KIBOGORA POLYTECHNICS

FACULTY OF HEALTH SCIENCES

DEPARTMENT OF BIOMEDICAL LABORATORY SCIENCES

PREVALENCE OF ASCARIS LUMBRICOIDES AND ASSOCIATED RISK FACTORS AMONG CHILDREN UNDER TEN YEARS OLD

Case study: Kibogora health center

Period: 1stJanuary2019 -31st June 2022.

Under graduate research thesis presented in partial fulfillment of requirement for the award of a Bachelor's degree with honor in Biomedical Laboratory Sciences

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DECLARATION

Declaration by the candidate

We,IRAGIRE Jeannette andHAKIZIMANA NIYONSENGA Sylvie, hereby declare that this is our own original work and not a duplication of any similar academic work. It has therefore not been previously or concurrently submitted for any other degree, diploma or other qualification to Kibogora Polytechnic or any other institution. All materials cited in this paper which are not our own have been duly acknowledged.

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ABSTRACT

The aim of this study was to explore the prevalence of A. lumbricoides and associated risk Factors among children under 10 years old attending Kibogora health center, Nyamasheke District, Rwanda. Specific objectives were: (1) to determine the prevalence of Ascaris lumbricoides in children attending Kibogora health center.(2)To determine the risk factors associated with Ascaris lumbricoides among children attending Kibogora health centre.(3) To determine the levels of Ascaris lumbricoidesin gender of among children under 10 years old of both sex from the years 2019 to 2022. The study adopted a retrospective cross-sectional study design with qualitative and quantitative approaches. The target population of the study was children under ten years old whose size was 1628 from the sample size of 321 was drawn. Secondary data from 1st January2019-31stj June2022 were used and questionnaire for risk factors. Data analysis was performed using the statistical package for social sciences (SPSS) software, version 23 . A total number of 321 children under 10 years old. Due to description of characteristics, this study found that the prevalence of Ascaris lumbricoides was 23.7%. Where female participant were 174 (54%) while 147 (46%) were the males. The study found 76 cases were confirmed for Ascaris lumbricoides, among those confirmed 41 (12.8%) were females while 35 (10.9%) were males. Based on the level of Ascaris lumbricoides in ages of children from 1-3 years were 11.5%, from 4-6 were 7.5% and 7-9 were 4.7%. The distribution of levels of Ascaris lumbricoidesin gender, the most of them were female with 12.8% while the male were 10.9 %.

The study show that there were more factors that influencing the Ascaris lumbricoides infection in the children under 10 years old at Kibogora health center was 76 (23.7%).the 65.7% were drink boiled water sometimes at home and 19.3% were never drink boiled water at home, 66.4% were wash their hands sometimes before their meals and 7.2% never wash hands before meals.67.9% were wash hands sometimes after meals 5.9% never wash hands after meals, 77.6 % were eat raw food at home, 78.8% were use tap water at their home and 21.2% use rivers or ponds, 79.4 % use human feces as fertilizer. The drinking boiled water were the determinant of suffering (with p-value < 0.000), wash hands before and after meals were determinant of suffering Ascaris lumbricoides (with p-value <0.000), using animal or human feces as fertilizer (with p-value < 0.014).This study concludes that, the prevalence of Ascaris lumbricoides among children under 10 years old attending Kibogora health center was higher (23.7%). Intervention at eradication of Ascaris lumbricoides need to focus on the

educating the population about wash hands after and before meal,drinking boiled water and wear personal protective equipment during using animal or human faces as fertilizer.

DEDICATION

This work is dedicated to

Our parents

Our Brother and Sisters

Our lectures

Our friends

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The realization of the present research was made possible through the support provided by several people to whom we are indebted.

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LIST OF ABBREVIATIONS AND ACRONYMS

CDC: Center for Disease Control

DALYs: disability adjusted life years

IL: interleukin

IPIs: Intestinal Parasite Infections

KIE: Kigali Institute of Education

NTDs: neglected tropical diseases

PC: Preventive Chemotherapy

RBC: Rwanda Biomedical Centre

SAC: school aged children

SES: socio-economic status

SPSS: statistical package for the social sciences

STH: Soil Transmitted Helminthes

TNF: tumor necrosis factor

WASH: water, sanitation, and hygiene

WHO: world health organization

CHAPTER ONE: GENERAL INTRODUCTION

1.0 INTRODUCTION

This chapter will study on: Background of the study, statement of the problem, purpose of the study, research questions, objectives of the study, significance of the study, limitation of the study and scope of the study.

1.1 BACKGROUND OF STUDY

Globally about 1.5 billion people are affected by Ascaris lumbricoides children are susceptible to infestation to environmental and socio-economic status which has influence on children health, as risk factors. About 5 Billion people in the world are affected with at least one species of soil transmitted helminth it means 1 billion due to Ascaris lumbricoides and 4 billion are at risk. Ascarislumbricoides is soil transmitted helminth commonly distributed in tropical and sub-tropical areas is the common Nematode affecting human with increased prevalence (%) due topoor sanitary conditions. About 4 billion people are at risk, 613 million are specifically school aged children. (Shahida Azhar Ali, 2020)

Ascaris infection cause about 60,000 deaths per year, mainly in children due to intestinal obstruction. An infection occurs to both female and male, but children are more susceptible to infection than adults, especially between 3 to 8 years old. Ascariasis is most prevalent at least 150 countries around the world. The distribution of Ascariasis shows that 8.3% of cases were in south America, central America and the Caribbean, and 16.7% of cases were in Africa and the middle east, and 75% of cases were in central and southeast Asia and the oceanic region. (Knaan Al-Tammeem, 2020)

The study conducted about the impact assessment after five rounds of mass administration in Kenya the prevalence of Ascaris lumbricoides were 9.7% (ollinCollins Okoyo, 2020), in southern high land Rwanda the soil transmitted helminthes were 38% in rural and 13% in urban children Ascaris lumbricoides were 96% of infection (Olga staudacher, 2014) and the

study conducted to evaluate risk factors associated intestinal parasitic infections on schoolchildren Thika district, central Kenya the Ten species of Intestinal parasite were identified among them Ascaris lumbricoides were 74 (19.6%). (T.W. ngonjo, 2020)

Helminthicparasites are among the most common infections in humans. Due to the role of contaminated soil in their transmission cycle, infection with Ascaris lumbricoides are in public health terms know as soil- transmitted helminthiasis (STH) this parasite affect more than a quarter of the world's population, and contribute to a substantial burden of human disease and disability. STH primarily affects individuals in communities with limited access to , and use of water , sanitation, and hygiene (WASH) facilities is the most widespread among the so called neglected tropical disease(NTDs) (de Vlas SJ, 2016)

The intestinal nematode Ascaris lumbricoides is one of the most common causes of infection among the soil-transmitted helminths (STH). Common in the tropics and sub-tropics, it is estimated that more than one quarter of the world population is infected with this helminth. The highest morbidity is found in children, especially in those with a high worm burden. A. lumbricoides can lead to reduced physical fitness, growth retardation, and respiratory and gastrointestinal problems. Evidence if A. lumbricoides infection has a negative impact on cognitive function and educational achievement in school children is controversially debated, (ME, 2008).

Ascariasis is a condition due to the infection by helminths parasite Ascaris lumbricoides. One billion people or 25% of the world's population harbour A. lumbricoides, making it the most prevalent helminthiasis of humans. It is usually a mild disease with relatively low morbidity and mortality rates. The high global prevalence Ascaris ultimately results in 20,000 deaths per year, mainly due to intestinal obstruction. (Chijioke, 2011)

Ascariasis is a common infection in children of tropical countries due to poor sanitation. It is, however, rare in adults. Infection is acquired via faecal-oral transmission through ingestion of food, water, or soil contaminated with embryonated eggs. (Gaash, 2004)

Infection occurs through the oral intake of eggs, usually contained in soil or food. Adult worms live in the lumen of the small intestine where the female lays unembryonated eggs which are excreted with the faeces. In the open, the eggs have to go through three stages of development in order to become infectious; a time during which they are exposed to environmental conditions. When embryonated eggs are swallowed by a human host, the

larvae hatch in the small intestine, have a short migratory phase (venous system, liver, lungs,trachea, oesophagus) after which they return to the small intestine where they mature and mate. (Walker M, 2011)

A. lumbricoides can caused a myriad of complications in the abdomen. The most common complications of Ascaris are intestinal obstruction caused by a worm bolus, which may present as acute or subacute intestinal obstruction or alternatively intussusceptions. Perforation and gangrene of the small bowel. Other areas where adult worms could lodge are in the appendix, causing acute appendicitis and appendicular perforation, or in the biliary and pancreatic ducts, causing hepatic pancreaticAscariasis. (Refeidi, 2007)

Strong recurrent Ascaris lumbricoidesillness can trigger malnutrition, anaemia in high-risk groups, and grow retardation in children. Intestinal parasitic diseases have been shown to keep challenging health care professionals and medical services globally, and they are considered being among the major diseases of public health problems in sub-Saharan Africa. For example, one study conducted in Ethiopia reported that IPIs rates were high among the schoolchildren and many health centres reported that most of the people who go to health centres in Rwanda have at least one intestinal parasitic infection such as Ascaris lumbricoides. (Moise Habiyaremye, 2021)

Although the major focus has been on prevalence of intestinal helminths infection, fewer studies have investigated the socio economic effects of transmission of intestinal helminths and namely Ascaris. It has been reported that the lack of standard toilets and education, occurrence of diarrhoea, lower socio-economic status, inadequate disposal of human excreta and the level of sanitation in households are related to parasitoses. (Cooper ES, 1992)

Laboratory confirmation, macroscopically checked the stool samples to observe the odour, colour, presence of mucus and or blood. Microscopically examined the stool samples after collection in 24 hours. Eggs and larvae of the parasite examined using multiple approaches. The stool samples were concentrated using the formal-ether concentration technique and examined for the presence of Ascaris eggs by direct smears using normal saline and iodine solutions. Besides, sodium nitrate and zinc sulphide floatation techniques, Biermann and stool egg counting techniques were adopted to investigate and count worm eggs and larvae. (Andrade, 2001)

1.2 PROBLEM STATEMENT

Ascaris lumbricoides infections are one of the commonnest intestinal nematode infections in the world. Ascaris lumbricoides is the one most intestinal parasite infecting people worldwide. The 1.2 billion are infected worldwide because of high fertilization ability of female to produce eggs due to high resistance to environmental condition and easy way of transmission among the people due to ingestion food and water contaminated with larvae in its second stage. There is reinfection when there is no immunity. Acute A.lumbricoides it cause about 60,000 death per year, mostly in children because intestinal obstruction. Both male and female can be infected but children are more susceptible to infection than other especially between ages 3 and 8 years old. A.lumbricoides is distributed mainly in warm, moisture climates area. A. lumbricoides is prevalent in at least 150 countries worldwide. The distribution of A. lumbricoidesin South America, Central America, and the Caribbean are 8.3% of cases and in African 16.7% of cases where in Central and Southeast Asia and the Oceanic region are 75% cases. (Kanaan al-tameemi, 2020)

The study conducted to determine the prevalence of intestinal parasite among Kigali institute of education (KIE) during 2010 academic years from February to July. Fresh stool sample was collected randomly to examine microscopically presence of cyst, egg and parasite more than 50.5% stool examined were infected by intestinal parasite among them A. lumbricoideswere 20.0%. (Emile Niyizurugero, 2013)

Besides Preventive chemotherapy (PC) were recommended by WHO to eliminate soil transmitted helminth (STH) as a problem by 2020. Study were conducted in Rwanda, western province from four district along lack kivu prevalent were high in Rubavu (92%), Rusizi (89%) compare to Nyamasheke(60%), Rutsiro(54%)a total of 4998 children school (5-15 years old) by using kato-katiz. A. lumbricoideswere (49.9% range between district are 28.5% to 63.3%).Prevalence of ascaris Lumbricoides and Trichirus trichiura was 7.1% and 13.9 %. (Joseph Kabatende, 2020).

In Rwanda there is big number of in ascaris lumbricoides infections especially in children under 10 years old. As the recent studies described there is high prevalent of ascariasis diseases in areas located around Lake Kivu and affects children on high rate, therefore the purpose of this study was to assess prevalence of Ascaris lumbricoides infections in children

under ten (10) Years old attended at Kibogora Health Center from 1st January, 2019 – 31stjune, 2022

As still health centre there is no full information about prevalence of A.lumbricoides in health centre of Nyamasheke district our contribution will provide information about prevalence of A. lumbricoides in Kibogora health centre and providing preventive measures because this disease it depend mainly on poor hygiene.

1.3 PURPOSE OF THE STUDY

1.3.1 General Objective

The general objective of this study is to assess the prevalence of Ascaris lumbricoides and risk factors associated among children under 10 years old attending kibogora health center from 2019 to 2022.

1.3.2 Specific Objectives

The specific objective will be based on how:

1. To determine the prevalence of Ascaris lumbricoides among children under 10 years old attending Kibogora health center from 2019 to 2022.
2. To determine the risk factors associated with Ascaris lumbricoides among children attending Kibogora health center from 2019 to 2022.
3. To assess prevalence of A. lumbricoides with respect to gender and age among children under10 years old at Kibogora health center from 2019 to 2022.

1.4 RESEARCH QUESTIONS

1. What is the prevalence of Ascaris lumbricoides among children under 10 years old attending Kibogora health center from 2019 to 2022?

2. What arethe risk factors associated with Ascaris lumbricoides among children attending Kibogora health center from 2019 to 2022?

3. What is the levels gender with Ascaris lumbricoides among children under10 years old at Kibogora health center from 2019 to 2022?

1.5. SIGNIFICANCE OF THE STUDY

The findings of this research are essential interest remarkably: personal interest, academic interest, scientific interest and social interest.

First of all this study is carried out in order to know deeply and to improve the knowledge on prevalence of Ascaris lumbricoides infection. This study has interest socially because

ithelp decision makers to establish the strategies pushing Rwandans to prevent Ascariasis diseases in children.

It helps planners to find out how treatment can be used to treat Ascariasis infection.

This study help other researchers in similar domain as a documentary source of information.

The study is also conducted to improve the knowledge in the domain of biomedical laboratory sciences especially to identify the prevalence of Ascaris lumbricoides.

1.6. SCOPE OF THE STUDY

This study conducted in three years and six months(from 1STJanuary 2019-31stjune 2022) retrospective cross-section study among childen under 10 years old attend Kibogora Health Center, Nyamasheke District, Western Provence, Rwanda . Each childrencoming for stool examination were explained about the research and their parents given a consent form and questionnaire to fill once accepted to participate in the research. The scope of this study is to do analysis of stool and were also look out on associated risk factors such asPoor socioeconomic conditions: Use of human feces as fertilizer, Lack of hand washing, Eating unwashed fruits and vegetables and Environmental contamination with feces.

1.7. LIMITATIONS OF THE STUDY

This study was limited by the time where we were doing our research at the same time with clinical placement. The study was limited by the financial support in other to accomplish easily all study requirements such as transport, airtime, and data collection.

CHAPTER TWO: LITERATURE REVIEW

2.0 INTRODUCTION

This chapter include definitions of key concepts/terms to be mentioned here, Literature relating to the first objective, Literature relating to the second objectiveand any other relevant and related literature to support the study.

2.1. DEFINITION OF KEY TERMS AND CONCEPTS

Keywords: STH, Prevalence, helminths and*Ascariasis*.

STH: (Soil Transmitted helminth): is the worms infecting the people transmitted through the contaminated soil. Example: *Ascaris lumbricoides*, *Trichuris trichiura* (whipworm) and *Anclostoma duodenal* (hook worm).(CDC, Parasites soil transmitted helminthes, 2020)

Prevalence: is the number of disease cases on period of time in particular population. The answer to prevalence is Haw many people had this at this period of time? While**Incidence** is new case of disease on given specified period. Prevalence are proportion product of incidence times duration of time.(Bruce, Pope, & Stanistreet, 2008)

Helminth: is a general term meaning worm. The helminths are invertebrates characterized by elongated, flat or round bodies. In medically oriented schemes the flatworms or Platyhelminthes (platy from the Greek root meaning “flat”) include flukes and tapeworms. Roundworms are nematodes (nematode from the Greek root meaning “thread”). These groups are subdivided for convenience according to the host organ in which they reside, e.g., lung flukes, extra intestinal tapeworms, and intestinal roundworms (Schmidt GD, 1985)

Nematodes: nematodes are cylindrical rather than flattened; hence the common name roundworm. The body wall is composed of an outer cuticle that has a no cellular, chemically complex structure, a thin hypodermis, and musculature. The cuticle in some species has longitudinal ridges called alae. The bursa, a flap like extension of the cuticle on the posterior end of some species of male nematodes, is used to grasp the female during copulation. (Hunter GW, 1976)

2.2 PREVALENCE OF ASCARIS LUMBRICOIDES

About 5 billion people in the word are affected with at least one species of soil transmitted helminth it means 1 billion due to Ascaris lumbricoides and 4 billion are at risk. Globally about 1.5 billion people are affected by Ascaris lumbricoides children are susceptible to infestation to environmental and socio-economic status which has influence on children health, as risk factors (Shahida Azhar Ali, 2020)

According to the study conducted in geohelminthes in remote areas of RWANDA, BURUNDI and SOUTH SUDAN the analysis of 884 stool was performed and 17.22% of Ascaris lumbricoideswere POSITIVE. Slight environmental differences between three sub Saharan African countries has been observed, however, they were not significant (ECCMID , 2019)

According to the data collected in 2020 from four district located near lack kivu in Rwanda indicated that a total of 4998 children of both sex between 5-15 years 49.9% were positive on Ascaris lumbricoides. (Joseph Kabatende, 2020)

2.3. RISK FACTORS OF ASCARIS LUMBRICOIDES

The Risk factors of Ascaris lumbricoides, 0.8 to 1.2 billion people worldwide are affected, The 1.2 to 10.5 disability life years. The main risk factor is consumption fruit and vegetable contaminated by eggs. Preschool children and school age children; Hypo immunity; Overcrowding; Poverty; Using stools to make fertilizer; Poor health education .(Wali Khan1, 2016)**.** The study conducted in Pakistan show that Ascaris is prevalent in areas with low socio-economic status, poor parental education, occupation, poor personal hygiene, overall result into 0.88% Ascaris lumbricoides, the stick of Ascaris lumbricoides eggs to the vegetable revealed 5.53% of Ascaris lumbricoides and in the soil sample less than 6.3% in Uganda 48.8% in Brazil, 54.1% in Nigeria due to variation in lab technic (Shadiha Azhar ali, 2020). Ingestion of termite mound earth has been reported as risk factor of A. lumbricoides among grade 3 children in South Africa. Evidence from several studies suggests that the risk of transmission due to contaminated food may be increasing as pressures to minimize the use of artificial fertilizer and to conserve water indirectly promote re-use of wastewater as an organic fertilizer and for irrigation of field crops and hothouse garden. In morocco A. lumbricoides prevalence was significantly high in children living pre-urban area where urban

wastewater was used for irrigation (13.3%), compared with children of similar living slandered but where well was used for irrigation (1.7%).(MARILYN E. Scott, 2008)**.** Children from households using wells or rivers were associated Ascaris lumbricoides infection 95% (Dongijan Yang, 2018). The infection is asymptomatic its effect contribute to child morbidity when associated with malnutrition, enteric disease, vitamin A deficiency and pneumonia. In poor country 3 million children die due to enteric disease.(Fernando Ferreira Carneiro, 2002)**.**

A.lumbricoidesis associated with dyspnoea, fever, eosinophilia, and cough known as Loffler's disease caused by migration of larvae to the lungs phase and abdominal pain during migration to the intestinal phase. Features of Ascariasis are: eosinophilia, master cell hyperplasia and high level circulating Immunoglobin E. the study conducted Effect of Ascaris lumbricoides infection on T helper cell type two in rural Egyptian children was indicated that high level of Il-4 and Il-5 found in school aged children as the main mediator immunity of host response to A. lumbricoides.(Naglaa M Shalaby, 2016)

2.4. LEVELS OF ASCARIS LUMBRICOIDES

The study conducted in Zambia about prevalence, intensity and factors associated with soil transmitted helminths infections among children most of them with helminthic infection were females 52.5%, most of guardians were married 79.7%, employments status of guardians were 18.6% (Sibongile Tembo, 2019). STH also occurs in high income countries among vulnerable population who are not reached by public health measures. Infection has been reported as 5 months of age and both the prevalence and intensity increase rapidly with age. Among Zanzibar enfant the prevalence of A. lumbricoides increased from approximately 7% in the 5 to 9 month old children to about 20% in enfant aged 10 to 11 months. The prevalence and intensity typically peak in the 6 to 10 years old age group. (MARILYN E. SCOTT, 2008) Ascaris lumbricoides infect an estimated 10.5 million most commonly pre-school age children , school age children and adolescents in endemic countries over the past 25 year , DALYs(disability adjusted life years)associated with Ascaris have dropped to around 1 million , now a quarter of the burden in 1990 . Mortality account for approximately one – sixth of the current disease burden, whereas most of the severe morbidity averted is thought

to be due to a reduction in severe wasting although the vast majority of infections occur in endemic countries.(Greenland k, 2015)

2.3.3 Biological data

The human ingest vegetables or fruit contaminated by eggs of Ascaris lumbricoides, in intestine it migrate to lungs then after it back to intestine. The A.lumbricoides it lay the eggs in intestine and eliminated in stool. Stool wascollected from children attending KIBOGORA health centre with symptoms of abdominal pain, caught, fever and dyspnoea. The stool collected analysed by under microscope by using normal saline wet mount method. To observe presence eggs, larvae or both of A. lumbricoides under microscope.(Vinay Khanna, 2014)

2.4 LIFE CYCLE OF A. LUMBRICOIDES

Transmission of Ascaris lumbricoides is accidental contact with soil or vegetables contaminated by fertilized or unfertilized eggs by ingestion. The egg remain in soil period of 10 years capable for infection. Adult worm are pinkish, male measuring 15-31cm with posterior end curved, female worm measure 20-49cm and fertilized eggs contain second stage larvae 50-70*40-50μm as infective stage. In jejunum egg hatch and release larvae, in few hours of ingestion. Larvae pass intestinal mucosa through lymphatic system into portal vein to liver within 2-8 days. Larvae move through the heart to the lungs and penetrate capillary wall entering into the alveoli stay there 10 days they moult for making fourth stage larvae. Theget back to the trachea and pharynx. (Kanaan al-tameemi, 2020)

Egg pass through oesophagus to the intestine where they arrive small time and became mature in 14-20 days. Adult worm female and male are formed after malting the female worm release millions of eggs in stool after 70 days of ingestion of contaminated food or drink by eggs. The shell of eggs give ability to resist to environment condition and remain in soil up to 6 years. They can be carried by wind in contaminated wind to affect new person. Eggshell composed by:lipoidal inner layer: which regulates the temperature of larvae, chitinous middle layer: which protect larvae from environmental conditions, The outer layer of protein: it give larvae ability to penetrate to other object. (Kanaan al-tameemi, 2020).

2.5.CLINICAL SIGNIFICANCE

The incubation period of parasitic worm is 2 weeks in respiration phase and 2 months in intestine phase develop. The symptoms are light like abdominal comfortable in both human and pig but in case of heavy infection it causes intestinal blockage and children growth impair. Major clinical sign includes: cough due to migration of eggs in respiratory some time coughing up worm, fever, wheezing, nausea, vomiting, loose of appetite, shortness of breath, abdominal swelling, abdominal pain, pneumonia, anaemia, malnutrition, loffer's syndrome, cholangitis from gall bladder obstruction, cholecystitis, biliary coli, liver abscess, and pancreatitis. (Pa, 2016)

2.6. MATERIAL AND METHODS

2.6.1.Specimens

321 faecal collected for symptomatic children under10 yearsattending KIBOGORA health centre with same intestinal symptoms like diarrhoea, abdominal pain and vomiting with in period of3month. All stool were analysed by saline wet mount.

2.6.2.Preparation of saline Wet Mounts of stools

Saline wet mount were prepared by mixing well small volume of a stool sample and a drop physiological saline. Apply coverslip on smear and putthe slide on microscope.

2.6.3. Stool Microscopy

Wet mount smear of saline on microscopy was examined initially on (10x) as low power after getting field observing parasite we use (40x) to observe morphology of parasite.

2.6.4. Stool microscope interpretation

We interpret what we were observe under the microscope, the presence of eggs or larvae of A. lumbricoides, No intestinal parasite present and other intestinal parasite.

2.7 .TREATMENT OF ASCARIS LUMBRICOIDES

Medication levamisole, Putantel pamoate, Albendazol, Mebendazore and Piperazine are used to remove parasitic worm from the body. But Albendazore and Mebendazore, are drug of choice for Ascaris lumbricoides species and have few side effect. The infection is treated in period of 1-3 days. Women can use Pyranted pamoate as safe drug because Albendazore and Mebendazore are contraindicative for pregnant patient. Levamisole and Ivermectin5

injectable are used in case suspect Ascaris pneumonia, blockage of intestine caused by large number of worm we use endoscopy to remove worm by surgery. No vaccine available for Ascaris lumbricoides. (LUMBRICOIDES, 2016)

2.8. PREVENTIVE MEASURES

Ascariasis the most common intestinal worm infection, which occurs due to consumption of contaminated water, and raw vegetables contaminated with Ascaris eggs. It is found in association with low personal hygiene and poor sanitation .The parasite is most common in warm and humid climate hence measures such as drinking of boiled water ,avoiding contact with soil contaminated with human faeces, proper washing hands with soap and warm water before handling the food proper washing ,peeling ,or cooking of all raw vegetable and fruits before eating ,particularly those that have been grown in the soil that has been fertilized with manure, will be helpful in preventing the infection. (Angesom hadush, 2016)

2.9.CONCEPTUAL FLAMEWORK

First Of ALL ,we start with definition ; **A variable** is an object, event, idea ,feeling , time period , or any other types of category you are trying to measure.

An Independent variable; is exactly what it sound like. It is a variable that stand alone and isn't changed by other variable you are trying to measure as were as it can cause corresponding change in other variable.

A dependent variable; is exactly what it sound like .it is something that depend on other factors and it can take different value only response to an independent variable.

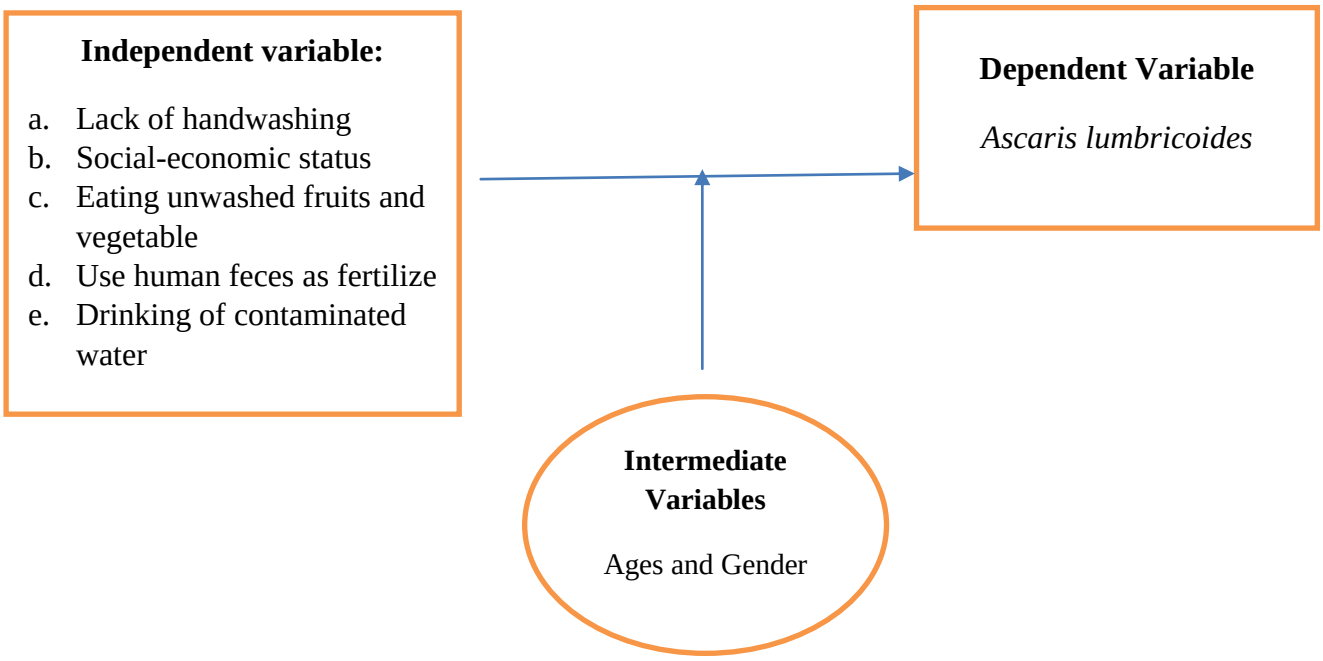

Figure 2: Conceptual framework model

From this figure the dependent variable is Ascaris lumbricoides it depends on independent variables such as lack of handwashing,social-economic status, eating unwashed fruits and vegetable, use human fesses as fertilizer and drinking of contaminated water, Intermediate variables Ages and Gender.

CHAPTER THREE: RESEARCH METHODOLOGY

3.0. INTRODUCTION

This chapter describes the methodology used to carry out this study: study area, study population, sample size, sampling method, study design, instrumentation and data collection procedure.

3.1. RESEARCH APPROACH AND DESIGN

This study adapted a cross-sectional design with quantitative approach. The researchers were interested by this design and approach to quantify and analyze theData collected during this research and presenting the finding as required .data were retrospectively collected from 1st January 2019 -31st June 2022, for one hand, to measure the prevalence, and primary data in order to assess the factors associated with Ascaris occurrence.

3.2.0. TARGET POPULATION

The target populations was 1628 people from children under 10 years with stool wet mount examination results in Kibogora health center from 1ST January2019-31st June 2022

3.2.1 Sampling procedures

Analyses of results wereincluding determination of proportion of patients with Ascarislumbricoidesresults in children under 10 years and its associated risk factors. The minimum sample size to be used to estimate the same proportion with a 95% confidence interval and 95% level of significance, allowing an error of 5%.

3.2.2 Sample size

Sample size was calculated by using the following formula

$$\mathbf{n} = \frac{\mathbf{N}}{(\mathbf{1} + \mathbf{Ne^2})}$$

Whereby **n:** is the sample size, **N:** is the total population, **e:** is the margin of error, N=1628 and the study used the confidence level of 95% that is with a permissible error of 5%, e = 0.05, Therefore$\mathbf{n} = \frac{\mathbf{1628}}{(\mathbf{1+1628\times 0.05^2})}$ **= 321.10** roughly equals to **321**children under 10 years.

3.2.3 Sampling methods

Any children coming for stool wet mount examination was **Systematic sampling** included in the sample size until the desired number of **321**patients was reached.

The sampling interval is calculated using the formula i=N/n

Where N; it's stand population size

N; it's stand for sample size

i; it's stand sampling interval so i=1628/321=5

3.2.4 Inclusion Criteria

To be included in the study population sample, a patient may:

Be request stool wet mount examination

Having known files of test result

Be children of both sex under 10 years.

3.2.5. Exclusion criteria

To be excluded from this population of the study may be ;

- Those above 10 years old
- Those unwilling to participate in this study.

3.3.DATA COLLECTION TOOLS AND PROCEDURE

Data collection tools were computer machine, files, pencil, papers and note book. Data capture sheet used to collect information from patients whose files are available. Stool sample collected from eligible patient of stool saline wet mount examination who are willing to participate in the study, analysed for Ascaris Lumbricoides. It is only when informed consent was provided that data collection was proceed.

3.3.2. ETHICAL CONSIDERATION

Eligible patient with Ascaris lumbricoides were receive details about the study including anonymous sample collection, analysis and confidentiality on results. It is only when

informed consent was provided that data collection was proceed. The informed consent form is under appendices.

3.4. DATA ANALYSIS

The data analysis was consist of determining proportion of patients with Ascaris lumbricoides in children under 10 years analyzed using the Student's $\chi 2$ test and SPSS software version 23. Frequency and percentage were also be used to draw conclusions.

3.5. RELIABILITY AND VALIDITY MEASURES

Validity is the degree to which an instrument measures what you are intended to measures; while Reliability refers to the consistence ,accuracy ,stability ,with which an instrument measures an attribute. In this study the pilot study was conducted thereafter the finding were tested to test sample collection form validity and reliability.

The sample collection form was constructed using concepts from literature following the study variables and this gave it content validity.

CHAPTER FOUR: DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.0. INTRODUCTION

In this chapters the raw data from the patient's files and laboratory logbook are presented, analyzed and interpreted. The result of the study about the prevalence and associated risk factors of Ascaris lumbricoides among children under 10 years old attending Kibogora health center in Nyamasheke district, Rwanda.he chapter also includes the discussion of the result in the light of existing evidence that have been found in the area of interest and this is guided by objective of the study the chapter ends up by summary of findings. The data analysis was done by statistical package for socio science (SPSS) software version 23. And the results were presented using descriptive statistic. Analytical statistic were used to compare independent and dependent variable in other establish the relationship between these variables. For the statistical test p value of < 0.05 was considered as to be statistical significant with 95%.

4.1 DEMOGRAPHIC CHARACTERISTIC OF THE RESPONDENTS

Table 1: Gender of children

	Gender	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Valid	MALE	147	45.8	45.8	45.8
	FEMALE	174	54.2	54.2	100.0
	Total	321	100.0	100.0	

Source: secondary data from 2019-2022

Table 2: Ages group of respondents

	Range of Ages	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Valid	1-3	146	45.5	45.5	45.5
	4-6	100	31.2	31.2	76.6
	7-9	75	23.4	23.4	100.0
	Total	321	100.0	100.0	

Source: secondary data from 2019-2022

Table 2: show the percentage in ages group of respondents where the 1-3,4 - 6 and 7 - 9 their percentage were 45.5%, 31.2 % and 23.4% ,respectively.

Table 3: religion of children

	Religion	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Valid	Christians	294	91.6	91.6	91.6
	Muslims	15	4.7	4.7	96.3
	None	12	3.7	3.7	100.0
	Total	321	100.0	100.0	

Source: secondary data from 2019-2022

Table 3: show the percentage of religion of children where Christian were 91.6%, Muslims were 4.7% and children which had no religion 3.7%.

Table 4: socio-economic category of children

	Socio-economic category	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Valid	Category A	3	.9	.9	.9
	Category B	66	20.6	20.6	21.5
	Category C	80	24.9	24.9	46.4
	Category D	154	48.0	48.0	94.4
	category E	18	5.6	5.6	100.0
	Total	321	100.0	100.0	

Source: secondary data from 2019-2022

The above Table 4: show socio- economic category. among 321 respondents, there are154(48 %) of category D while 80(24.9%) of category C, while66(20.6 %) category B and category E with18(5.6%) while the remaining one is category A with 3(0.9 %).

4.3. THE PREVALENCE OF ASCARISLUMBRICOIDES

This study found that the prevalence of Ascaris lumbricoides among the children under 10 years attending Kibogora health centre from 2019 to june 2022 was 23.7 %

Table 5: distribution of Ascaris lumbricoides in Gender

GENDER		RESULT		
		POSITIVE (%)	NEGATIVE (%)	Total (%)
	MALE	35 (10.9%)	112 (34.9%)	147 (46%)
	FEMALE	41 (12.8%)	133 (41.4%)	174 (54%)
Total		76 (23.7%)	245 (76.3%	321 (100%)

Source: secondary data from 2019-2022

Table 5: show the prevalence of Ascaris lumbricoides in both sex, among 147 male 35(10.9%) with affected while112(34.9) without affected. Where among 174(54%) female 41(12.8%) with affected while 233(41.4%) without affected

4.4THE RISK FACTOR OF ASCARIS LUMBRCOIDS

4.4.1Drinking boil water within the children

Table 6: percentage of drinking boiled water within the children

	Drinking boiled water	Frequency	Percent(%)	Valid Percent(%)	Cumulative Percent(%)
Valid	Always	48	15.0	15.0	15.0
	sometimes	211	65.7	65.7	80.7
	Never	62	19.3	19.3	100.0
	Total	321	100.0	100.0	

Source: secondary data from 2019-2022

:shown in the table above, of children drink boil water where the most of them drink boil water sometimes 65.7%, always 15.0%, and never 19.3%

4.4.2 Wash hands before meal

Table 7: status of handwashing before meal

	Wash hands before meal	Frequency	Percent(%)	Valid Percent(%)	Cumulative Percent(%)
Valid	Always	85	26.5	26.5	26.5
	Sometimes	213	66.4	66.4	92.8
	Never	23	7.2	7.2	100.0
	Total	321	100.0	100.0	

Source: secondary data from 2019-2022

The above table shows the percentages of children wash hands before eating where the most of them wash hands before the meal same times 66.4%, always 85 %, and 23%.

4.4.3 Wash hands after meal

Table 8:status of wash hands after meal

	Wash hands after meal	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Valid	Always	84	26.2	26.2	26.2
	Sometimes	218	67.9	67.9	94.1
	Never	19	5.9	5.9	100.0
	Total	321	100.0	100.0	

Source: secondary data from 2019-2022

The above table show the percentages of wash hand after eating food where the most children wash hands same times 67.9%, always 26.2%, and never 5.9%.

4.4.4 Eating raw food

Table 9:Status of eating raw food

	Eating raw food	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Valid	NO	72	22.4	22.4	22.4
	YES	249	77.6	77.6	100.0
	Total	321	100.0	100.0	

Source: secondary data from 2019-2022

The above table show the percentage of the children eating raw food most of them were like it 77.6% and 22.4% were not eating raw food.

4.4.5 Water source

Table 10; status of water source

	Water source	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Valid	TAP WATER	253	78.8	78.8	78.8
	rivers or ponds	68	21.2	21.2	100.0
	Total	321	100.0	100.0	

Source: secondary data from 2019-2022

The table 10: this table shows the water source used by the children in their home where the tap water used mostly 78.8%, and river or ponds 21.2%

4.4.6 Using animal or human faces as fertilizer

Table 10: using animal or human faces as fertilizer

	Using animal or human faces as fertilizer	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Valid	NO	66	20.6	20.6	20.6
	YES	255	79.4	79.4	100.0
	Total	321	100.0	100.0	

Source: secondary data from 2019-2022

The table 11: shows thepercentage of using animal or human faces were 79.4%, and 20.6% were not use animal or human faces as fertilizer.

4.4.7 Availability of latrines

Table 11: availability of latrines

	Availability of latrine	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Valid	YES	314	97.8	97.8	97.8
	NO	7	2.2	2.2	100.0
	Total	321	100.0	100.0	

Source: secondary data from 2019-2022

The table 12: shows the availability of latrine in children homes were 97.8%, and 2.2% were not have latrines.

4.4.8 Wash hands with soap after defecation

Table 12: wash hands with a soap after defecation

	Wash hands after defecation	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)

Valid	ALWAYS	33	10.3	10.3	10.3
	SAMETIMES	267	83.2	83.2	93.5
	NEVER	21	6.5	6.5	100.0
	Total	321	100.0	100.0	

Source: secondary data from 2019-2022

The table 13:the table shows percentage of children washing hand with a soap after defecation the most them wash hand with soap same times 83.2%, always 33% and 21 %.

4.5 LEVELS OF ASCARIS LUMBRICOIDES

Table 13: distribution of Ascaris lumbricoides in Ages

Age group		RESULT		
		POSITIVE (%)	NEGATIVE(%)	Total (%)
1.	1TO 3	37 (11.5%)	109 (33.9%)	146 (45.5%)
2.	4 TO 6	24 (7.5%)	76 (23.7%)	100 (31.1%)
3.	7 TO 9	15 (4.7%)	60 (18.7%)	75 (23.4%)
Total		76 (23.7%)	245 (76.3%)	321 (100%)

Source: secondary data from 2019-2022

The table 14 :shows the distribution of Ascaris lumbricoides in children in different range of ages where from 1 to 3 years were affected in high number with 11.5%, 4 to 6 years moderately high with 7.5% and 7 to 9 years were 4.7%.

4.6ASSOCIATION BETWEEN VARIABLES

4.6.1 Association between outcome and predictor variables

Table 15; Association between predictor variables and out come

OUTCOME VARIABLES	Pearson Chi-Square	df1	df2	Sig.
DRINKING BOILED WATER	7.099[a]	4	316	.530
WASH HANDS BEFORE THE MEAL	16.526[a]	4	316	.026
WASH HANDS AFTER THE MEAL	24.370[a]	4	316	.001
EATING RAWFOOD	2.411[a]	4	316	.598
WATERSOURCE	8.734[a]	4	316	.056
USINGANIMALFACES OR HUMAN FACES AS FERTILIZER	5.475[a]	4	316	.204
AVAILABILITYOFLATRINE	6.832[a]	4	316	.226
WASH HANDS AFTER DEFECATION	9.504[a]	4	316	.366

Source: secondary data from 2019-2022

*****person's chi-squared Test was used with fisher Tests where appropriate. Significance was set at $p<0.05$ at 95 %.

The table 15: shows the relationship between demographic characteristics and what the children provided as their daily hygiene-related variables. A chi-squared test was used to establish relationship between different variables. The chi-squared shows that there is a statistically significant association between socio-economic category of the children and wash hands before the meal with chi-squared value of 16.526 and p-value of 0.026 and wash hands after the meal with chi-squared value of 24.370 and p-value of 0.001. there was no statistical significant association socio-economic category and water source with chi squared value of 8.734 and p-value of 0.056, using human or animal faces as fertilizer with chi-squared value of 5.475 and p-value of 0.204,drinking boiled water with chi-squared value of

7,099 and p-value of 0.530, eating raw food with chi-squared of 2.411 and p-value of 0.598 and availability of latrine with chi-squared value of 6.832 and p-value of 0.226.

4.6.2 Association between Result and Risk Factors

Table 14:Association between hygiene-related variable and suffering from Ascaris lumbricoides

Ascaris lumbroides / Hygiene related Variable	Pearson Chi-Square	df1	df2	Sig.
DRINKINGWATER	95.631[a]	1	319	.000
HANDSWASHBEFORE	60.692[a]	1	319	.000
HANDSWASHAFTER	38.571[a]	1	319	.000
EATINGLOWFOOD	6.416[a]	1	319	.0120
WATERSOURCE	29.491[a]	1	319	.000
USINGANIMALFACES	6.139[a]	1	319	.014
AVAILABILITY OF LATRINE	.377[a]	1	319	.515
WASHWITHSOAP	40.842[a]	1	319	.000

Source: secondary data from 2019-2022

*person's chi-squared Test was used with Fisher Exact Test where appropriate. Significance was set at $p<0.05$ at 95 %

Table 15:shows the relationship between hygiene-related variable and suffering from Ascaris lumbricoides

The fisher exact test showed that there was a statistically significant association between suffering from Ascaris and hygiene-related variables including drinking boiled water with the chi-squared value of 95.631 and p-value of 0.000, using animal and human feces as fertilizer chi-squared value of 6.139 and p-value of 0.014, wash hands before the meal with chi-squared 60.692 and p-value of 0.000, wash hands after the meal with chi-squared value of

38.571 and p-value of 0.000, eating raw food with chi-squared value of 6.416 and p-value of 0.120, water source with chi-squared value of 29.491 and p-value of 0.000 and wash hands with a soap after defecation with chi-squared value of 40.841 and p-value of 0.000. The fisher exact test showed that there was not a statistical significant association between suffering Ascaris lumbricoides and hygiene-related variable including availability of latrine with chi-squared value of 0.377 and p-value of 0.515.

4.7 DISCUSSION OF FINGINGS

The study has the main purpose to assess the prevalence and associated risk factors of Ascaris lumbricoides among under 10 years old attending Kibogora Health center in Nyamasheke district, Rwanda. It wasound that the prevalence were 23.7% most of them were the females 12.8% while the male are 10.9%. This overcomes with the findings of the study done by (Sibongile Tembo, 2019) where female were females 52.5%

The current study found that prevalence of Ascaris lumbricoides was 23.7% which is higher than in the study conducted in KIE where prevalence of Ascaris lumbricoides were 20%, the one found in recent study conducted by preventive chemotherapy (PC) in Rwanda, western province from four district along lack kivu prevalent of Ascaris lumbricoides were 7.1% and 16.7% of cases were in Africa and the middle-east. Compare to the result of study conducted in Rwanda where Ascaris vary from place to place (Joseph Kabatende, 2020)

This study showed that the relationship socio-economic categories and wash hands before the meal with chi-squared value of 16.526 and p-value of 0.026 and wash hands after the meal with chi-squared value of 24.370 and p-value of 0.001. there was no statistical significant association socio-economic category and water source with chi squared value of 8.734 and p-value of 0.056, using human or animal faces as fertilizer with chi-squared value of 5.475 and p-value of 0.204,drinking boiled water with chi-squared value of 7,099 and p-value of 0.530, eating raw food with chi-squared of 2.411 and p-value of 0.598 and availability of latrine with chi-squared value of 6.832 and p-value of 0.226.

Relationship between cases and risk factors were including drinking boiled water with the chi-squared value of 95.631 and p-value of 0.000, using animal and human feces as fertilizer chi-squared value of 6.139 and p-value of 0.014, wash hands before the meal with chi-squared 60.692 and p-value of 0.000, wash hands after the meal with chi-squared value of 38.571 and p-value of 0.000, eating raw food with chi-squared value of 6.416 and p-value of

0.120, water source with chi-squared value of 29.491 and p-value of 0.000 and wash hands with a soap after defecation with chi-squared value of 40.841 and p-value of 0.000. The fisher exact test showed that there was not a statistical significant association between suffering Ascaris lumbricoides and hygiene-related variable including availability of latrine with chi-squared value of 0.377 and p-value of 0.515.

4.7 SUMMARY OF FINDINGS

A total number of 321 children under 10 years old. Due to description of characteristics, this study found that the prevalence of Ascaris lumbricoides was 23.7%. Where female participant were 174 (54%) while 147 (46%) were the males. The study found 76 cases were confirmed for Ascaris lumbricoides, among those confirmed 41 (12.8%) were females while 35 (10.9%) were males. Based on the level of Ascaris lumbricoides in ages of children from 1-3 years were 11.5%, from 4-6 were 7.5% and 7-9 were 4.7%. The distribution of levels of Ascaris lumbricoidesin gender, the most of them were female with 12.8% while the male were 10.9 %.

The study show that there were more factors that influencing the Ascaris lumbricoides infection in the children under 10 years in Kibogora Health center, the factors were the most of them65.7%were drink boiled water sometimes at home and 19.3% were never drink boiled water at home, 66.4% were wash their hands sometimes before their meals and 7.2% never wash hands before meals.67.9% were wash hands sometimes after meals 5.9% never wash hands after meals, 77.6 % were eat raw food at home, 78.8% were use tap water at their home and 21.2% use rivers or ponds, 79.4 % use human feces as fertilizer.

CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS

5.0 INTRODUCTION

The chapter presents the study conclusion and recommendations, based on the study objectives and research questions, and the research questions. The chapter ends up by the suggestions on future research studies for Ascaris lumbricoides infections.

5.1 CONCLUSION

This study concludes that, the prevalence of ascaris Lumbricoides among children under 10 years old attending Kibogora Health Centre from 2019 January to 2022 june were (23.7%) greater than the one from the study conducted in Rwanda, western from four district along the lack Kivu ascaris Lumbricoides were 7.1% (Joseph Kabatende, 2020). Intervention in aims at Eradication of Ascaris lumbricoides needs to educating children under 10 years old about drinking boiled water, wash hands before and after their meals, wash hands with a soap after defecation and availability person protective equipment during using animal or human faces as fertilizer should be given priority.

5.2 RECOMMANDATIONS

Ascaris lumbricoides is the one serious soil transmitted helminth that affecting children under 10 years old. It is the reason why we recommend:

5.2.1 To Kibogora Health Center

Kibogora Health Centre their health care provider should increase the education of children about the cause and prevention of Ascaris lumbricoides especially in children under 10 years Old.

5.2.2 To Government of Rwanda and local authorities

The Government of Rwanda throughout the ministry of health Rwanda Biomedical Centre (RBC) should reinforce and follow up in case of education of the Kanjongo citizens about the cause and prevention of Ascaris lumbricoides.

The Government of Rwanda will also reinforce for encouraging populations about using personal protective equipment during using animal or human faces as fertilizer and wash hands with a soap before and after meals.

The local authorities will make more effort in case of decentralized water to the population for better hygiene.

5.3. SUGGESTIONS FOR FURTHER STUDY

- A similar study should be conducted in other health facilities of the country to compare the findings in Ascaris lumbricoides among children under 10 years old.
- The local authority will make more effort in case of decentralized water to the population for better hygiene practices
- Other research can examine the risk factors of Ascaris lumbricoides prospectively because our study was limited by the medical records may not have included comprehensive information on Ascaris lumbricoides risk factors.

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APPENDIX

APPENDICES 1: data collection sheet

	TOTAL CASES TESTED FOR ASCARIS LUMBRICOIDES		TOTAL CASES CONFRIMED FOR ASCARIS LUMBRICOIEDS	
	FEMALE	MALE	FEMALE	MALE
2019				
2020				
2021				
(1st January -31st June) 2022				
TOTAL				
GRAND TOTAL				

APPENDICES 2: QUESTIONNAIR

SECTION A: socio demographic information

Table 16: questionnaire of socio-demographic information

	Factor	YES/ NO
Age	…….	
Sex	Female	
	Male	
Religion	Christians	
	Muslims	
	None	
Socio-economic category	Category A	

Category B

Category C

Category D

Category E

SECTION B: risk factors associated by Ascaris

Table 17: questionnaire of risk factors associated by Ascaris lumbricoides

FACTORS	LEVELS	YES/ NO
Wash hands with soap	Always	
	Sometimes	
	Never	
Drinking boiled water	Always	
	Sometimes	
	Never	
Washing hands before meals	Always	
	Sometimes	
	Never	
Washing hands after defecation	Always	
	Sometimes	
	Never	

Eating raw food	Yes
	No
Water source at home	Yes
	No
Using human or animal faces as fertilizer	Yes
	No
Availability of latrine(Toilets)	Yes
	No

APPENDICES 3: INFORMATION SHEET

Dear participant,

We invite you to participate in a research study entitled: the evaluation of prevalence and risk factor associated with *Ascaris lumbricoides* among the children under 10 years old attending Kibogora Health centre in kanjongo sector, Nyamasheke district, Rwanda. We are currently enrolled in the biomedical laboratory sciences at Kibogora Polytechnic in kanjongo sector, Nyamasheke district, Rwanda, and we are in process of writing our research project for bachelor degree. The enclosed questionnaire has been designed to collect information concerned to the risk factor as well.

Your participation in this research is voluntary. You may decline altogether .there are no known risk to participation beyond those encountered in everyday life. Your responses will remain confidential and anonymous. Data from this research will keep as secret, no one other than the researchers will know your individual answers to this questionnaire. If you have any questions about this project, feel free to NIRAGIRE Jeannette: Tel: 0782027285, HAKIZIMANA NIYONSENGA Sylvie: Tel: 0787139423. Thank you for your assistance in this important end over

Sincerely yours,

APPENDICES 4: CONCERT

I understand the provided information and the opportunity to ask questions. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason and without cost. I understand that I will be given a copy of this consent form voluntary to take part in this study.

Participant's signature……dates…….

APPENDICES 5: LETTER STUDENT DISSERTATION PROJECT'S LETTER

KIBOGORA POLYTECHNIC

STUDENT PROJECT'S LETTER

DATE: 11th June, 2022

To whom it may concern;

We write this letter to humbly request you to allow **Mrs HAKIZIMANA NIYONSENGA Sylvie** and **Mrs NIRAGIRE Jeannette** to conduct project work at **KIBOGORA HEALTH CENTER**

The above mentioned are bonafide students of Kibogora Polytechnic pursuing Bachelor's degree in Biomedical Laboratory Sciences.

This candidate is currently conducting a project entitled **" Prevalence of ascaris Lumbricoides and Risk factors associated among children under 10 years old ."**

We are convinced that your institution will constitute a valuable source of information pertaining to their work. The purpose of this letter is to humbly request you to avail them with the pertinent information they may need. We pledge to ensure that all provided information will be used in the strict academic purpose.

Any assistance rendered to the candidate will be highly appreciated.

Approved by:

MUNYANDAMUTSA Fulgence

Head of department/Biomedical Laboratory Sciences

Kibogora Polytechnic