the cases were there was no light we added a drop of formalin into each sample bottles to preserve the parasite contained in them.

RESULTS

Plate 10:Strongyloide Stercularis larvae

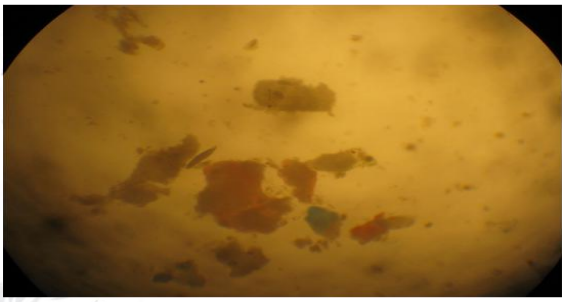

Plate 11: Coloured Substance (Others)

Plate 12: Gardia Lambia

Table 1: Showing various parasites found in well water within the study area.

S/N	Location	*Strongyloides stercoralis* larvae	*Ascaris lumbricoides* larvae	Hookworm	Taenia solium	*Trichuris trichiura*	*Fasciola hepatic*	*Schistosoma*	*Giardia lamblia*	*Entamoeba histolytica*	*Trichostrongylus* egg
1	Well 1	+	-	-	-	-	-	-	-	-	-
2	Well 2	+	+	+	-	+	-	-	-	-	-
3	Well 3	-	+	+	-	+	-	-	-	-	-
4	Well 4	+	-	-	-	+	-	-	-	-	-
5	Well 5	+	-	-	-	-	+	-	-	-	-
6	Well 6	+	+	-	-	+	-	-	-	-	-
7	Well 7	+	+	+	-	-	+	-	-	-	-
8	Well 8	-	-	-	-	-	-	-	-	-	+
9	Well 9	+	+	+	-	-	-	-	-	-	-
10	Well 10	+	-	-	-	-	+	-	-	-	-

Table 1. Continued…

11	Well 11	+	+	+	-	-	-	-	-	-	-
12	Well 12	+	+	-	-	-	+	-	+	-	-
13	Well 13	-	-	-	+	-	-	+	-	-	-
14	Well 14	+	-	+	+	-	-	-	-	-	-
15	Well 15	+	+	-	-	-	-	-	-	-	-
16	Well 16	-	+	+	-	-	-	-	-	-	-
17	Well 17	-	-	+	-	-	-	-	-	-	-
18	Well 18	-	-	-	+	+	-	-	-	-	-
19	Well 19	-	-	-	+	-	-	-	-	-	-
20	Well 20	+	-	+	+	-	-	-	-	-	-
21	Well 21	-	-	-	+	-	-	-	+	-	-
22	Well 22	-	-	-	-	-	-	-	-	+	-
23	Well 23	+	+	-	-	-	-	-	-	-	-
24	Well 24	-	+	-	-	+	-	-	-	-	-
25	Well 25	+	-	-	-	-	-	-	-	-	-
26	Well 26	-	-	-	+	-	-	-	-	-	-
27	Well 27	-	-	-	-	-	-	-	-	-	-
28	Well 28	+	-	-	-	-	-	-	-	-	-
29	Well 29	+	-	-	-	-	-	-	-	-	-
30	Well 30	+	-	-	-	-	-	-	+	-	-
31	Well 31	+	-	-	-	-	-	+	-	-	-
32	Well 32	+	-	-	-	+	-	-	-	-	-
33	Well 33	+	+	-	-	-	-	-	-	-	-
34	Well 34	-	-	-	-	-	-	-	-	-	-
35	Well 35	+	-	+	-	-	-	-	-	-	-
36	Well 36	-	-	-	+	-	-	-	-	-	-
37	Well 37	-	-	+	-	-	-	+	-	+	-
38	Well 38	+	-	-	-	-	-	+	-	-	-
39	Well 39	+	-	-	+	+	-	-	-	-	-
40	Well 40	+	-	-	-	-	-	-	-	-	-
41	Well 41	+	+	-	-	-	-	-	-	-	-
42	Well 42	+	+	+	-	-	-	-	-	-	-
43	Well 43	+	-	-	-	-	-	-	-	-	-
44	Well 44	+	+	-	-	-	-	-	-	-	-
45	Well 45	-	+	-	-	+	-	+	-	-	-
46	Well 46	+	-	-	-	-	-	+	-	-	-
47	Well 47	+	-	-	-	-	+	-	-	-	-
48	Well 48	+	-	-	-	-	-	-	-	-	-
49	Well 49	+	-	-	+	-	+	-	-	-	-
50	Well 50	+	-	-	-	+	-	-	-	-	-
51	Well 51	-	+	+	-	-	-	-	-	-	-
52	Well 52	+	+	-	-	-	-	-	-	-	-
53	Well 53	-	+	+	-	-	-	-	-	-	-
54	Well 54	+	-	-	-	-	-	+	-	-	-
55	Well 55	+	-	-	-	-	+	+	-	-	-
56	Well 56	-	+	+	-	-	-	-	-	-	-
57	Well 57	+	-	-	-	+	-	-	-	-	-
58	Well 58	-	+	-	-	-	-	-	-	-	-
59	Well 59	+	+	+	-	-	-	-	-	-	-
60	Well 60	+	-	-	+	-	-	-	-	-	-
61	Well 61	-	+	-	-	-	-	-	-	-	-
62	Well 62	+	-	-	-	-	-	-	+	-	-
63	Well 63	+	-	-	-	-	-	-	-	+	-
64	Well 64	-	+	-	-	-	-	-	-	-	-
65	Well 65	+	-	-	-	-	-	-	-	-	+
66	Well 66	-	+	+	-	-	-	-	-	-	-
67	Well 67	-	-	+	+	-	-	-	-	-	-
68	Well 68	+	-	-	-	+	-	-	-	-	-
69	Well 69	+	-	-	-	-	-	+	-	-	-
70	Well 70	-	+	-	-	-	-	-	-	-	-
71	Well 71	-	+	-	+	-	+	-	-	-	-
72	Well 72	-	-	-	-	-	-	-	+	+	-
73	Well 73	+	-	+	-	+	-	-	-	-	-
74	Well 74	-	-	-	-	+	-	-	+	-	-
75	Well 75	+	-	-	-	-	-	-	-	-	-
76	Well 76	+	+	-	-	-	-	-	-	-	-
77	Well 77	+	-	-	-	-	-	-	-	-	+
78	Well 78	-	+	+	-	-	-	-	-	-	-
79	Well 79	+	-	-	-	-	-	+	-	-	-
80	Well 80	-	+	-	-	-	-	-	-	+	-

Table 1. Continued…											
81	Well 81	-	-	+	-	-	-	-	+	-	-
82	Well 82	+	-	-	-	-	+	-	-	-	-
83	Well 83	+	-	-	-	+	-	-	-	-	-
84	Well 84	-	+	-	-	-	-	-	-	-	-
85	Well 85	+	-	-	-	-	-	-	-	-	-
86	Well 86	-	+	-	-	-	-	-	-	-	-
87	Well 87	+	-	-	-	-	-	-	-	+	-
88	Well 88	+	-	-	-	-	-	+	-	-	-
89	Well 89	+	-	-	-	-	-	-	-	-	+
90	Well 90	+	+	-	-	-	-	-	-	-	-
91	Well 91	-	-	-	+	+	-	-	-	-	-
92	Well 92	+	-	-	-	-	-	-	-	-	-
93	Well 93	+	-	-	-	-	-	-	-	-	-
94	Well 94	-	+	-	-	-	+	-	-	-	-
95	Well 95	-	+	+	-	-	-	-	-	-	-
96	Well 96	+	-	-	+	-	-	-	-	-	-
97	Well 97	+	-	-	-	-	-	-	-	-	-
98	Well 98	-	+	-	-	-	-	-	-	-	-
99	Well 99	+	-	-	-	+	-	-	-	-	-
100	Well 100	-	-	+	-	-	+	-	-	-	+
101	Well 101	+	+	-	-	-	-	-	-	-	-
102	Well 102	-	+	-	+	-	-	-	-	-	-
103	Well 103	-	-	-	-	+	-	-	-	-	-
104	Well 104	+	-	-	-	-	-	-	-	-	-
105	Well 105	+	-	+	-	-	-	-	-	-	-
106	Well 106	-	-	-	+	-	+	-	-	+	-
107	Well 107	+	-	-	-	-	-	-	+	-	-
108	Well 108	-	+	-	-	-	-	-	-	-	-
109	Well 109	+	+	-	-	-	+	-	-	-	-
110	Well 110	-	-	-	-	-	-	-	-	-	-
111	Well 111	+	-	-	+	-	-	+	-	-	-
112	Well 112	+	-	-	-	-	-	-	-	-	-
113	Well 113	-	-	+	-	+	-	-	-	-	-
114	Well 114	-	-	+	-	-	-	-	-	-	-
115	Well 115	+	+	-	-	-	-	-	-	-	-
116	Well 116	+	-	-	-	-	-	-	-	-	-
117	Well 117	-	+	-	-	-	-	-	-	-	-
118	Well 118	+	-	-	-	-	-	-	+	-	-
119	Well 119	-	+	-	-	-	+	-	-	-	-
120	Well 120	-	-	+	-	-	-	-	-	-	-
121	Well 121	-	-	+	+	-	-	-	-	-	-
122	Well 122	+	-	-	+	-	-	+	+	-	-
123	Well 123	-	+	+	-	-	-	-	-	+	-
124	Well 124	+	-	-	-	-	-	-	-	-	-
125	Well 125	-	+	-	-	-	-	-	-	-	-
126	Well 126	-	-	-	-	-	-	-	-	-	-
127	Well 127	-	-	-	-	+	-	-	-	-	+
128	Well 128	+	-	-	-	-	-	-	-	-	-
129	Well 129	-	+	-	-	-	-	-	--	-	-
130	Well 130	-	-	+	-	+	-	+	-	-	-
131	Well 131	+	-	-	-	-	-	-	-	-	-
132	Well 132	-	+	-	-	-	-	-	-	-	-
133	Well 133	+	-	-	+	-	+	-	-	-	-
134	Well 134	-	+	-	-	-	-	-	-	-	-
135	Well 135	+	-	-	-	-	-	+	-	+	-
136	Well 136	-	-	-	+	-	-	-	-	-	-
137	Well 137	+	+	-	-	-	-	-	-	-	-
138	Well 138	+	-	-	-	-	-	-	-	-	-
139	Well 139	+	+	-	-	-	-	-	-	-	-
140	Well 140	-	-	+	-	+	-	+	+	-	-
141	Well 141	-	-	+	-	-	+	-	-	-	-
142	Well 142	+	-	-	-	-	-	-	-	-	-
143	Well 143	+	-	-	-	-	-	-	-	+	-
144	Well 144	-	-	+	-	-	-	-	-	-	-
145	Well 145	-	-	-	-	-	+	-	-	-	-
146	Well 146	+	-	-	-	-	-	-	-	-	-
147	Well 147	-	-	-	+	-	-	-	-	-	-
148	Well 148	-	-	-	+	-	-	+	-	-	-

+ means Presence of parasite, Absence of the parasite

Table 2: Showing various parasites found in borehole water within the study area

S/N	LOCATION	*Strongyloid stercoralis larva*	*Ascaris lumbricoides larva*	Hookworm	*Taenia saginata*	*T. trichiura*	*Fasciola hepatica*	*S. intercalatum*	*E. histolytica*
1	BH 1	-	-	+	-	-	-	-	-
2	BH 2	-	+	-	+	-	-	-	-
3	BH 3	+	-	-	-	-	-	-	-
4	BH 4	-	+	-	-	-	-	-	-
5	BH 5	-	+	+	-	-	-	-	-
6	BH 6	-	-	+	+	-	-	-	-
7	BH 7	-	-	+	-	-	-	-	-
8	BH 8	+	-	+	-	-	-	-	-
9	BH 9	+	-	+	-	-	-	-	-
10	BH 10	-	-	+	-	-	-	-	-
11	BH 11	+	-	+	-	-	-	-	-
12	BH 12	+	-	-	-	-	-	-	-
13	BH 13	+	-	-	-	-	-	-	-
14	BH 14	+	-	-	-	-	-		-
15	BH 15	+	-	-	-	-	-	-	-
16	BH 16	+	+	-	-	-	-	-	-
17	BH 17	+	-	-	-	-	-	-	-
18	BH 18	-	+	-	+	-	-	-	-
19	BH 19	-	-	+	-	-	+	-	-
20	BH 20	+	-	-	-	-	-	-	-
21	BH 21	+	-	-	-	-	-		-
22	BH 22	+	-	+	-	-	-	-	-
23	BH 23	-	-	+	-	-	-	-	-
24	BH 24	+	-	-	-	-	-	-	-
25	BH 25	+	-	-	-	-	-	-	-
26	BH 26	-	+	-	-	-	-	-	-
27	BH 27	+	-	-	-	-	-	-	-
28	BH 28	-	-	+	-	-	-	-	-
29	BH 29	-	+	-	+	-	-	-	-
30	BH 30	+	-	-	-	-	-	-	-
31	BH 31	+	-	-	-	-	-	-	-
32	BH 32	-	-	-	-	-	-	-	-
33	BH 33	+	-	-	-	-	-	-	-

Table.3: Showing various parasites found in tap water within the study area.

S/N	Location	*Strongyloid stercoralis larva*	*Ascaris lumbricoide larva*	Hookworm	*Taenia saginata*	*Fasciola hepatica*
1	Tap 1	-	-	+	-	-
2	Tap 2	-	+	+	-	-
3	Tap 3	+	+	-	-	-
4	Tap 4	+	-	+	-	-
5	Tap 5	+	-	-	+	-
6	Tap 6	+	-	+	-	-
7	Tap 7	+	-	-	-	-
8	Tap 8	+	-	+	-	-
9	Tap 9	-	-	+	-	-
10	Tap 10	-	-	-	-	+
11	Tap 11	-	-	+	-	+

A total of 200 samples were examined from the study area. The following results obtained are, *Strongyloides stercoralis* larva was observed 111 times *Ascaris lumbricoides* larva was observed 52 times, Hookworm observed 54 times, *Taenia* spp was observed 32 times *Schistosoma intercalatu*m was observed 11 times, *F*asciola *hepatic* was observed 19 times, *Trichuris trichiura* egg and larva was observed 23, *Schistosoma mansoni* was observed 17 times, *Entamoeba histolytica* was observed 13 times, *Trichostrongylus egg* was observed 4 times, *Giardia lamblia* was observed 11 times.

According to the results of this research, hand dug well harbored the highest number of about 10 different types of parasites, followed by stream water which also contains 6 types of different parasites while tap water contained 5 different types of parasites, in borehole 5 different types of parasites was found. Each of the water samples examined contained a minimum of one parasite while a great

number harbored 3 to 4 parasites, as shown in table 2.

Table 4: Showing various parasites found in streams within the study area.

S/N	Location	Strongyloide stercoralis larva	Ascaris lumbricoides larva	Hookworm	Taenia saginata	Fasciola hepatica	Giardia lamblia
1	Stream 1	+	+	+	+	-	+
2	Stream 2	+	+	+	+	-	+
3	Stream 3	-	-	-	+	+	+
4	Stream 4	-	+	-	-	+	-

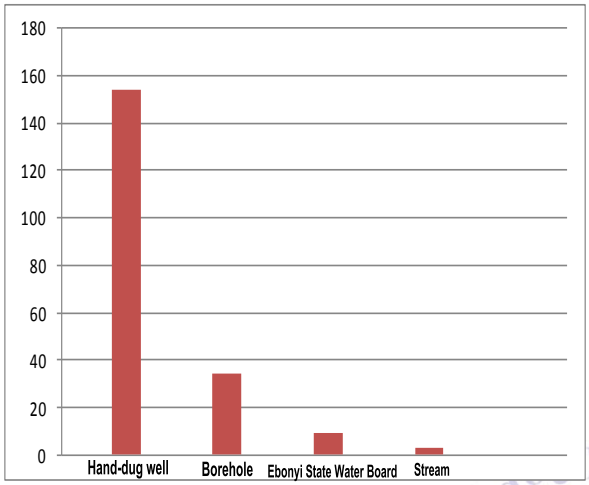

Fig. 1: Chart Showing the Surface water and Groundwater sources within the Study Area.

From (Fig.1) shows that hand-dug is the highest source of water for domestic use within the study area followed by borehole, tap, and stream respectively. The inhabitants of the study area rely on hand-dug wells as most of inhabitant of the area cannot afford to sink borehole. Boreholes in the area are found in student hostels. The tap water is not regular. The few streams in the area dry up during the dry season.

DISCUSSION

This research has shown that *strongyloides stercoralis larvae* was most prevalent in the study area, while *Ascaris lumbricoides* larvae, Hookworm, *taenia spp, Trichuris trichiura* egg *and* larvae were also in high occurrence this group was closely followed by *Fasciola hepatica, S. mansoni, E. histolytica, S. intercalatum and G. lamblia and Trichostrongylus egg* were found but on a minimal level. These parasites were observed to be in their cystic or larvae forms. The identification of water in various sources of water agreed with the study done by Bakir *et al.*, (2003) on drinking water sources in Ankara, Turkey.

The results also shows that *Strongyloides stercoralis* larvae was the most prevalence it was observed 105 times, this shows a high prevalence of this parasite in various water sources within the study area. There could also be a high rate of strongyloidiasis within the study area due to fecal contamination of water in the study area. Hookworm was also present in high number it occurred 52 times, infection with Hookworm is due to poor hygienic conditions by using these Hookworm contaminated water to bath or for domestic purposes. *Ascaris lumbricoides* larvae was also present on a high rate, it occurred 47 times. The presence of this parasite can cause ascariasis which is due to a contamination of *Ascaris lumbricoides* larvae which can be present in different water sources in the study area. *Taenia* spp, *Trichuris trichiura* egg and larvae were observed as they occurred 32 and 21 times respectively this is due to improper situation of their well, by citing their wells close to septic tanks allowing seepage from the tanks. *Fasciola hepatica and S. mansoni was* observed 18, 16 and 14 times respectively. Water development projects for water conservation and irrigation have contributed to the spread of *S. mansoni* and changes in its distribution. *Fasciola hepatica* is transmitted by ingesting metacercariae encysted on wild watercress or other aquatic plants grown in water contaminated with faeces from infected animals these parasite was present but not in high occurrence, their presence is due to bathing, washing clothes, fishing, or engaged in agricultural work or other activity involving contact with water that

has been faecally contaminated according Cheesebrough (2002). *Trichostrongylus* were also observed on a much minimal level. The presence of *G. lamblia* was observed in majorly wells and streams, agrees with the report of state public health laboratory of Missiouri department of health and senior services (2006). According to this research G. lamblia is typically associated with surface water sources (wells and streams). *E. histolytica* were also observed 13 times this shows that there could be cases of amoebiasis within the study area and this is due to contamination of different water sources by parasites. Barwick *et al.,* (1991) proved that the outbreak of E. histolytica is due to infection caused by sewage contaminated water supplies. From the result of the present survey it was obvious that *Strongyloid stercoralis* larvae, *Ascaris lumbricoides* larvae *and* Hookworm was most prevalent in the water sources in the study area, this could be high of contamination of water with fecal matters.

In plate 1-8 showing wells situated inside a bush where they could be prone to erosion and also when these erosion is been washed into the well they come with fecal matter from the surrounding bush as the people of that area sometimes defecate inside the bush, by so doing contaminating the well water with the cysts of parasites found in their feaces. Also in plate 9 which is a clear example of a well that is prone to seepage from septic tanks, these seepage from septic tanks causes the well water to have an unpleasant odour and also contaminating the well water with different parasites. Although these water may look clean from the outward appearance but when examined they were found to contain some harmful parasites which causes some parasitic infections examples are, amebiasis, Hookworm infections, *Strongyloides stercoralis* infections, ascariasis, Taeniasis, T. *trichiura* infections, schistosomiasis, and *Fasciola hepatica* infections.

In the case of tap water, the water can get contaminated due to the kind of environment the pipes are been laid, for example if these pipes are laid in places close to refuse dump site and there was a breakage in the pipe due to water pressure, the water coming out from the broken pipe can wash in some of these dirt which may contain some parasites and introduce them to the water body that is been supplied for consumption.

While in cases of boreholes that were contaminated, was based on the situation of the borehole close to septic tanks and definitely the water will be prone to seepage.

Finally water gotten from streams which is known as surface water. In most cases they are surrounded by bushes and the people of the study sometimes dump refuse close to the stream, thereby contaminating these streams and making them unfit for use, but due to the poor state of water supply in the study area, the some people still fetch water from these streams ignorantly introducing some harmful parasites to their body system. Examples of such parasites are numerous, some of which include, G. *lamblia*, E. *histolytica*, *Fasciola hepatica*, *Ascaris lumbricoides* and others.

During the analysis some of the samples collected were found to be cloudy making difficult to see the types of parasites found in the water.

CONCLUSION

There several health risks in consumption of parasite contaminated water which cannot be over emphasized; this has lead to carrying out of this research.

This research has shown that majority of the water sources in Ishieke community are infected with one waterborne parasites or the other. Apart from the parasites organisms identified other observations were made, few of the water contained hair follicle, dirt and debris while one the samples contained colored substances, which therefore made unfit for

consumption. Erosion and influx after rain could account for the turbidity and pollution experienced in most water sources. Simple microscopy method were used to achieved the results and based on the research it could said that *Strongyloid stercoralis* larvae, *Ascaris lumbricoides* larvae, Hookworm, *Taenia spp, Trichuris trichiura* egg *and* larvae, *Fashiola hepatica, S.mansoni, G. lamblia, E. histolytica, Trichostrongylus,* prevalent in the study area. This parasites were found to be in their cystic or larvae forms, it was also observed that *Strongyloid stercoralis* larvae, *Ascaris lumbricoides* larvae, Hookworm *was* prevalent in the study area thereby making the people of the study area to be prone to strongyloidiasis, ascariasis, and hookworm infections which is due poor sanitation, improper digging of wells in places where they will be prone to seepage from sewage and septic tanks.

RECOMMENDATION

The presence and transmission of waterborne parasites in the study area is definitely possible, therefore several precautionary methods should be used to avert the problem of parasitic infections. Wells should be constructed in an environment where it will be free from seepage from septic tanks, and also the wells should be raised above ground levels to prevent erosions to be washed into the wells, they should also have covers to prevent mosquitoes from using them to breed. Water gotten from streams should also be treated appropriately before usage for any domestic purposes with chemicals or by boiling above 100^0c to get rid of some parasites, before construction of boreholes survey should be made to know if years to come the borehole water will be prone seepage that definitely contaminate the water and also to get the appropriate location for drilling of boreholes.

The Ebonyi state water board scheme should ensure steady water supply so as to prevent these infections and should monitor the pipe that the water flow through from time to time and the once that are bad should be repaired immediately to prevent parasite from penetrating into the water. Clearing of water pathways of streams, and cleaning of bottom of wells should be done routinely to make way for free flow of water and also to remove contaminants. Wells which is dug close to toilet should be closed completely due to contaminations from the toilet.

Water is essential for survival and definitely all liquid that life exists and function well contains some percentage quantities of water that they are made of, life can never exist well without water. There is needed to keep all water sources clean and free from parasites contaminations for parasites for the sake of health. We should also use this water also having conservation in main because after we contaminate the water we have the next generation will suffer because in the absence of water there might not be continuation of human race.

REFERENCES

- Barwick, R.S., Uzicanin, A., Lareau, S. M., Malakmadze, Bishop H,. Hightower, A. Petri, W. A and Juranck, D. D (1991). Outbreak of Aoebiasis in Tblisi, Republic of Georgia. *American Society of Tropical Medicine*. pp 234
- Bakir S, Tanriverdi MH, Gün R, Yorgancilar AE, Yildirim M, Tekbaş G, Palanci Y, Meriç K, Topçu I (2003). Deep neck space infections: a retrospective review of 173 cases. *American Journal of Tolaryngol.*, 33(1) :56-63.
- Bennett, A. F., R. B. Huey, and H. John-Alder. (1987). body temperature, sprint speed, and muscle contraction kinetics in lizards. Physiologist 29: 179.
- Beuchat, L.R., 1995. Pathogenic microorganisms associated with fresh produce. Journal of Food Protection 59 (2), 204–216.
- Beuchat, L.R., 1998. Surface Decontamination of Fruits and Vegetables Eaten Raw; A Review.

World Health Organization, Geneva, Switzerland

- Cheesebrough, M. (2002).District Laboratory Practice in Tropical Countries: Cambridge University Press, New York 2nd. 454, Pp 183-250
- Fewtrell L., Kay D, Wyer M, Godfree A, Neill, G.O.(1997) Microbiological quality of bottled water. Water Science and Technology. 34: pp 47-53.
- Food and Agricultural Organisation FAO. (2007). Coping with water scarcity, 2007 World Water Day, 22nd March, 2007. Available on 127 017 2010 from http://www.fao.org/nr/water7docs/wwd07brochure.pdf
- Garba, Z. N., Gimba, C.E., Hamza, S.A and Galadima, A. (2008): Tetrimetric determination of arsenic in well water from Getso and Kutama, Gwarzo Local Government Area, Kano state, *Nigeria Chemical Class Journal*. (5), pp. 78-80.
- Garba, Z.N., Hamza, S.A and Galadima, A. (2010) Arsenic level speciation in fresh water from Karaye Local Government Area, Kano State, Nigeria. International Journal of Chemistry, India. 20(2) : pp 113-117.
- Geo, F. B, Janet, S. B and Stephen, A.M. (2012). Medical Microbiology. Mc Fraw-Hill Comapanies, Asia. 2nd ed. 848pp.
- Hill, A., (1993). Model - Based Interpretation of 3D Medical Images. In Illingworth, J., editor, *British Machine Vision Conference*. 2, pp. 339-348.
- Ike, O. (1999) *Tertiary Institutions in Nigeria*: Ibadan: Idowu Press.
- Khaniki, G.R.J., Zarei A, Kamkar, A., Fazlzadehdavil, M., Ghaderpoori, M, Zarei A. (2010). Bacteriological evaluation of bottled water from domestic brands in Tehran markets in Iran. *World Applied Science Journal*, 8(3): pp274-278.
- Lund, B. M.(1998). Bacteria Spoilage. In: Post-Harvest Pathology of Fruits and Vegetables. *London Academic Press* 2; pp 219.
- Marshall, J. D., Ludman, M. D., Shea, S. E., Salisbury, S. R., Willi, S. M., LaRoche, R. G., Nishina, P. M. (1997).Genealogy, natural history, and phenotype of Alstrom syndrome in a large Acadian kindred and three additional families. *America Journal of Medical Genetics* **73**: 150-161.
- Miller, T. J., Crowder, L. B., Rice, J. A., and Marschall, E. A. (1988). Larval size and recruitment mechanisms in fishes: toward a conceptual framework. *Canadian Journal of Fisheries and Aquacultural Sciences* 45: pp1657–1670.
- Okonko I.O., Adejoye O. D, Ogunnusi T. A., Fajobi, EA., Shittu O.B., (2008a). Microbiological and physicochemical analysis of different water samples used for domestic purposes in Abeokuta and Ojota, Lagos State, Nigeria. *African Journal of Biotechnology*. 7(3): pp 617-621.
- Osuide, S. (1990). Environmental pollution in Nigeria. Habitat International. 14(1), pp 5-15.
- Umeh, C.N., Okorie O. I, Emesiani G. A. (2015). Towards the provision of safe drinking water: The bacteriological quality and safety of sachet water in Awka, Anambra State. In: the Book of Abstract of the 29th Annual Conference & General Meeting on Microbes As Agents of Sustainable Development, organized by Nigerian Society for Microbiology (NSM), University of Agriculture, Abeokuta, 23; pp. 22.
- Petersen, S. E., Fox, P. T., Posner, M. I., Mintun, M., Raichle, M.E. 1988b. Positron emission tomographic studies of the cortical anatomy of single word processing. *Nature* 331:pp 585 89.
- Pickering, A. D., Stewart, A. (1984). Acclimation of the interrenal tissue of the brown trout, Salrno trutta L., *to chronic crowding stress Journal Fish of Biology*. 24: pp 731-7.
- Rosenberg, F. A. (2003) the microbiology of bottled water. Clinical Microbiology Newsletter, 25: pp 41-44.
- Rose, M. R., Rauser, C. L., Benford, G., Matos, M., and Mueller, L. D. (2007). Hamilton's forces of natural selection after forty years. *Evolution* 61, 1265–1276.

- Radin, D. I., & Ferrari, D. C. (1999). Effects of consciousness on the fall of dice: A meta-analysis. *Journal of Scientific Exploration, 5,* 61-83.
- Smith, C. and Lloyd, B.B. (1978) maternal behavior and perceived sex of infant: revisited. Child Development, 49; pp.1263-1265.
- WHO, (2010), Microscopic Examination of Stool. In: *Basic Laboratory Methods in medical Parasitology*. World Health Organization Geneva Pp. 10-24.

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