KIBOGORA POLYTECHNIC

FACULTY OF HEALTH SCIENCE

DEPARTMENT OF BIOMEDICAL LABORATORY SCIENCE

PREVELENCE OF SCHITOSOMIASIS AMONG CHILDREN IN PRIMARY SCHOOL IN NYAMASHEKE DISTRICT

Case study of Kirehe Primary school

Period: From 3rd August to 15thSeptember 2018

Undergraduate thesis submitted in partial fulfilment of the requirements for the bachelor's degree with honor in Biomedical laboratory science

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DECLARATION

Declaration by the Candidate

We **NYIRAHABINEZA Agnes and MUSHIMIYIMANA Naome** hereby declare that this is my own original work and not a duplication of any similar academic work. It has therefore not been submitted to any other institution of higher learning. All materials cited in this paper which are not my own have been duly acknowledged.

NYIRAHABINEZA Agnes

Signed……..

Date…….

MUSHIMIYIMANA Naome

Signed……..

Date…….

Declaration by the Supervisor

I declare that this work has been submitted for examination with my approval as KP Supervisor

LECTURRE' NAME: MUNYANDAMUTSA Flugence

SIGNED……..

DATE……..

DEDICATION

We do dedicate this research proposal to the almighty God who never overlook us for the period of our studies. We also would like to dedicate this proposal to our parents and our families who had done their best to give us all necessary requirements to fulfill our studies. As well, we do dedicate this proposal to all our beloved brothers, sisters and colleagues who contributed in accomplishment of our studies in one way or another.

This work is highly dedicated to you!

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Your contribution is highly appreciated

ABSTRACT

The study entitled the prevelence of schitosomiasis among children in primary school in Nyamasheke district precisely. The purpose of this study was to determine the prevalence and risk factors of schistosomiasis at Kirehe primary school, Nyamasheke district western province, Rwanda, this study considered the following objectives: To determine the prevalence of schistosomiasis at Kirehe primary school; to determine the risk factors associated with schistosomiasis at Kirehe primary school.

The results showed frequency distributions of schistosomiasis were presented in Table 2. All students who were tested for schistosomiasis infections got negative results. Therefore the prevalence of schistosomiasis at Kirehe primary school is 0%.

There is no Schistosoma spp infection at Kirehe Island therefore intake level, age group and gender have no effect on schistosomiasis status.

By conclusion all children at Kirehe island should not allowed to play with stagnant water and should not allowed to swim in lake Kivu usually after its rain.

The following recommendations were given: innovative and integrated control measures to control this infection should be implemented among Rwandan population.

Periodic school-based and community-based drug distribution, health education, provision of clean and safe drinking water, introduction of proper sanitation will help to reduce the prevalence and morbidity of schistosomiasis in Rwanda.

TABLE OF CONTENT

ABREVIATION AND ACRONYM

ALB: Albendazole

EPG: Eggs per gram of faeces

MDA: Mass drug administration

MEB: Mebendazole

NTD: Neglected tropical disease

Pre-SAC: Preschool-aged children

PZQ: Praziquantel

SAC: School-aged children

SCI: Schistosomiasis Control Initiative

SSA: Sub-Saharan Africa

STH: Soil-transmitted helminth

WASH: Water, sanitation and hygiene

WHO: World Health Organization

SPSS: Statistical Package for the Social Science

CHAPTER ONE: GENERAL INTRODUCTION

1.0. INTRODUCTION

This chapter presents; the background of the study, problem statement, objectives of the study, research questions, significance of the study and scope of the study.

1.1. BACKGROUND OF THE STUDY

Schistosomiasis, a parasitic infection caused by digenetic blood trematode worms of the family *Schistosomatidae*, is one of the most prevalent neglected tropical diseases (NTDs) and still considered as a major public health problem in about 77 developing countries in the tropics and subtropics(WHO, 2013). It is estimated that over 240 million people are infected, with about 700 million people worldwide at risk of infection(Hotez, 2012). Over 90% of this infection occurs in sub-Saharan Africa with almost 300,000 deaths annually from schistosomiasis in Africa(King, 2008).

Urogenital schistosomiasis, caused by *S. haematobium*, is characterized by hematuria, dysuria, bladder wall pathology, hydronephrosis, and it can also lead to squamous cell carcinoma(Parkin, 2008). In adults, the infection can cause genital ulcers and other lesions(King, 2008) resulting in poor reproductive health, with sexual dysfunction and infertility(Swai, 2006). On the other hand, intestinal schistosomiasis caused by *S. mansoni*, presents with bloody diarrhea and bowel ulceration, chronic infections progressing to hepatomegaly and/or associated with per portal liver fibrosis, portal hypertension, and hematemesis (King, 2008). Although *S. intercalatum* can cause another form of intestinal schistosomiasis, its distribution is limited to West and Central Africa (Tchuem Tchuenté LA, 2003).

Schistosomiasis prevalence and morbidity is highest among schoolchildren, adolescents and young adults(Hotez PJ, 2009). Thus, the negative impacts on school performance and the debilitation caused by untreated infections demoralize both social and economic development in endemic areas(Van der Werf MJ, 2003).

The distribution of the disease among school-going children between 10 and 15 years of age is mainly attributed to the high frequency of contact with infested water in an endemic area. This

predominance thereafter decreases with less contact with infested water in adulthood(Colley, 2014).A better understanding of risk factors for schistosomiasis is important in controlling the disease among school children. We therefore aimed to investigate the prevalence schistosomiasis and risk factors among school-going children at Kirehe primary school, Nyamasheke district western province, Rwanda

1.2. STATEMENT OF THE PROBLEM

Schistosomiasis, one of the most prevalent neglected tropical diseases (NTDs), remains as a public health problem in many developing countries in the tropics and subtropics, and ~700 million people worldwide are at risk of this infection(Gryseels, 2012).Over 90% of this infection occurs in sub-Saharan Africa with almost 300,000 deaths annually from schistosomiasis in Africa(King, 2008). Schistosomiasis prevalence and morbidity is highest among school children(Hotez PJ, 2009). In the study conducted in Nigeria among Hausa communities in Kano state reported the overall prevalence of schistosomiasis of 17.8%, where being < 18 years was highly associated with schistosomiasis infestation (Salwa DAWAKI, 2016). In the other studies conducted in Africa, The prevalence of schistosomiasis among school children were; 45% in Sudan (Hassan Ahmed Ismail, 2014) and 57.1% in rural community of south east Nigeria(BSC Uzochukwu, 2010). The highest prevalence (62.1%) of schistosoma mansoni in Rwanda was found among school children of Nkombo Island, Rusizi district in western province(Eugene Ruberanziza, 2015).Schistosomiasis prevalence and morbidity is highest among schoolchildren(Hotez PJ, 2009), thus, the negative impacts on school performance, social and economic development in endemic areas(Van der Werf MJ, 2003). Apart from that study on the prevalence of schistosoma mansoni at Nkombo island (Eugene Ruberanziza, 2015), there is no research ever conducted on the prevalence of schistosomiasis among primary school children and associated risk factors at Kirehe Island. This makes intervention and control measures more difficult as such information is crucial to identify and implement effective control measures. Considering this context, the present study has aimed to investigate the prevalence and risk factors of schistosomiasis at Kirehe primary school, Nyamasheke district western province, Rwanda.

1.3. GENERAL OBJECTIVE

The purpose of this study was to determine the prevalence and risk factors of schistosomiasis at Kirehe primary school, Nyamasheke district western province, Rwanda.

1.4. SPECIFIC OBJECTIVES

This study considered the following specific objectives:

i. To determine the prevalence of schistosomiasis at Kirehe primary school.

ii. To determine the risk factors associated with schistosomiasis at Kirehe primary school.

1.5. RESEARCH QUESTIONS

i. What is the prevalence of schistosomiasis at Kirehe primary school?

ii. What are the risk factors associated with schistosomiasis at Kirehe primary school?

1.6. SIGNIFICANCE OF THE STUDY

This study will provide the necessary data required for formulating policies for intervention and control measures against schistosomiasis among children at Kirehe Island. Furthermore the results from this study will contribute to the current literature parasitological areas of research.

1.7. SCOPE OF THE STUDY

1.7.1. Content scope

This research assessed the prevalence and risk factors of only Schistosoma mansoni.

1.7.2. Geographic scope

This study carried out in Kirehe primary school located in Kirehe village (Kirehe Island), Rugali cell, Macuba sector, Nyamasheke district, western province, Rwanda.

1.7.3. Time scope

The study was conducted during the period, from 3rd August to15th September 2019.

CHAPTER TWO: LITERATURE REVIEW

2.0. INTRODUCTION

This research deals with literatures of other researches, and how those findings relate to what this study accomplished basing on set objectives from existing problem in study area.

2.1. DEFINITION OF KEY CONCEPT/TERMS

Schistosomiasis is a parasitic disease caused by flukes (trematodes) of the genus SchistosomaInfestation with or disease caused by schistosomes; specifically : a severe endemic disease of humans in Africa and parts of Asia and South America that is contracted when carcariae released into fresh waters (such as rivers) by a snail intermediate host penetrate the skin and that is marked especially by blood loss and tissue damage.

Prevalence in epidemiology, the proportion of a population with a disease or a particular condition at a specific point in time (point prevalence) or over a specified period of time (period prevalence).

A risk factor is any attribute, characteristic or exposure of an individual that increases the likelihood of developing a disease or injury. Some examples of the more important **risk factors** are underweight, unsafe sex, high blood pressure, tobacco and alcohol consumption, and unsafe water, sanitation and hygiene.

2.2 PREVALENCE OF SCHISTOSOMIASIS

The data available on the prevalence of schistosomiasis, i.e., the proportion of people infected, are unreliable because of unrepresentative sampling procedures and the uneven distribution of the infection itself caused by ecological or social peculiarities of the countries concerned. Therefore, it is only possible to estimate the numbers of people exposed to infection and the degree of endemicity of schistosomiasis (Mendis S, 2007). The disease is endemic In 74 countries (Olveda, 2013) where 779 million people were at risk of schistosomiasis and 207 million individuals were infected with schistosoma worms. Regarding the at-risk population, an

estimated 660 million were concentrated in Africa, accounting for 85% of the global at-risk estimate.

An alarming 201.5 million schistosoma infections (mainly Schistosoma haematobium) were estimated to occur in Africa, accounting for more than 97% of the estimated number of infections worldwide (OkworiAEJ, 2014). Most of the countries endemic for schistosomiasis are among the least developed, whose health systems face severe strains to provide basic care at the primary level. They can only undertake schistosomiasis control through grant (Chitsulo L, 2000).Based on the estimated prevalence and the size of the endemic areas, the most severely affected countries are: in Africa: Angola, Central African Republic, Chad, Egypt, Ghana, Madagascar, Malawi, Mozambique, Nigeria, Senegal, Sudan, the United Republic of Tanzania, Zambia ;b In South America: Brazil ;In South-East Asia: Philippines ;In South-West Asia: Yemen Arab Republic (Mendis S, 2007). Almost 300,000 people die annually from schistosomiasis in Africa alone. About 10 million women in Africa are infected during pregnancy .Zoonotic transmission is possible with these species, because the parasite infects not only humans but also wild rodents (Olveda, 2013). Least prevalence countries were reported or estimated number of infections is below 1000 in Antigua and Barbuda, India, Indonesia, Jordan, Oman and Saint Lucia. While most suffering countries at present, 29 African countries, Brazil and Yemen which harbor more than one million cases each (Steinmann., 2008).

Of the 662 million people infected worldwide, over 90% are from Africa. In Tanzania, Schistosoma is highly endemic and its prevalence varies from one region to another up to 80% in highly endemic areas. Very few systematic reviews were done aiming to present the prevalence of parasitic infections in the developing world over the last 30 years , and high level of Schistosoma mansoni were found in Zimbabwe (50%) and Tanzania (63.5%) , but the prevalence in other countries was typically around 30%.Another Study in Tanzania, a total of 5952 school children from 36 schools were recruited for the study and had their stool and Urine specimens examined, Schistosomiasis out of 5952 children:898 (15.1%) were positive for S.Mansoni while 519 (8.9 %) were positive for S.Haematobium..The study area is located on the northwest of Tanzania around Lake Victoria. Intestinal schistosoma decrease with the distance from the Lake Victoria, conversely the prevalence of urogenital Schistosoma Increase with distance from the

lake .Regarding Nigeria, It has the greatest number of cases of Schistosoma worldwide (Dawaki S, 2015).

The overall prevalence of Schistosoma was 17.8%, with 8.9% and 8.3% infected with S.Mansoni and S.haematobium respectively, and 0.5% had co-infection of both species. A study was carried out among 960 pupils within the age range of 5 – 16 years ,the findings of this research revealed that the study area was found to be endemic for schistosomiasis as the overall prevalence rate (43.55%) was considered to be high (BR Usaini, 2015). It's well documented that Schistosomiasis haematobium was endemic in Ancient Egypt .The prevalence and species distribution of Schistosomiasis differ in different governorates and regions in Egypt .S.haematobium was highly prevalent (60%) both in Nile Delta and Nile Valley south of Cairo in districts of perennial irrigation , while it's was low (6%) in districts of basin irrigation. S.mansoni infected 60% of the population in the Northern and Eastern parts of Nile Delta and only 6% in the Southern part. Neither S.mansoni cases nor its snail intermediate host were found in the Nile Valley South of Cairo. The highest prevalence was recorded in the Northern and Eastern parts of the Delta where 85% of the population was infected with either one or both species of the parasite (Steinauer ML, 2010). In Egypt, the implementation of Schistosomiasis control programs has accelerated the decline of the disease (Roberts T, 2011).

In 1996, 168 villages has S.mansoni prevalence>30%, 324 villages 20-30% and 654 villages 10-20%. By the end of 2010, in the whole country only 29 villages had prevalence >3% and none had more than 10%.So, S.haematobium rates decreased from approximately 60-70% in 1925 to 5% in 1996, and S.mansoni rates fell from 32% in 1932 to 12% in 1996 (Hassan Ahmed Ismail, 2014). A study was done in Sudan where Schistosomiasis is the most prevalent parasitic disease, and had shown that prevalence of schistosomiasis, especially S.Haematobium, is high in the White Nile River basin, and is closely associated with frequencies of water contact (Hassan Ahmed Ismail, 2014). 157 of 338 (46.5%) students were found to be infected by S. haematobium or S. mansoni, and 4.4% of them had mixed infections. The egg-positive rate in boys and girls were 48.9% (86 cases) and 43.8% (71 cases), respectively .And regarding age, the egg-positive rates were 47.8% in 7–9-years old, 44.7% in 10–12-year-old, and 46.2% in 13–15-year-old. In Zambia, a symptom questionnaire, demographic survey and physical examination was conducted among patients presenting to Kaoma district outpatient clinics to assess the prevalence of

S.Mansoni infections. Blood was collected and screened for the presence of Schistosoma antibody using ELISA, of the 110 patients 88% were ELISA positive (Payne L, 2013).

In 2008 in Ghana, 42% of the S.Haematobium infections are of heavy intensity (> 50 eggs/10 ml urine).The risk of S.haematobium mono-infections is highest (> 30 %) in areas adjacent to the lake Volta as well as in areas not associated with the lake Volta in the south of the country (Roberts T, 2011).

Schistosoma is a public health problem in Malawi but estimates of its prevalence vary widely (Kapito-Tembo AP, 2009).A cross sectional study between May and July 2006 among pupils in Blantyre district from a random sample of 23 primary schools. Urine samples were examined for S.haematobium ova using Filtration method, 1150 pupils were enrolled with a mean age of 10.5 years .In these populations, children who attend schools close to open water sources are at in increasing risk of infection. The study provides an important update on the status of infection in this part of sub-Saharan Africa and exemplifies the success of deliberate national efforts to advance active participation in Schistosoma prevention and control activities at the sun-National or sub district levels. Repeated cross-sectional survey in a representative sample of 200 schools (over 20,000 children) across Kenya. Samples were obtained for microscopic examination, the overall prevalence of S.Mansoni was 2.1% while the prevalence of S.haematobium was 14.8% and the mean infection intensity was 16 eggs/10 ml urine (Mwandawiro CM, 2013).

2.3 RISK FACTORS OF SCHISTOSOMIASIS

The continuous transmission of schistosomiasis in sub-Saharan Africa is attributable to various environmental and socio-economic factors such as:

Climatic changes

There is an established link between climatic changes and infectious disease transmission. Schistosomiasis is a typical example of diseases whose local infection and geographical expansion is influenced by climatic changes and global warming (Mas-Coma, 2009). Mangal and co-workers showed that a rise in ambient temperature from 20 °C to 30 °C will lead to over tenfold increase in the mean burden of *S. mansoni* infection in endemic areas. Nonetheless, at

temperatures above 30 °C a decrease in the disease burden was observed, probably due to higher death rate of the intermediate snail host.

They observed that although an increase in disease burden leads to increased morbidity and mortality, there might be a negligible increase in prevalence of the disease(Gali, 2006). Rainfall patterns also have an effect on the transmission of schistosomiasis; in Senegal, the snail specie *Biomphalariapfeifferi* is responsible for *S. mansoni* transmission during the raining season, while during the dry season *S. haematobium* infection is transmitted by *Bilunusglobosus*(Ernould, 1999).

Proximity to water sources

The schistosome parasite requires an avenue wherein there is direct contact between the molluscan intermediate snail and the final human host for transmission of schistosomiasis to take place(Brooker, 2007). An estimated 76% of the sub-Saharan population lives close to various open water bodies which are infested with the intermediate snail host necessary for the transmission of the disease (P. Steinmann, 2006). Various studies have established a direct association between the intensity of the disease and proximity of infected individuals to natural water sources such as lakes, rivers, and ponds (Kapito-Tembo AP, 2009). A study carried out in Blantryre district in Malawi, showed that children whose school were closer to open water bodies had increased risk of infection(Kapito-Tembo AP, 2009), a finding in consonance with that reported by Clennon and co-workers(Clennon, 2006).

Man-made ecological changes

Ecological changes due to man-made construction of irrigation schemes, reservoirs and dams for agricultural purposes and electricity generation are also responsible for continued transmission of schistosomiasis in some in sub-Saharan African countries (Fenwick, 2009). Construction of dams led to remarkable increase in cases of urinary schistosomiasis as experienced in some sub-Saharan Africa countries such as Senegal, Cote d'Ivoire, Ghana, Mali, Namibia, and Cameroun(Olveda, 2013). Steinmann and co-workers estimated that 13.6% (106 million) of people vulnerable to schistosomiasis reside close to irrigation schemes and large dam reservoirs (P. Steinmann, 2006).

Socio-economic factors

Socio-economic factors influencing the continuous transmission of the debilitating disease in sub-Saharan countries include poverty occupational activities, poor sanitation and hygiene, and non-availability of potable water for domestic use (Gryseels, 2012). A World Bank analysis confirmed that the majority of the sub-Saharan population survive on between US$ 1.25–2 per day(Hotez PJ, 2009). King postulated a vicious cycle between poverty and schistosomiasis. He explained that poverty compels an individual to utilizing contaminated water sources for his domestic activities therefore getting infected with the disease, on getting sick due to the infection, he becomes unable to engage in activities to earn his livelihood and thus, poverty persists(King C. , 2010). Ugbomoiko and co-workers established the link between schistosomiasis and poverty in their cross-sectional study in two peri-urban communities in Osun State, Nigeria. An alarming 62% prevalence was recorded among 1023 individuals under study (Ugbomoiko, 2010).

An analysis by Esrey and co-workers reported on the role of improved water supply and hygiene on disease transmission and incidence. They concluded that availability of safe water and sanitation are necessary for reducing the incidence and prevalence of schistosomiasis and some other water related diseases(Esrey, 1991). Many inhabitants of sub-Saharan countries have limited access to potable water for domestic use, leaving them with the option of using natural water bodies such as lakes, rivers, ponds, and other water sources contaminated with developmental stages of the schistosome parasite. A study carried out in northern Nigeria showed the link between safe water and intensity of urinary schistosomiasis. A higher rate of infection (88.57%) was recorded in a community that only had a pond as source of water for domestic use in comparison with 0.59% in a neighboring community with borehole(Kanwai, 2011).

Occupational activities such as fishing and farming are also risk factors for transmission of the disease. Contact with infected water is a vital factor in transmission of infection; women and children get exposed to infection during activities such as laundry, plate washing, and water fetching for domestic use and bathing. Recreational activities such as swimming and diving also expose an individual to infection(WHO, schistosomiasis fact sheet, 2014).

2.4 LIFE CYCLE OF SCHISTOMIASIS

Matured schistosomes are usually grayish or white worms with a length of 7–20 mm, having a cylindrical shape with two ending suckers, a blind digestive tract, a complex tegument, and reproductive organs. A distinguishing feature in this trematode compared with other trematodes is its existence in two sexes. The male has a gyneaphoric channel or a groove, wherein it grips the female which is usually longer and thinner. The male and female schistosomes live as permanently embraced couples in the perivesical venous plexus (in *S. haematobium*) or in the mesentric venous plexus (in *S. mansoni* and *S. japonicum* species). The schistosomes get nourishment from the host blood and globulins by means of anaerobic glycolysis and excrete the waste back into the body of the hosts(Gryseels, 2012). A female schistosome has the capacity to produce hundreds of eggs per day as discovered in the African species, and about thousands of eggs per day in the oriental species. The individual ovum is home to miracidium larva with cilia that produce proteolytic enzymes which aid the eggs to move either towards the lumen of the bladder or towards the host intestine(Gryseels, 2012).

Subsequently, the parasites eggs are released into the faeces or urine where they remain alive for about seven days. When they get into fresh water, the miracidium is released from the egg. With the aid of chemical stimuli and light, the miracidium seeks the freshwater snail which is its intermediate host. On locating the snail, the miracidium penetrates it and undergoes asexual reproduction to produce multicellular sporocytes which develop to cercarial larvae having embryonic suckers as well as a two-branched tail.[2] After 4–6 weeks of infecting the snail, the cercariae leave the snail and gyrate around for about 72 h looking out for the skin of a prospective host. Once released from the snail the cercariae are instigated by light mainly during the day time. On locating a human host skin, the cercariae burrow into it, migrate into the blood through the liver and lungs and undergo transformation into schistosomula also called young worms(Gryseels, 2012).

The schistosomula mature within 4–6 weeks inside the portal vein, mate, and migrate to their destination, which is either the perivesicular or mesenteric venous plexus, to start the cycle again. A single infected snail has the potential of shedding thousands of cercariae daily for many months. An adult schistosome has an average lifespan of between three to five years, but it can as well live for 30 years. A single schistosome pair has a theoretical reproduction potential of up

to 600 billion schistosomes(Gryseels, 2012). The intermediate freshwater snail inhabits calm or slowly moving freshwater lakes, rivers, ponds, or streams. The rate of infection in human increases with the duration of time spent in contaminated water(Gray, 2011). Microscopic examination of stools and urine is the gold-standard for detection (diagnosis) of schistosomal infection. The schistosome eggs are easily seen and identified on microscopy due to its peculiar size and shape, and possession of a lateral or terminal spine(Gray, 2011).

2.5 MORBIDITY AND MORTALITY

The significance of morbidity and mortality resulting from helminthic infections including schistosomiasis has been grossly underestimated in most developing countries.[12] School-aged children, teenagers, women and young adults are mostly hit with the morbidity and mortality associated with schistosomiais(Rollinson, 2013). Population studies of schistosoma-infected children revealed that schistosomiasis can cause growth retardation, fatigue, weakness, impairment of memory and cognitive reasoning, and increased risk of anemia, leading to poor academic performance, thus limiting the potential of infected children (Gray, 2011). These negative outcomes in children add to the socioeconomic burden of the society (Conteh, 2010).

Though schistosomiasis is rarely fatal, it causes long term morbidity such as anemia which results from bleeding from the urinary and intestinal tracts due to worm invasion and movements; iron deficiency is also an outcome of the disease sequel to nutritional impairment such as nutrient mal absorption and digestive disorder like diarrhea (Hürlimann, 2014). A study in Daekena, in the Republic of Niger an area endemic for urinary schistosomiasis, revealed 41.7% of the 174 school children having iron deficiency while 57.7% exhibited anaemia related to iron deficiency(Prual, 1992). A longitudinal study in Burkina Faso among 1727 Burkinabe children aged 6–17 years revealed a dramatic increase in hemoglobin concentration following chemotherapy of *S. haematobium* compared with baseline concentration a year earlier(Koukounari, 2007).

Clinical observation and autopsy strongly indicate that people, specifically elderly patients, die as a result of schistosomal-induced kidney damage(Gryseels, 2012).Urogenital schistosomiasis is a key predisposing agent for Human Immunodeficiency Virus (HIV) transmission. Urogenital

schistosomiasis in HIV-infected women increases the ease of transmission to male sexual partners, as well as transmission from an HIV-infected male to his sexual partner. It also hastens the progression of the disease in people already infected with the virus by increasing the plasma concentration of the HIVRNA (viral load)(Mbabazi, 2011). A study among Zimbabwean women showed that women with *S. haematobium* eggs in their pap smear had a risk three times higher of having HIV(Kjetland, 2006).

Studies on animal models and human subjects have established adverse consequences of schistosomiasis on pregnancy outcomes. *S. haematobium* infection has been linked to placental inflammation, leading to poor birth-outcomes as a result of placental incompetency. Heavy *S. mansoni* infection has also been linked to higher risk of anaemia that might subsequently lead to maternal mortality or low birth weight (LBW) babies. The anemia may be due to urinary iron loss and fecal waste. Proinflammatory cytokines resulting from schistosomiasis infection leads to anorexia or loss of appetite of pregnant women which might ultimately result in reduced maternal weight gain and thus lead to a LBW baby(Friedman, 2007). An observational study in Tanzania showed that there was a high prevalence of *S. mansoni* infection among the pregnant women and the high intensity of infection exposes the women to a higher risk of anemia during pregnancy(Ajanga, 2006). Another study in Tanzania linked the delivery of LBW babies to infection with parasitic diseases including schistosomiasis during pregnancy(Dreyfuss, 2001). The study has shown an elevated progression of liver fibrosis in people co-infected with schistosomiasis and hepatitis C virus in comparison with cases of single infections, which ultimately led to advanced liver disease(El-Awady, 2006).

2.6 DIAGNOSIS

Schistosomiasis is diagnosed through the detection of parasite eggs in stool or urine specimens. Antibodies and/or antigens detected in blood or urine samples are also indications of infection. For urogenital schistosomiasis, a filtration technique using nylon, paper or polycarbonate filters is the standard diagnostic technique. Children with *S. haematobium* almost always have microscopic blood in their urine which can be detected by chemical reagent strips .The eggs of intestinal schistosomiasis can be detected in fecal specimens through a technique using

methylene blue-stained cellophane soaked in glycerin or glass slides, known as the Kato-Katz technique (Gray, 2011).

For people living in non-endemic or low-transmission areas, serological and immunological tests may be useful in showing exposure to infection and the need for thorough examination, treatment and follow-up(Gryseels, 2012).

2.7 PREVENTION AND CONTROL

The control of schistosomiasis is based on large-scale treatment of at-risk population groups, access to safe water, improved sanitation, hygiene education, and snail control .The WHO strategy for schistosomiasis control focuses on reducing disease through periodic, targeted treatment with praziquantel through the large-scale treatment (preventive chemotherapy) of affected populations. It involves regular treatment of all at-risk groups. In a few countries, where there is low transmission, the interruption of the transmission of the disease should be aimed for(Fenwick, 2009).

Groups targeted for treatment are: School-aged children in endemic areas, Adults considered to be at risk in endemic areas, and people with occupations involving contact with infested water, such as fishermen, farmers, irrigation workers, and women whose domestic tasks bring them in contact with infested water and Entire communities living in highly endemic areas(Gray, 2011).

The frequency of treatment is determined by the prevalence of infection in school-age children. In high-transmission areas, treatment may have to be repeated every year for a number of years. Monitoring is essential to determine the impact of control interventions. The aim is to reduce disease morbidity and transmission: periodic treatment of at-risk populations will cure mild symptoms and prevent infected people from developing severe, late-stage chronic disease. However, a major limitation to schistosomiasis control has been the limited availability of praziquantel(Olveda, 2013). Data for 2016 show that 35.6% of people requiring treatment were reached globally, with a proportion of 53.7% of school-aged children requiring preventive chemotherapy for schistosomiasis being treated .Praziquantel is the recommended treatment against all forms of schistosomiasis. It is effective, safe, and low-cost. Even though re-infection

may occur after treatment, the risk of developing severe disease is diminished and even reversed when treatment is initiated and repeated in child hood(Roberts T, 2011).

Schistosomiasis control has been successfully implemented over the past 40 years in several countries, including Brazil, Cambodia, China, Egypt, Mauritius, Islamic Republic of Iran, Oman, Jordan and Saudi Arabia. There is evidence that schistosomiasis transmission was interrupted in Morocco. In Burkina Faso, Ghana, Niger, Rwanda, Sierra Leone, the United Republic of Tanzania, and Yemen, it has been possible to scale-up schistosomiasis treatment to the national level and have an impact on the disease in a few years. An assessment of the status of transmission is being made in several countries .Over the past 10 years, there has been scale-up of treatment campaigns in a number of sub-Saharan countries, where most of those at risk live(WHO, schistosomiasis fact sheet, 2014).

CHAPTER THREE: RESEARCH DESIGN AND METHODOLOGY

3.0. INTRODUCTION

This chapter shows various methods and techniques which will be used this study .It includes; research design, data collection, target population, sample size, research instruments and methods of data analysis and data presentation.

3.1. RESEARCH APPROACHES AND DESIGN

A cross-sectional study design was used to conduct this study

3.1.1. Research design

The researcher used descriptive survey research design. The major aim of a descriptive study according to Kumar (2005) is to describe and provide information on what is prevalent regarding a group of people, a community, a phenomenon or a situation. This study also will use renowned theoretical perspectives to derive the research questions of the study and to name the research variables. This stance of the study as descriptive research is underscored by Hussey and Hussey's (2010) argument that research constructs in a descriptive study must be supported by established theory.

Then present research put into consideration two approaches including: quantitative and qualitative.

3.1.2. Quantitative approach

This approach helped in numerical data to investigate traits and situations in data collection and data were analyzed using statistical methods to arrive at results which were interpreted to give meanings of the study.

3.1.3. Qualitative approach

This approach emphasizes on description where people's event views and arguments to give different ideas and arguments about the study.

3.2. TARGET POPULATION

The target population of this study were under 18 years' old students of P4, P5, and P6 of Kirehe primary schools at Kirehe Island.

Age group			
9-13	0	137	137 (60.8%)
14 - 18	0	88	88 (39.1%)

3.3. SAMPLING PROCEDURES

A stratified sampling technique will be employed to select the subjects of this study. Stratified sampling is a probability sampling technique wherein the researcher divides the entire population into different subgroups or strata, then randomly selects the final subjects proportionally from the different strata .During sampling for this study, 113 of male and 112 female students were randomly selected in each intake (P4, P5, and P6), until the calculated sample size is achieved.

3.4. SAMPLE SIZE

Since the prevalence (p) of schistosomiasis obtained in the recent study conducted Nigerian primary school was 17.8%(Salwa DAWAKI, 2016)we set p= 0.178 to yield the value of the sample size (n). Assuming that we require the estimate to be within 5% of the true value in either direction then, at 95% CI, the sample size, $n= z^2.p(1-p)/d^2$, where z is the value of the standard normal Distribution corresponding to a significance level of α (1.96 for α=0.05), and d=0.05.

$n = (1.96)^2 \frac{0.178(1-0.178)}{(0.05)^2} = 224.83$Finally 225children were selected in this study

3.5. RESEARCH INSTRUMENTS FOR DATA COLLECTION

A questionnaire was used to collect data which were required for this study. Demographic characteristics and laboratory results of stool analysis were filled in that questionnaire. Sterilized stool collection cup, slides and cover slips, wood applicator stick, conic tubes, normal saline, lugol iodine solution, Microscopy and personal protective equipment were used to analyze stool

macroscopically and microscopically. Pen, data collection sheets and computer were used to record, store and analysis of the data collected.

3.6 DATA COLLECTION PROCEDURES

Data including age, sex and intake level were recorded on questionnaire by face to face interview. Stool sample collection vials were labeled with the patients ID and the names of the children. The researcher instructed the selected participants on how to correct stool samples. The labeled stool correction vials were given to the patient for sample collection. The collected samples were preserved and transported to Hanika health centre laboratory for analysis, where the samples were analyzed by wet mount procedures.

In the Wet mount, fresh stool samples (approximately 2 mg of stool) were put on a slide with wooden applicator, emulsified with a drop of physiological saline (0.85 %) for diarrheic and semi solid or Iodine for formed stools, covered with cover slide and examined under microscope using first 10 × objectives and then 40 × objectives(Davis, 2002). Results obtained were recorded on questionnaires.

3.6. DATA ANALYSIS PROCEDURES

Categorical measurements (age groups and intake, sex and schistosoma status) were reported as number and percentages. Descriptive statistics will be used to give a clear picture of background variables like age and to determine the prevalence of shistosomiasis. The statistical analysis were be performed by IBM SPSS version 21, software for statistics.

3.7. ETHICAL CONSIDERATION

Confidentiality was of great importance while gathering information. This is the reason why the identity of individuals from whom the information was drawn was not permeated. Informants were not pressured to become a subject of the research. This was done to ensure the safety, social and psychological of both children and researcher. Then after, the researcher tried to get data from respondents; the information given had to be treated with confidentiality and anonymity. This study was revised and approved by a research committee within the school of Health

Sciences of Kibogora polytechnic. Ethical approval were also requested from Kirehe primary school.

3.8. RELIABILITY AND VALIDITY MEASURES

Validity and reliability of the instruments to be used in this study will be given assurance in the way the researcher will give to his supervisor such instruments for the necessary corrections.

To ensure the validity of the instrument, research will check the questionnaires for the consistency of the items, intelligibility and clarity, for adjustment and realignment purposes. As for reliability, the concept refers to the degree to which the same results would be obtained in repeated attempt of the same tests. Moreover, ensuring the reliability of the instruments, the study will be conducted into two phases: In the first place, the researcher will use a pre-test to see whether the questions are well formulated, by delivering ten questionnaires to students of Kirehe primary school. In the second phase, after making necessary corrections, the instruments will be re-administered, this time to the main respondents.

CHAPTER FOUR: DATA PRESENTATION, ANALYSIS, INTERPRETATION AND SUMMARY

4.0 INTRODUCTION

This chapter deals with data analysis, presentation of findings and discussion. It starts with presentation of characteristics of study subjects, and then each objective and question is being addressed by the analysis.

4.1 DATA PRESENTATION AND ANALYSIS

4.1.1 Demographic characteristics of study subject

Table 1: Characteristics of the study respondents

Variables	Gender		Total
Age group	***Females***	**Males**	
9-13	73	64	137 (60.8%)
14 - 18	40	48	88 (39.1%)
Intake level			
P4	38	37	75 (33%)
P5	38	37	75 (33%)
P6	37	38	75 (33%)
Total	**113(50.2%)**	**112(49.7%)**	**225 (100%)**

The characteristics of the study respondents were showed in Table 1. A total of 225 participants aged between 9 to 18 years including 112 (50.2%) females and 112 (49.7%) Males were selected in the study. The mean ages of study subjects were 12.81 ± 2.9. The patients aged 14 to 18 years were 88 (39.1%) including 40 females and 48 males. An equal number (75) of students were selected from each intake level where, 37females and 38 males were in P6, 38 females and 37 males in P5 and 38 females and 37 males in P4.

4.1.2 Prevalence of schistosomiais

Table 2: Frequency distribution of schistosomiasis

Status	Frequency	Percent (%)
Negative	225	100
Positive	0	0
Total	**225**	**100%**

Frequency distributions of schistosomiasis were presented in Table 2. All students who were tested for schistosomiasis infections got negative results. Therefore the prevalence of schistosomiasis at Kirehe primary school is 0%.

4.1.3 Risk factors of schistosomiasis

Table 3: Distribution of schistosomiasis based on gender, intake level and age group

Variables	Schistosomiasis status		Total
Gender	**Positive**	**Negative**	
Males	0	112	112(49.7%)
Females	0	113	113(50.2%)
Age group			
9-13	0	137	137 (60.8%)
14 - 18	0	88	88 (39.1%)
Intake level			
P4	0	75	75 (33%)
P5	0	75	75 (33%)
P6	0	75	75 (33%)
Total	**0 (0.00)**	**225 (100%)**	**225(100%)**

Distribution of schistosomiasis based on gender, intake level and age group were showed in Table 3. According to the present study there were no students with schistosoma spp infection. Therefore intake level, age group and gender had negative relationship with schistosomiasis in this study.

4.2 DISCUSSION

4.2.1 Prevalence of schistosomiasis

The present study obtained the prevalence of schistosomiasis of 0%. Different similar studies were conducted. A Study in Tanzania, a total of 5952 school children from 36 schools were recruited for the study and had their stool and Urine specimens examined, Schistosomiasis out of 5952 children:898 (15.1%) were positive for S.Mansoni while 519 (8.9 %) were positive forS.Hematobium (Dawaki S, 2015).Very few systematic reviews were done aiming to present the prevalence of parasitic infections in the developing world over the last 30 years , and high level of Schistosoma mansoni were found in Zimbabwe (50%) and Tanzania (63.5%) , but the prevalence in other countries was typically around 30% (Hotez, 2012). In the other studies conducted in Africa, The prevalence of schistosomiasis among school children were; 45% in Sudan (Hassan Ahmed Ismail, 2014) and 57.1% in rural community of south east Nigeria(BSC Uzochukwu, 2010). The highest prevalence (62.1%) of schistosoma mansoni in Rwanda was found among school children of Nkombo Island, Rusizi district in western province(Eugene Ruberanziza, 2015). The overall prevalence of schistomiasis in Rwanda is 2.7%(Eugene Ruberanziza, 2015). Therefore we were not surprised by obtaining the prevalence of 0%. Another explanation is that climate change mainly in winter are associated with Schistosomiasis and this study were conducted in summer.

4.2.2 Risk factors of schistomiasis

According to the present study there were no students with schistosoma spp infection. Therefore intake level, age group and gender had negative relationship with schistosomiasis in this study. The multiple logistic regression analysis in the study conducted in Nigeria, revealed that age < 18 years (OR = 2.13; 95% CI; 1.34- 3.41), presence of infected family members (OR = 3.98; 95% CI; 2.13-7.46), and history of infection (OR = 2.87; 95% CI; 1.87- 4.56) were the

significant risk factors associated with schistosomiasis in these hausa communities in Kano state (Salwa DAWAKI, 2016).

The prevalence of schistosomiasis was significantly higher among children aged >10 years compared to those aged ≤10 years (P<0.05) in the study conducted in Yemen. Multivariate analysis confirmed that presence of other infected family member (P<0.001), low household monthly income (P=0.003), using unsafe sources for drinking water (P=0.003), living nearby stream/spring (P=0.006) and living nearby pool/pond (P=0.002) were the key factors significantly associated with schistosomiasis among these children (Sady H, 2013). In contrast of the current study that study conducted showed that >18 years is significantly associated with shistosomiasis. However they did not determine the relationship between sex and schistosoma infection.

4.3 SUMMARY OF FINDINGS

All students who were tested for schistosomiasis infections got negative results. Therefore intake level, age group and gender had negative relationship with schistosomiasis in this study.

CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS

5.0 INTRODUCTION

This chapter presents, conclusions, recommendations and Suggestions for further study.

5.1 CONCLUSION

There is no Schistosoma spp infection at Kirehe Island therefore intake level, age group and gender have no effect on schistosomiasis status.

5.2 RECOMMENDATIONS

To the parents

All children at Kirehe island should not allowed to play with stagnant water and should not allowed to swim in lake Kivu usually after its rain.

To ministry of health

Innovative and integrated control measures to control this infection should be implemented among Rwandan population.

Periodic school-based and community-based drug distribution, health education, provision of clean and safe drinking water, introduction of proper sanitation will help to reduce the prevalence and morbidity of schistosomiasis in Rwanda.

5.3 SUGGESTION FOR FURTHER STUDIES

Further studies should determine the prevalence of other helimiths infection on this island.

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APPENDICES

APPENDIX 1: DATA COLLECTION SHEET RESULTS

SN	Patient code	Age	Sex	Type of results found		Observation
				Schistosoma negative	Schistosoma positive	
1	3003	9	Male	Yes	No	No presence of Schistosoma helmith.
2	4007	9	Male	Yes	No	No presence of Schistosoma helmith.
3	1012	9	Male	Yes	No	No presence of Schistosoma helmith.
4	203	9	Male	Yes	No	No presence of Schistosoma helmith.
5	101	9	Male	Yes	No	No presence of Schistosoma helmith.
6	603	9	Male	Yes	No	No presence of Schistosoma helmith.
7	007	9	Male	Yes	No	No presence of Schistosoma helmith.
8	8003	9	Male	Yes	No	No presence of Schistosoma helmith.
9	3005	9	Male	Yes	No	No presence of Schistosoma helmith.
10	1201	9	Male	Yes	No	No presence of Schistosoma helmith.
11	004	9	Male	Yes	No	No presence of Schistosoma helmith.
12	012	9	Male	Yes	No	No presence of Schistosoma helmith.
13	013	9	Male	Yes	No	No presence of Schistosoma helmith.
14	1019	9	Male	Yes	No	No presence of Schistosoma helmith.
15	1503	9	Male	Yes	No	No presence of Schistosoma helmith.
16	1601	9	Male	Yes	No	No presence of Schistosoma helmith.
17	017	9	Male	Yes	No	No presence of Schistosoma helmith.
18	1803	9	Male	Yes	No	No presence of Schistosoma helmith.
19	903	9	Male	Yes	No	No presence of Schistosoma helmith.
20	203	9	Male	Yes	No	No presence of

						Schistosoma helmith.
21	2103	9	Male	Yes	No	No presence of Schistosoma helmith.
22	1087	9	Male	Yes	No	No presence of Schistosoma helmith.
23	1209	9	Male	Yes	No	No presence of Schistosoma helmith.
24	0025	9	Male	Yes	No	No presence of Schistosoma helmith.
25	0025	9	Male	Yes	No	No presence of Schistosoma helmith.
26	26003	9	Male	Yes	No	No presence of Schistosoma helmith.
27	0027	9	Male	Yes	No	No presence of Schistosoma helmith.
28	0028	9	Male	Yes	No	No presence of Schistosoma helmith.
29	0029	9	Male	Yes	No	No presence of Schistosoma helmith.
30	0030	9	Male	Yes	No	No presence of Schistosoma helmith.
31	0031	9	Male	Yes	No	No presence of Schistosoma helmith.
32	0032	10	Male	Yes	No	No presence of Schistosoma helmith.
33	0033	10	Male	Yes	No	No presence of Schistosoma helmith.
34	0034	10	Male	Yes	No	No presence of Schistosoma helmith.
35	0035	10	Male	Yes	No	No presence of Schistosoma helmith.
36	0036	10	Male	Yes	No	No presence of Schistosoma helmith.
37	0037	10	Male	Yes	No	No presence of Schistosoma helmith.
38	0038	10	Male	Yes	No	No presence of Schistosoma helmith.
39	0039	10	Male	Yes	No	No presence of Schistosoma helmith.
40	0040	10	Male	Yes	No	No presence of Schistosoma helmith.
41	0041	10	Male	Yes	No	No presence of Schistosoma helmith.
42	0042	10	Male	Yes	No	No presence of

						Schistosoma helmith.
43	0043	10	Male	Yes	No	No presence of Schistosoma helmith.
44	0044	10	Male	Yes	No	No presence of Schistosoma helmith.
45	0045	10	Male	Yes	No	No presence of Schistosoma helmith.
46	0046	10	Male	Yes	No	No presence of Schistosoma helmith.
47	0047	10	Male	Yes	No	No presence of Schistosoma helmith.
48	0048	10	Male	Yes	No	No presence of Schistosoma helmith.
49	0049	10	Male	Yes	No	No presence of Schistosoma helmith.
50	0050	10	Male	Yes	No	No presence of Schistosoma helmith.
51	1234	10	Male	Yes	No	No presence of Schistosoma helmith.
52	2121	10	Male	Yes	No	No presence of Schistosoma helmith.
53	1267	10	Male	Yes	No	No presence of Schistosoma helmith.
54	1401	10	Male	Yes	No	No presence of Schistosoma helmith.
55	0090	10	Male	Yes	No	No presence of Schistosoma helmith.
56	0956	10	Male	Yes	No	No presence of Schistosoma helmith.
57	0578	10	Male	Yes	No	No presence of Schistosoma helmith.
58	0582	10	Male	Yes	No	No presence of Schistosoma helmith.
59	0539	10	Male	Yes	No	No presence of Schistosoma helmith.
60	0601	10	Male	Yes	No	No presence of Schistosoma helmith.
61	0617	10	Male	Yes	No	No presence of Schistosoma helmith.
62	062	10	Male	Yes	No	No presence of Schistosoma helmith.
63	00363	10	Male	Yes	No	No presence of Schistosoma helmith.
64	00364	10	Male	Yes	No	No presence of

						Schistosoma helmith.
65	00365	10	Male	Yes	No	No presence of Schistosoma helmith.
66	00366	10	Male	Yes	No	No presence of Schistosoma helmith.
67	00367	10	Male	Yes	No	No presence of Schistosoma helmith.
68	00683	10	Male	Yes	No	No presence of Schistosoma helmith.
69	00693	10	Male	Yes	No	No presence of Schistosoma helmith.
70	00703	10	Male	Yes	No	No presence of Schistosoma helmith.
71	00713	10	Male	Yes	No	No presence of Schistosoma helmith.
72	00723	10	Male	Yes	No	No presence of Schistosoma helmith.
73	00733	10	Male	Yes	No	No presence of Schistosoma helmith.
74	00743	10	Male	Yes	No	No presence of Schistosoma helmith.
75	00753	10	Male	Yes	No	No presence of Schistosoma helmith.
76	00763	10	Male	Yes	No	No presence of Schistosoma helmith.
77	00773	10	Male	Yes	No	No presence of Schistosoma helmith.
78	00783	10	Male	Yes	No	No presence of Schistosoma helmith.
79	00793	9	Male	Yes	No	No presence of Schistosoma helmith.
80	00813	9	Male	Yes	No	No presence of Schistosoma helmith.
81	00803	9	Male	Yes	No	No presence of Schistosoma helmith.
82	00823	9	Male	Yes	No	No presence of Schistosoma helmith.
83	0083	9	Male	Yes	No	No presence of Schistosoma helmith.
84	2048	9	Male	Yes	No	No presence of Schistosoma helmith.
85	5803	9	Male	Yes	No	No presence of Schistosoma helmith.
86	683	9	Male	Yes	No	No presence of

						Schistosoma helmith.
87	1. 003	9	Male	Yes	No	No presence of Schistosoma helmith.
88	2. 003	9	Male	Yes	No	No presence of Schistosoma helmith.
88	3. 003	9	Male	Yes	No	No presence of Schistosoma helmith.
89	4. 003	9	Male	Yes	No	No presence of Schistosoma helmith.
90	5. 003	9	Male	Yes	No	No presence of Schistosoma helmith.
91	6. 003	9	Male	Yes	No	No presence of Schistosoma helmith.
92	7. 003	9	Male	Yes	No	No presence of Schistosoma helmith.
93	8. 003	9	Male	Yes	No	No presence of Schistosoma helmith.
94	9. 003	9	Male	Yes	No	No presence of Schistosoma helmith.
95	10. 003	9	Male	Yes	No	No presence of Schistosoma helmith.
96	11. 003	9	Male	Yes	No	No presence of Schistosoma helmith.
97	12. 003	9	Male	Yes	No	No presence of Schistosoma helmith.
98	13. 003	9	Male	Yes	No	No presence of Schistosoma helmith.
100	14. 003	9	Male	Yes	No	No presence of Schistosoma helmith.
101	15. 003	9	Male	Yes	No	No presence of Schistosoma helmith.
102	16. 003	9	Male	Yes	No	No presence of Schistosoma helmith.
103	17. 003	10	Male	Yes	No	No presence of Schistosoma helmith.
104	18. 003	10	Male	Yes	No	No presence of Schistosoma helmith.
105	19. 003	10	Male	Yes	No	No presence of Schistosoma helmith.
106	20. 003	10	Male	Yes	No	No presence of Schistosoma helmith.
107	21. 003	10	Male	Yes	No	No presence of Schistosoma helmith.
108	22. 003	10	Male	Yes	No	No presence of

						Schistosoma helmith.
109	23. 003	10	Male	Yes	No	No presence of Schistosoma helmith.
110	24. 003	10	Male	Yes	No	No presence of Schistosoma helmith.
111	25. 003	10	Male	Yes	No	No presence of Schistosoma helmith.
112	26. 003	10	Male	Yes	No	No presence of Schistosoma helmith.
113	27. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
114	28. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
115	29. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
116	30. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
117	31. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
118	32. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
119	33. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
120	34. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
121	35. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
122	36. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
123	37. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
124	38. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
125	39. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
126	40. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
127	41. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
128	42. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
129	43. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
130	44. 003	10	Female	Yes	No	No presence of

						Schistosoma helmith.
131	45. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
132	46. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
133	47. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
134	48. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
135	49. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
136	50. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
137	51. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
138	52. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
139	53. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
140	54. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
141	55. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
142	56. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
143	57. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
144	58. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
145	59. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
146	60. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
147	61. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
148	62. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
149	63. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
150	64. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
160	65. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
161	66. 003	10	Female	Yes	No	No presence of

						Schistosoma helmith.
162	67. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
163	68. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
164	69. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
165	70. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
166	71. 003	10	Female	Yes	No	No presence of Schistosoma helmith.
167	72. 003	11	Female	Yes	No	No presence of Schistosoma helmith.
168	73. 003	11	Female	Yes	No	No presence of Schistosoma helmith.
169	74. 003	11	Female	Yes	No	No presence of Schistosoma helmith.
170	75. 003	11	Female	Yes	No	No presence of Schistosoma helmith.
171	76. 003	11	Female	Yes	No	No presence of Schistosoma helmith.
172	77. 003	11	Female	Yes	No	No presence of Schistosoma helmith.
173	78. 003	11	Female	Yes	No	No presence of Schistosoma helmith.
174	79. 003	11	Female	Yes	No	No presence of Schistosoma helmith.
175	80. 003	11	Female	Yes	No	No presence of Schistosoma helmith.
176	81. 003	11	Female	Yes	No	No presence of Schistosoma helmith.
177	82. 003	11	Female	Yes	No	No presence of Schistosoma helmith.
178	83. 003	11	Female	Yes	No	No presence of Schistosoma helmith.
179	84. 003	11	Female	Yes	No	No presence of Schistosoma helmith.
180	85. 003	11	Female	Yes	No	No presence of Schistosoma helmith.
181	86. 003	11	Female	Yes	No	No presence of Schistosoma helmith.
182	87. 003	11	Female	Yes	No	No presence of Schistosoma helmith.
183	88. 003	11	Female	Yes	No	No presence of

						Schistosoma helmith.
184	89. 003	11	Female	Yes	No	No presence of Schistosoma helmith.
185	90. 003	11	Female	Yes	No	No presence of Schistosoma helmith.
186	91. 003	11	Female	Yes	No	No presence of Schistosoma helmith.
187	92. 003	11	Female	Yes	No	No presence of Schistosoma helmith.
188	93. 003	11	Female	Yes	No	No presence of Schistosoma helmith.
189	94. 003	11	Female	Yes	No	No presence of Schistosoma helmith.
190	95. 003	11	Female	Yes	No	No presence of Schistosoma helmith.
191	96. 003	11	Female	Yes	No	No presence of Schistosoma helmith.
192	97. 003	11	Female	Yes	No	No presence of Schistosoma helmith.
193	98. 003	11	Female	Yes	No	No presence of Schistosoma helmith.
194	99. 003	12	Female	Yes	No	No presence of Schistosoma helmith.
195	195003	12	Female	Yes	No	No presence of Schistosoma helmith.
196	196003	12	Female	Yes	No	No presence of Schistosoma helmith.
198	19803	12	Female	Yes	No	No presence of Schistosoma helmith.
199	199003	12	Female	Yes	No	No presence of Schistosoma helmith.
200	200003	12	Female	Yes	No	No presence of Schistosoma helmith.
201	201003	12	Female	Yes	No	No presence of Schistosoma helmith.
202	202003	12	Female	Yes	No	No presence of Schistosoma helmith.
203	20303	12	Female	Yes	No	No presence of Schistosoma helmith.
204	20403	12	Female	Yes	No	No presence of Schistosoma helmith.
205	20503	12	Female	Yes	No	No presence of Schistosoma helmith.
206	20603	12	Female	Yes	No	No presence of

						Schistosoma helmith.
207	20703	12	Female	Yes	No	No presence of Schistosoma helmith.
208	20803	12	Female	Yes	No	No presence of Schistosoma helmith.
210	2170	13	Female	Yes	No	No presence of Schistosoma helmith.
211	2115	13	Female	Yes	No	No presence of Schistosoma helmith.
212	2123	13	Female	Yes	No	No presence of Schistosoma helmith.
213	213	13	Female	Yes	No	No presence of Schistosoma helmith.
214	0214	13	Female	Yes	No	No presence of Schistosoma helmith.
215	0215	13	Female	Yes	No	No presence of Schistosoma helmith.
216	0216	13	Female	Yes	No	No presence of Schistosoma helmith.
217	217	13	Female	Yes	No	No presence of Schistosoma helmith.
218	218	14	Female	Yes	No	No presence of Schistosoma helmith.
219	2193	14	Female	Yes	No	No presence of Schistosoma helmith.
220	2203	14	Female	Yes	No	No presence of Schistosoma helmith.
221	2037	14	Female	Yes	No	No presence of Schistosoma helmith.
222	208	14	Female	Yes	No	No presence of Schistosoma helmith.
223	007	14	Female	Yes	No	No presence of Schistosoma helmith.
224	1003	14	Female	Yes	No	No presence of Schistosoma helmith.
225	173	14	Female	Yes	No	No presence of Schistosoma helmith.