KIBOGORA POLYTECHNIC

FACULTY OF HEALTH SCIENCES

DEPARTMENT OF BIOMEDICAL LABORATORY SCIENCES

PREVALENCE OF AMOEBA SPECIES AND INTESTINAL HELMINTH AMONG CHILDREN UNDER 5 YEARS OLD

Case study: Nkombo Health Center

Period: May 2019- June 2022

Undergraduate research thesis presented in partial fulfillment of the requirements for the Bachelor's degree with honor in Biomedical Laboratory sciences.

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DECLARATION

Declaration by the Candidate

I, NDAHIRO Eric hereby declare that this is my own 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 my own have been duly acknowledged 2019-2022.

Names: NDAHIRO Eric

Signature:

Date :

Declaration by the supervisor

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

Supervisor's name: HITAYEZU Elysee

Signature:

Date:

ABSTRACT

The study aimed to describe the prevalence of amoeba species and intestinal helminths among children under 5 years old attending Nkombo health center. The study's specific objective were 1) To determine the prevalence of amoeba species among children under 5 years 2) To determine the prevalence of intestinal helminths among children under 5 years old, and 3) To assess the various risk factors associated with the amoeba species and intestinal helminths among children under 5 years attending Nkombo health in the period of 3 years from May 20219 –June 2022. Retrospectively cross-sectional study design with both quantitative and qualitative approach was adopted, secondary data were used on the prevalence of amoeba species and intestinal helminths and risk factors was collected from consultation book and laboratory results books, The study include 168 children under 5 years old ,Spss software version 16 was used in analysis of data.

The prevalence of amoeba species and intestinal helminth among children under-five years at Nkombo health center were Entamoeba histolytic 17.3%, Entamoeba coli 2.4%, Ascaris lumbricoides 25.0%, Trichuris trichiura 10.1%, Ankylostoma duodenal 6.0%, Schistosoma mansoni 3.0% and Strongyiloiedes stercolaris 2.4%.

Results from this study has shown that factors associated with the prevalence of amoeba species and intestinal helminthes 66.1% of participant are positive to amoeba species and intestinal helminthes while 33.9% were negative to that parasites, study showed that 64.5% has habit of washing their hand before eating while 35.7% not doing, 35.7% were affected by these parasites during the raining time while 64.3% were affected during summer time. Among these children, 57.1%, drank untreated water while 42.9% drank treated water. Among these children 50% wash their hands after toilette and 50% do not wash their hands after toilette. a chi-squared value of 22.966a and p-value of .000 are for Wearing shoes, use human feces as fertilizer with the chi-squared value of 11.031a and p-value of .000, wash hands before eating with the chi-squared value of 27.276a and p-value of .000, wash hands after toilette with the chi-squared value of 49.096a and p-value of .000. And water treatment with the chi-squared value of 29.263a and p-value of .000. In conclusion all these risk factors were significant to the prevalence of Amoeba species and intestinal helminth at Nkombo health center. From the findings of this study, it is factual to recommend the local authority will make more effort in case of decentralized water to the population for better hygiene practices.

DEDICATION

To the Almighty God

To my parents

To my sisters and brothers

To my classmates and friends

ACKNOWLEDGEMENTS

First and foremost I thank almighty God for keeping me in a good health condition throughout this project.

Special thanks go to my supervisor; Mr. HITAYEZU Elysee for academic support and critical evaluation during my write-up. He was always concerned about my progress and provided prompt responses whenever I communicated with him.

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LIST OF ABBREVIATIONS AND ACRONYMS

CBEHPP: Community-Based Environmental Health Promotion Program

CHC: Community Health Club

df: degree of freedom

KP: Kibogora Polytechnic

MoH: Ministry of Health

P: p-value

RBC: Rwanda Biomedical Center

STHs: soil-transmitted helminths

WHO: World Health Organisation

X2: chi-square

CHAPTER ONE: GENERAL INTRODUCTION

1.0 INTRODUCTION

Chapter one deals with, the background of the study, statement of the problem, the 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 THE STUDY

Generally, Intestinal parasites are considered a global health concern with enormous dynamics in developing countries, Parasitic diseases caused by intestinal helminths and protozoan, are among the foremost predominant contaminations carrying the tall burden of dreariness and mortality. Concurring to World Health Organization (WHO 2017), Amoebiasis and intestinal helminthiasis are the most intestinal parasite infections that cause death, especially in endemic areas such as the sub-Saharan area, the children are the most the victims of Entamoeba and helminths infection(Hajissa et al., 2022).

In tropical areas especially in the area where sanitation is not well-practiced, there are high Entamoeba infections, *Entamoeba histolytica* causes amoebiasis and it is known as the second parasitic infection that causes the death in the world (Jones et al., 2013), intestinal helminths that are considered to be a public concern are *Ascaris lumbricoides, Ttichuris trichiura, Enterobius vermicularis,* hookworms, tap worms like *t*aenia species and *Hyminolepis nana*.

Globally, over 1.5 billion children are contaminated with one or more intestinal helminths, Additionally, 700 million children were contaminated with hookworm, 807 million children were tainted with *Ascariasis lumbricoides*, and 587 million were *Trichuris trichiura*. Intestinal helminths contaminations are common among children under 5 years old with diverse causes such as playing with soil, sucking fingers, and defecation in an open field, All-inclusive(WHO 2020).

A study conducted In European countries such as Germany, England, Italy Sweden, and Belgium, has shown a 16.9% predominance rate was for Intestinal helminths in children

dwelling in European nations. The same study was conducted in Asia with 25.9% of protozoan and 9.8% helminths(Hailegebriel, 2018). The study done in Iran on the prevalence of intestinal helminth in children indicated that the prevalence of intestinal helminths was 9.48%, whereby *Enterobius vermucularis* occupied a high prevalence of 16.5% among the other intestinal helminths(Tegen & Damtie, 2021).In the African continent, intestinal protozoan parasites among children were 25.8% with *Entamoeba histolytica* and 21.2% Giardia species, and 17.1% *Entamoeba coli* was the most common non-pathogenic protozoa(Hajissa et al., 2022).

In sub-Saharan Africa, The larger part of contaminations is caused by *Ascaris lumbricoides*, hookworm, and *Trichuris trichiura*. Cryptosporidium species, *Entamoeba histolytica*, and *Giardia duodenalis* are the foremost common protozoan contaminations in children who matured for a long time(Kantzanou et al., 2021)In the great region of Rwanda studies done in Uganda indicate that 50% of the children under 5years old were with an intestinal infection where the prevalence of *Ascaris lumbricoides* 17.5%, *Trichuris trichiura* was 7.3% and hook work worm 44.5%(Kabatereine et al., 2001). Research conducted in Rutsiro 2018 on children aged less than 2 years old disclosed the appeared predominance of *Ascaris lumbricoides* 28.5% *Entamoeba histolytica* 25.96% individually. The accessible information for the predominance of Entamoeba contamination in Rwanda is 26% where 16.5% is for males and 8.7% is for females. Helminths contamination is as a rule less lethal but affects children contaminated with them like disabled development, mental hindrance, constant iron deficiency(anemia), diminish school participation and execution, and lessened physical wellness(Butera et al., 2019).

1.2 PROBLEM STATEMENT

The *Entamoeba histolytica* and intestinal helminths are dominant intestinal parasites that cause high mortality and morbidity rate in Africa. It was investigated that *Entamoeba histolytica* and intestinal helminthiasis affect children and their families in different aspects. Socially, children experience intestinal discomfort day and night and keep visiting the hospital for acquiring health care facilities. This affects the education status of children because they do not go to school. After all, it merits most of their time is went through within the clinic. The financial status of the family falls because parents spend much time and cash for paying well-being administrations for their children and in the long last, they don't lock in on their improvement activities hence

poverty. Worldwide assets of 100 million school-going children have the issue of stunting due to intestinal worms(Teshale et al., 2018).

These contaminations actuate issues in children such as chronic anemia, malnutrition, and mental and physical impede growth. There are distinct risk factors that contribute to intestinal parasite infections; Financial status or ubudehe division, health education, personal hygiene, water treatment, occupation, environment, walking with bare feet, and demographic characteristics, Using human feces as fertilizer, are all the risk factors that put children at risk of being infected. Rwanda MoH established a Community-Based Environmental Health Promotion Program (CBEHPP) to form community well-being clubs that were in charge of village-based wellbeing education (WHO 2010).

These clubs were doled out obligations of direction people on how down and out cleanliness has interrelated with overwhelming sicknesses and weak wellbeing. Even even though there are achievements of this built-up program to the diminishment of parasitic contaminations in natural districts, the MoH report of 2017 showed up that because it was 42.3% of towns have got advancing working Community health Club (CHCs(Ntakarutimana et al., 2021). Advance, a decade has passed since Rwanda's actualizing WHO's suggestion of preventive chemotherapy to kill soil-transmitted helminths as an open well-being concern by 2020. Even though the set objective was to decrease The predominance to <1% of director overwhelming contaminations, there's still an increment of intestinal parasites among children in provincial ranges of Rwanda (Butera et al., 2019). My study was conducted on patients attending Nkombo health center to identify the prevalence of amoeba species and intestinal helminth among children under 5 years old attendings Nkombo health centers.

1.3 PURPOSE OF STUDY

1.3.1GENERAL OBJECTIVE

The main objective of this study was to determine the prevalence of amoeba species and intestinal helminth among children under 5 years old attending Nkombo health center.

1.3.2 SPECIFIC OBJECTIVES

1) To determine the prevalence of Entamoeba species among children under 5 years old attending Nkombo health center.

2) To determine the prevalence of intestinal helminth among children under 5 years old attending Nkombo health center

3) To assess various risk factors associated with amoeba species and intestinal helminths in the study population.

1.4 RESEARCH QUESTIONS

1)What is the prevalence of Entamoeba species among children under 5 years old attending Nkombo health center?

2)What is the prevalence of intestinal helminth among children under 5 years attending Nkombo health?

3)Which various risk factors are associated with amoeba species and intestinal helminths among children under 5 years attending Nkombo health center?

1.5 SIGNIFICANCE OF THE STUDY

1.5.1 Researcher

I hope that future researchers will use this research as their reference and take care of what I did not mention in order to continue to have a family without intestinal worms.

1.5.2 Kibogora Polytechnic

Many people especially those who work and study heath science will use this research in the study and prevention of parasitic species according to the findings of this study.

1.5.3 Nkombo health center

Residents, officials, and other visitors to Nkombo Health Center will learn about the health status of their children in terms of intestinal worms and measures to be taken against them as they are a threat to the future of the babies.

1.5.4 Ministry of health

Rwanda's Ministry and other affiliated agencies such as RBC, and other stakeholders should use my findings as a planning tool for setting strategies to eradicate parasitic infections.

1.6 LIMITATIONS OF THE STUDY

Some of the obstacles I encountered were travel problems because reaching the Nkombo island required a boat and was not always available, the other being some people who refused to share information with us.

1.7 SCOPE OF THE STUDY

1.7.1 Time scope

The study was conducted, from May 2019- June 2022 at Nkombo Health center and was tested for the prevalence of amoeba species and intestinal helminth among children under 5 years.

1.7.2. Geographical scope

The study carried out in the department of the laboratory at Nkombo health center, located in the Western province, Rusizi district, Nkombo sector. The research work will locate in the field of the parasitology department.

CHAPTER TWO: LITERATURE REVIEW

2.0 INTRODUCTION

This second chapter cover the Definition of Key terms, the overview of relevant literature on the level of Entamoeba species, Determine the prevalence of intestinal helminth among the study population, and the Risk factors associated with Amoeba species and intestinal helminths.

2.1. DEFINITION OF KEY CONCEPTS/TERMS

Intestinal helminthiasis: is a macroparasitic disease that affects the human gastrointestinal tract.

Entamoeba histolytica: is facultative anaerobic amoeba species that is found in the phylum of protozoa and it is only one pathogenic organism among all amoeba species that causes Amoebiasis.

Amoebiasis: simply, it is the infection of *Entamoeba histolytica* in the human being or other primates.

Prevalence: refers to the percentage of particular disease cases found in the population of a certain area.

2.2. LITERATURE RELATED TO AMOEBIASIS

Amoebiasis is a condition due to the disease caused by the protozoan parasite among single adaptable cell species of Entamoeba species. The disease is still considered a major open health problem in the developing nations of the world. It was reported that the prevalence of intestinal parasite infection in school children of sub-Saharan countries of Africa is 90% in central Sudan. 27.7% to 95% in Ethiopia, 48.7% in Tanzania, 50% in Rwanda, and 84.7% in Burkina Faso (Hailegebriel, 2018). Among the four species of Entamoeba found within the human gastrointestinal tract, *Entamoeba moshkovskii*, *Entamoeba coli*, *Entamoeba disper*, and, *Entamoeba histolytica* is respected as the intrusive sort due to their intestinal tissue dissolving carnivorous potential, thus of therapeutic significance(Nyeke et al., 2010).

The protozoan *Entamoeba histolytica* causes amoebiasis. Among four species of intestinal amoeba that affect human being *Entamoeba histolytica* is most symptomatic diseases.

Entamoeba dispar is nonpathogenic, and *Entamoeba moshkovskii* is detailed progressively, but its pathogenicity is vague. These living beings are spread through the oral-fecal course. The tainted blisters are frequently found in sullied nourishment and water. Rare cases of sexual spread have also been reported(Saidin et al., 2019) .

2.2.1 LIFE CYCLE OF ENTAMOEBA HISTOLYTICA

The life cycle of *Entamoeba histolytica* started by ingestion of developed blisters in fecally contaminated nourishment, water, or hands. Excitation happens within the little digestive system and trophozoites are released, which move to the huge digestive system. The trophozoites increase by binary fission and create cysts, which are passed within the feces. Since of the protection conferred by their walls, the blisters can survive days to weeks within the outside environment and are dependable for transmission. (Trophozoites can too be passed in diarrheal stools, but are quickly crushed once the exterior of the body, and in case ingested would not survive introduction to the gastric environment.) In numerous cases, the trophozoites stay limited to the intestinal lumen (: noninvasive disease) of people who are asymptomatic carriers, passing blisters in their stool. In a few patients, the trophozoites attack the intestinal mucosa (: intestinal illness), or, through the circulatory system, extraintestinal sit (Kumanan, 2018).

2.2.2. Signs and symptoms of Entamoeba histolytica

About 10%-20% of people infected with *Entamoeba histolytic* become ill, those individuals may produce the following symptoms and signs: Early symptoms (in about 1-4 weeks) include loose stools and mild abdominal cramping and If the disease progresses, frequent, watery, and/or bloody stools with severe abdominal cramping (termed amoebic dysentery) may occur. Also if the trophozoites reach the intestinal walls and go through them, symptoms of liver infection such as liver tenderness and fever are the initial signs and symptoms of liver abscess formation. Other organs (heart, lungs and brain may produce symptoms specific to the organ and produce severe illness and/or death. The other sign and symptoms are: Abdominal tenderness and/or stomach pain, Tenesmus, Flatulence, Appetite loss, Weight loss, Fatigue, Anemia and Occasionally it may cause skin lesions(Izere et al., 2021).

2.3. INTESTINAL HELMINTH

Helminths are worm-like intestinal parasites that live interior of the digestive system and feed on the host, causing the contaminated individual to end up malnourished and vulnerable to illness and chronic disease, Parasitic diseases, especially intestinal helminths, cause hundreds of thousands of avoidable passing each year, and are among the world's most common infectious diseases. Intestinal helminths are more prevalent throughout the tropics, particularly among poor communities(Tadesse, 2005) children are one of the groups at high risk for intestinal parasitic contaminations. The unfavorable impacts of intestinal parasites among children are assorted and alarming. Intestinal parasitic diseases have detrimental effects on the survival, craving, development and physical fitness, school participation, and cognitive performance of school-age children(Gashaw et al., 2015).

2.3.1. Common intestinal helminth

A. Ascaris lumbricoides

It has a worldwide distribution and its spread occurs through the fecal pollution of the environment. The adult worm is the largest (20-35 cm) of the common intestinal nematodes of man. It is bright or pink in color, and the posterior end of the male is curved ventrally with a pair

of copulatory spicules without a gubernaculum. The female has a vulvar waist situated mid-ventrally. A person becomes infected by ingesting its infective eggs through contaminated food or by eating with contaminated hands. The most common symptoms are vague abdominal discomfort, acute colicky pain in the epigastric region, poor digestion, diarrhea, and fever. The wandering worms may cause symptoms like acute appendicitis, gastric or duodenal trauma, oesophageal perforation, severe involvement of the genito-urinary tract of males and females; and invasion of the heart(Scott, 2008).

B. **Hookworm**

Its infection is caused by *Ancylostoma duodenale* and *Nectar americanus*, with *Ancylostoma* as the predominant species. Hookworm species have a worldwide distribution, mostly in areas with moist, warm climates where larvae can survive in the environment. Both *Necator americanus* and *Ancylostoma duodenale* are found in Africa, Asia, Australia, and the Americas. The infection is spread by the fecal pollution of the soil. The infection occurs when the infective filariform larvae penetrate the skin. Hookworm resides in the intestine and sucks blood, leading to iron deficiency anemia and chronic blood loss (Fagbuaro et al., 2006).

C. Strongyloides stercoralis

It is endemic in many tropical and sub-tropical countries. The infection occurs by the penetration of the skin by the infective filariform larvae. In immuno-competent hosts, it is generally asymptomatic or it produces minimal symptoms. But in immunocompromised hosts, it produces a potentially life-threatening infection called the hyperinfection syndrome. The common symptoms are upper abdominal burning or pain, diarrhea, constipation, cough, rash, red hives near the anus, vomiting, and weight loss.(Chelkeba et al., 2020)

D. **Trichuris trichiura**

Trichuriasis, also known as whipworm infection, is an infection by the parasitic worm *Trichuris trichiura* (whipworm). It is common in moist, warm climates. Its infection is spread by ingesting its infective eggs through contaminated food or by eating with contaminated fingers. If the infection is only with a few worms, there are often no symptoms. In those who are infected with many worms, there may be abdominal pain, nausea, vomiting, headaches, sudden, unexpected

weight loss, fecal incontinence, tiredness, and diarrhea. Diarrhea sometimes contains blood. In children, it can cause chronic diarrhea and intestinal ulceration with blood and mucus.

2.4. VARIOUS RISK FACTORS ASSOCIATED WITH AMOEBA SPECIES AND INTESTINAL HELMINTHS

2.4.1. socio-economic status

Proper cleanliness and sanitation continuously cost much. The riches category of the people permits him to manage it or not. Regularly, natural contamination of soil-transmitted helminths (STHs) incorporates a closer relationship with the level of poverty in society. This often means that; open stool transfer is likely to happen due to a need for a modernized pit toilet. The children in a range get a disease when they get in contact with stool-contaminated soil. A few parasites like hookworms, *Strongyloides stercolaris*, and Schistosoma species contaminate the entrance of the skin of barefooted people.

Children are at high risk of being infected with the larval arrangement of parasites like hookworms and *Strongyloides Stercolaris* when they are playing or strolling in parasites sullied soil. Distinctive considers appeared that financial status is the hazard figure for protozoa like Amoebiasis and intestinal helminthiasis. For illustration, the diary of tropical medication detailed that individuals of the lower and center class(farmers most of the time) have 68% of all amoebic contaminations due to missing the implies of practicing cleanliness legitimately(Kumanan, 2018). World Bank report of 2009 showed that 51% of the sub-Saharan African population lives on less than 1.25$ and 73% live on less than 2$ per day. to this report, the economic status of people contributes to the spread of Entamoeba histolytica and soil-transmitted helminths infection among the population(Hategekimana et al., n.d.).

The government of Rwanda established ubudehe categorization as a key role to determine the flow of government resources with the aim of social protection. Ministry of local government launched new ubudehe divisions of four categories; 1, 2, 3, and 4 in 2015, these categories were formulated by basing on the wealth and well-being of the people (Paper, 2017).

Afterward in 2021 Rwandan ubudehe categories were newly updated based on the level of pay of the families, this updating of categories came up with five sequential order categories; A, B, C,

D, and E family which is within the category 'A' gains over 600 thousand per month, family in category 'B' gains between 65 to 600 thousand, family in category 'C' wins between 45 to 65 thousand Rwandan francs, family within the category 'D' gains less or rise to 45 thousand Rwandan francs, family in category "E" are supported, families(Izere et al., 2021)Wealth, well-being, and income of people are considered as health determinants that may or not expose people to numerous infectious microbes with intestinal parasites included.

2.4.2 Using human feces as fertilizer

Numerous individuals utilize human waste as a rural fertilizer, frequently called "night soil." On the off chance that the waste isn't properly treated, the utilization utilizes of night soil may advance the spread of infectious infections. They suspected that night soil utilization may encourage the spread of the water-borne illness, schistosomiasis, as a few schistosomiasis eggs can survive within the environment for weeks, in-rural China in arrange to see in case the sum of night soil utilized in a town was related to schistosomiasis. The study was conducted in a range where schistosomiasis reemerged and endured despite a forceful disease control program. They found half of the family units detailed utilizing night soil—it was utilized on all major crops and by individuals over the socio-economic range. they too found that night soil utilization was strongly related to schistosomiasis disease(Carlton et al., 2015).

2.4.3. Demographic characteristics

Children are highly risked at being contaminated and infected with intestinal parasites. Unlike adults who know that environment is dirty, children or infants do not. Individuals of this age group are easily contaminated by the soil and another object that are reservoirs of intestinal pathogenic parasites. Babies get infected, provided that they will ingest objects that harbor parasites.

Referring to the study conducted in Ethiopia on schoolchildren, they found that children aged 2-5 years old had a high prevalence of intestinal parasites than other age groups. On the other hand, males had a high prevalence of 55.9% and females had 44.1% out of 170 participants. They also showed that *Entamoeba histolytica/dispar* had a high prevalence of 13.8% followed by hymenolepsis nana at 9.2%, and *Ascaris lumbricoides* at 5.9%.

2.4.4 Climatic period change

As a result of natural alter, it is anticipated that shifts in temperature and precipitation designs will impact parasite communities and there have unpredictable effects. Parasites play a crucial part in environments but there's as it were limited quantitative information that describes the impacts of natural parameters beneath characteristic conditions.

The distribution of *Entamoeba histolytica* and pathogens intestinal helminths will be specifically influenced by worldwide warming, In common, transmission rates of parasites and pathogens are anticipated to extend with expanding temperature. Prove recommends that the harmfulness of a few pathogens intestinal helminths and some Entamoeba species may moreover increment with worldwide warming(Harley et al., 2006).

2.4.6. Drinking unsafe water

Drinking properly treated water is lifesaving unless treated as life-damaging. Varieties of parasites are thrown into the water by us and some of those parasites continue their life cycle to get their maturity. Open defecation in or around water bodies is considered the main way of

water contamination. Among affordable ways to make water safe for drinking are to add chemicals or apply heat that can kill pathogenic parasites

The cross-sectional study conducted in the Rutsiro district was performed on 353 children less than 2 years, and the results showed that Ascaris lumbricoides was having a high prevalence of 28.5%, Entamoeba histolytica was the second parasite that induce the infection in the 25.95%. Approximately one in two children was infected with at least one intestinal parasite. The children who used to drink untreated water were having a high prevalence of intestinal helminth infection at 50%(Butera et al., 2019).

2.4.7. Hand washing habit

Hands act as enemies of the owner. Understanding it requires everyone to recognize numerous pathogenic parasites, how are distributed in the environment, and their route of entry to infect human beings. Hands are the important body part used in our daily activities. Unfortunately, hands get in contact with microbes and those germs finally are ingested during eating by using unwashed hands

Contamination of hands often occurs during shaking hands, visiting toilets, touching on contaminated objects, and when children are playing in contaminated soil of the endemic area. Individuals who do not have a habit of handwashing are likely to be infected with different communicable diseases with intestinal parasites included. Different studies signified the lack of washing hands as a special risk factor for parasite infections.

The mapping of intestinal parasitic infection in 2020 identified that the people who habitually wash their hands are less likely to be infected with intestinal parasites while those who do not, expressed multiple numbers of infected individuals. From this mapping, 38% of participants who wash their hands were infected while 63% of people who never wash their hands were infected with intestinal parasites (Izere et al., 2021).

2.5. MODE OF TRANSMISSION

Intestinal helminths are mostly transmitted when an individual comes in contact with infected feces that is to say either by contaminated soil, food, or water. Same parasites remain in the

intestines and others move outside the intestine to colonize other organs. The development of tapeworms and roundworms takes place in the human body and lays eggs, produced eggs pass out of the body through feces and infect another human (Nzeyimana et al., 2018). Open disposal of cyst-contaminated stool leads to contamination of food and water that people consume and get infected by Entamoeba species. Intestinal helminths like hookworms and *Strongyloides Stercolaris* infect humans by penetrating the skin.

2.6. LABORATORY TECHNIQUE

Microscopically, protozoa and intestinal helminths are diagnosed in the stool of the patient directly and/or by applying concentration techniques. Kato Katz is a suitable concentration technique used in research and it is recommended for freshly formed stool to count the number of eggs per gram of stool sample, this concentration technique is more sensitive than direct stool examination techniques. The above-mentioned techniques were used hand in hand to increase sensitivity. Direct wet mount methods saline and iodine wet mounts are suitable for detection of trophozoites and cysts respectively in watery stool and motile larvae of *Strongyloides stercolaris* and hookworms.

2.7. TREATMENT

Mass drug administration program for the prevention of intestinal helminths infection among children, albendazole 400 mg for single-dose and mebendazole 500 mg single dose are currently administered to children at high risk of infection. WHO proposed to set the affordable cost of ivermectin to be used as preventive chemotherapy for *Strongyloides stercolaris* (WHO, 2020). A symptomatic patient is treated with metronidazole and tinidazole(Obayes AL-Khikani, 2020).

2.8 CONCEPTUAL FRAMEWORK

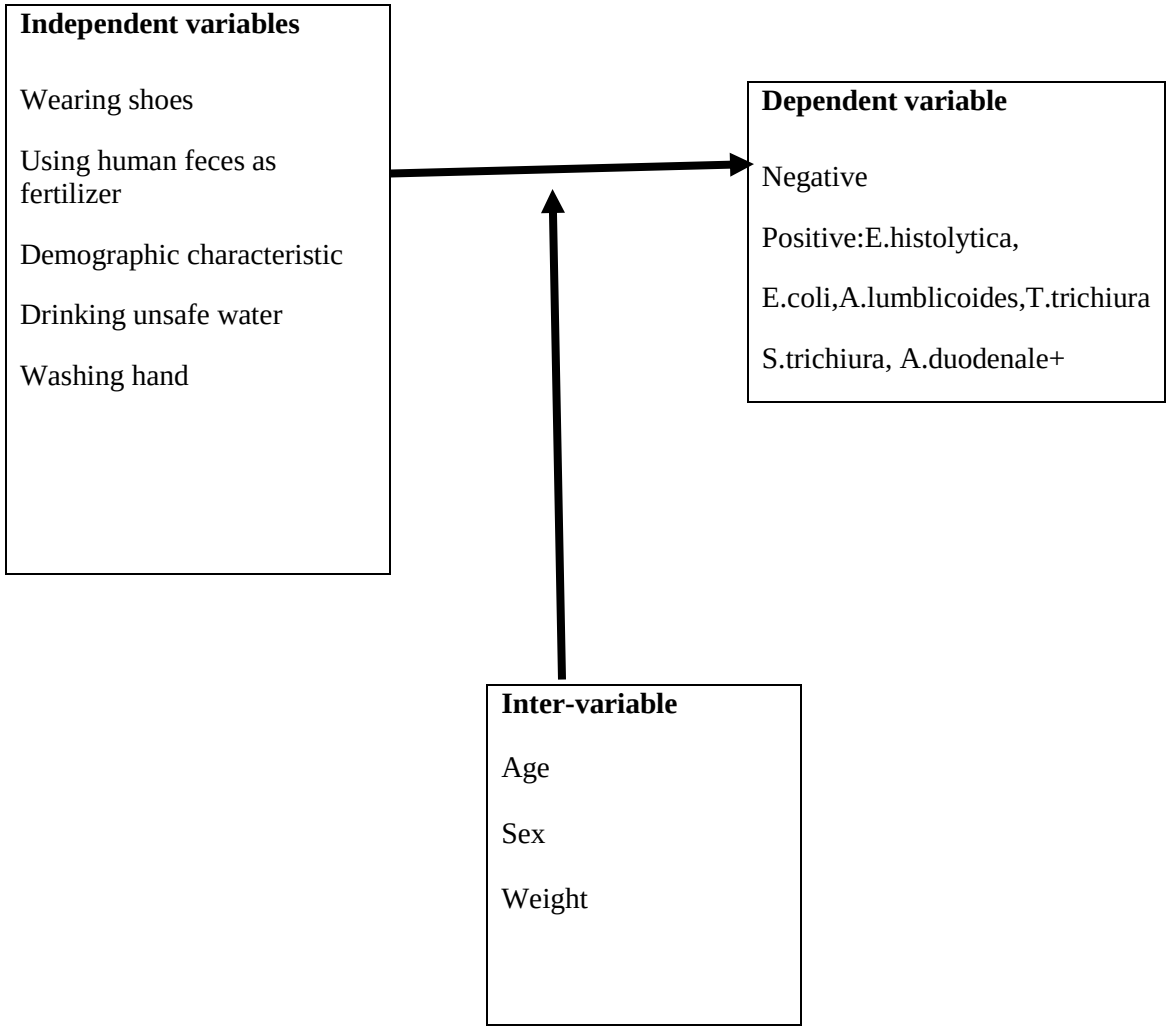

Figure 1: *Conceptual framework*

Many of the group's gastrointestinal infections have been exposed to potential risk factors such as drinking unsafe water, improper handwashing, parent occupation, socioeconomic status, and demographic characteristic. Independent variables cause-effect to the dependent variable.

2.9 RESEARCH GAP

Previous studies have been conducted about amoebiasis and intestinal helminthes but researcher are not interested on evaluating the results from verbal immunizations that has been taken in previous years (Jones et al., 2013).

In Rwanda there are various studies done locally according to the matter of interest on certain areas but there are not recent studies at least on provincial level and national levels done. So this gap research have to collect and know the prevalence and most prevalent intestinal helminthes on large community.

CHAPTER THREE: RESEARCH METHODOLOGY

3.0 INTRODUCTION

This chapter describes the research approach and design, target population, sampling procedure, inclusion and exclusion criteria, sample size, research instruments, ethical issues, and data analysis**.**

3.1. RESEARCH APPROACHES

The study used a mixed approach to address quantitative research questions and research questions that are qualitative. The data will then be analyzed using statistical SPSS software to arrive at results.

3.2. RESEARCH DESIGN

The research design was retrospectively cross-sectional conducted from May 2019-June 2022, and secondary data were used to evaluate the prevalence of Entamoeba species and Intestinal helminth among children under 5 years attending Nkombo health center, in Nkombo sector, Rusizi district, western province and associated risk factors were conducted by questionnaire.

3.3 TARGET POPULATION

The target population of this study was all the children under 5 years attending Nkombo health center during the period (May 2019-June 2022) . Patients in this period were 290.

3.3.1 Inclusion criteria

Children under 5 years attending Nkombo health for the reason of being suspected of gastrointestinal parasites were included in this study.

3.3.2. Exclusion criteria

Children who requested other laboratory exams were excluded and those above 5 years were excluded from this study.

3.4. SAMPLING PROCEDURE

A simple random sampling method was used to select the participants the interval of participants is calculated by dividing the population size by the desired sample size. chosen. data were collected according to patient's age, sex, laboratory reports, and also The questionnaires helped to assess the different risk factors associated with intestinal parasitic infections such as social-economic status, health education, hand washing, , and were to determine the risk factor with the help consultation book, and laboratory book results with children under the age of five who were attended Nkombo health center at that time.

3.5. SAMPLE SIZE

This study would be carried out on a sample of 290 people which covers the minimum sample size of 168 persons, which was obtained from a calculation using the below formula

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

, $n = \frac{290}{1+290(0.05)2} = 168$

, Where: ***n*** = Sample,

e =Margin error (5%) and

N= Population

3.6. RESEARCH INSTRUMENTS FOR DATA COLLECTION

Questionnaire was used as tool for collecting associated risk factors ,this questionnaire was contain needed information such as age, sex, wearing shoes ,using human feces as fertilizer, period, ubudehe division,water treatment, washing hand after toilet, washing hand before eating.

3.7. ETHICAL CONSIDERATIONS

For carrying out the study, written permission was granted by Kibogora Polytechnic and the Faculty of health science, Department of Biomedical laboratory science the authorities of Nkombo health center. The targets of the study were clearly explained to the participants and those who agreed were asked to sign an consent form. Written educated consent was gotten from the guardians of the children. The consent form was written in English but translated into Kinyarwanda so that the participant be able to understand well the questions, The right to privacy and confidentiality was respected.

3.8. DATA ANALYSIS

The data collected were analyzed using the statistical package for the social sciences (SPSS) software version16. Descriptive statistics will be used to explain my study sample by basing on socioeconomic status, demographic characteristics, and other risk factors, the chi-squared test was used with a confidential interval of 95% and a significant level of < 0.05%

3.9 RELIABILITY AND VALIDITY MEASURES

Reliability is the quality of how reliably a strategy measures something. In case, the same result can be reliably accomplished by utilizing the same strategies under the same circumstances. the lower the degree of mistake, the higher the unwavering quality meaning that the investigation device is more precise. While Validity refers, to how precisely a strategy measures what it is planning to a degree. On the off chance that inquires about has tall legitimacy, which means it produces comes about that compare to genuine properties, characteristics. Both helped conduct my research about the prevalence of amoeba species and intestinal helminths among children under 5 years old attending Nkombo health center.

CHAPTER FOUR: DATA PRESENTATION, ANALYSIS, INTERPRETATION

4.0 INTRODUCTION

Chapter 4 contains data obtained from the patients that have to be presented, analyzed, and interpreted. The chapter gives an overview of the results and discussion. The results are presented in terms of tables relating the study findings with the objectives of the study. The results on the prevalence of amoeba species and intestinal helminth among children under 5 years old attendings Nkombo health centers, in western Rwanda. The findings from the study are discussed by the existing evidence that has been found in the same area of interest, the chapter also contains a summary of the findings. Microsoft excel and statistical package for social sciences (SPSS) software, version 16, were engaged in the analysis of the data. A p-value of < 0.05 was considered statistically significant with 95%, to establish a relationship between variables.

4.1 DEMOGRAPHIC CHARACTERISTICS OF PATIENTS

Among 168 children that were enrolled in this study, 21.4% had 1 year old, 29.8% had 2 years, 15.5% had 3 years old, 18.5% had 4 years old and 14.0% had 5 years old. 46.4% of them were male while 53.6% were female. Among them 23.2% belong to the 1st division, 56% belong in the 2nd division, 20.2% belong to the 3rd division and 0.6% belong to the 4th division. as shown in the below table.

Table 1: Demographic information

	Characteristic	Frequency	Percentages
Ages	1years old	36	21.4
	2years old	50	29.8
	3years old	26	15.5
	4years old	31	18.5
	5yeras old	25	14.9
Gender	Male	78	46.4
	Female	90	53.6
Ubudehe Division	1	39	23.2
	2	94	56.0
	3	34	20.2
	4	1	0.6

4.2 PREVALENCE OF AMOEBA SPECIES AND INTESTINAL HELMINTH

Table 2: Prevalence of amoeba species and intestinal helminth

	Frequency	Percent	Cumulative Percent
E.histolytica	29	17.3	17.3
A.lumblicoides	42	25.0	42.3
T.trichiura	17	10.1	52.4
A.duodenale	10	6.0	58.3
S.mansoni	5	3.0	61.3
S.stecolaris	4	2.4	63.7
E.coli	4	2.4	66.1
NEGATIVE	57	33.9	100.0
Total	168	100.0	

Among amoeba species and intestinal helminth the prevalence were: *Entamoeba histolytic* 17.3%, *E,coli* 2.4%, *Ascaris lumbricoides* 25.0%, *Trichuris trichiura*10.1%, *Ankylostoma*

Duodenal 6.0%, *Schistosoma masoni* 3.0% and *Strongyloides stericolaris* 2.4%. As shown in the above table

4.3 PREVALENCE OF AMOEBIASIS AND INTESTINAL HELMINTH

Table 3: Amoebiasis and Intestinal helminths Status among patients under study

	Frequency	Percent	Cumulative Percent
POSITIVE	111	66.1	66.1
NEGATIVE	57	33.9	100.0
Total	168	100.0	

In general, I found children with positive for AMOEBIASIS and intestinal helminth were 66.1% and 33.9% were negative as shown in the table above.

4.4 RISK FACTORS ASSOCIATED WITH AMOEBIASIS SPECIES AND INTESTINAL HELMINTH

4.4.1 Wearing shoes

Table 4: Wearing shoes

	Frequency	Percent	Cumulative Percent
YES	120	71.4	71.4
NO	48	28.6	100.0
Total	168	100.0	

Among them, 71.4% were wearing shoes while 28.6% were not wearing shoes as shown in the table above.

4.4.2 Children affected by this parasite for the climatic period time

Table 5: Children affected by this parasite during raining and summer time

	Frequency	Percent	Cumulative Percent

	Summer	108	64.3	64.3
	Rain	60	35.7	100.0
	Total	168	100.0	

In this study, 35.7% were affected by these parasites during the raining time while 64.3% were affected by these parasites during summer time.

4.4.3 Water treatment

Table 6: Water treatment

		Frequency	Percent	Cumulative Percent
Valid	NO	72	42.9	42.9
	YES	96	57.1	100.0
	Total	168	100.0	

Among these children, 57.1%, drank untreated water while 42.9% drank treated water as shown in the table above.

4.4.4 Hands wash before eating

Table 7: Hands wash before eating

		Frequency	Percent	Cumulative Percent
	YES	108	64.3	64.3
	NO	60	35.7	100.0
	Total	168	100.0	

In this study, 64.4% wash their hands before eating while 35.7% do not wash their hands before eating as shown in the table above.

4.4.5 Hands wash after toilette

Table 8: Hands wash after toilette

	Frequency	Percent	Cumulative Percent
YES	84	50.0	50.0
NO	84	50.0	100.0
Total	168	100.0	

Among these, children 50% wash their hands after toilette and 50% do not wash their hands after toilette as shown in the table above.

4.5 RELATION BETWEEN DEMOGRAPHIC CHARACTERISTICS AND RESULT

Table 9: relation between demographic characteristics and result

	Chi-squared value	Significance
Age	1.765[a]	.795
Sex	.023[a]	1.000
Ubudehe division	51.743[a]	.000

Pearson's Chi-square Test was used and the significance level was set at a $p<0.05$ at 95 CI

The association between demographic characteristics and results (positive and negative) in this study was found, Division with the chi-squared value of 51.743a and p-value of .000 were significant to the prevalence of Amoeba species and intestinal helminth at Nkombo health center. While ages with the chi-squared value of 1.765a and p-value of .795 and sex with the chi-squared value of .023a and p-value of 1.000 were not significant as shown in the table above4.6

ASSOCIATION BETWEEN RISK FACTORS AND RESULTS FOR PREVALENCE OF AMOEBA SPECIES AND INTESTINAL HELMINTHS

Table 10: Association between risk factors and results for the prevalence of amoeba species and intestinal helminth

	Chi-squared test	Significance value
Wearing shoes	22.966[a]	.000
Using human fees as fertilizer	11.031[a]	.000
Wash hands before eating	27.276[a]	.000
Hand wash after toilet	49.096[a]	.000
Water treatment	29.263[a]	.000
Period	.048[a]	.866

Pearson's Chi-square Test was used and the significance level was set at a $p<0.05$ at 95 CI.

In the table above, It shows, wearing shoes with chi-squared values of 22.966a and p-value of .000, using human fees as fertilizer with a chi-squared value of 11.031a and p-value of .000, washing hands before eating with the chi-squared value of 27.276a and p-value of .000, wash hands after toilette with the chi-squared value of 49.096a and p-value of .000. And water treatment with the chi-squared value of 29.263a and p-value of .000 all these risk factors were

significant to the prevalence of Amoeba species and intestinal helminth at Nkombo health center. While period with a chi-squared value of .048a and p-value of .866 was not significant.

4.6 DISCUSSION OF THE FINDINGS

This study has the target of determining the prevalence of amoeba species and intestinal helminth among children under 5 years old attending Nkombo health centers, in western Rwanda. The study found that among the study participants the prevalence of *Ascaris lumbricoides* were 25.0% and *Trichuris trichiura* at 10.1% were great than the prevalence of them in Rwanda where *Ascaris lumbricoides* were 17.5% and *Trichuris trichiura* was 7.3% (Kabatereine et al., 2001).

The prevalence of amoebiasis in Rwanda was 50% which is great than my finding at Nkombo where *Entamoeba histolytic* with 17.3% and E,coli with 2.4%, which is 19.7% (Hailegebriel, 2018). Research conducted in Rutsiro 2018 on children less than two years old a long time of age has appeared predominance of Ascaris lumbricoides 28.5% Entamoeba histolytica 25.96% individually which is great than my finding at Nkombo health center were *Ascaris lumbricoides* were 25.0% and: *Entamoeba Histolytic* were17.3% **(**Butera et al., 2019**).**

Referring to the study conducted in Ethiopia on schoolchildren, they found that children aged 2-5 years old had a high prevalence of intestinal parasites than other age groups. On the other hand, males had a high prevalence of 55.9% and females had 44.1% out of 170 participants. Among 168 children that were enrolled in this study, 46.4% of them were male while 53.6% were female(Tadesse, 2005)

At Nkombo health center In general, I found children with positive for Amoebiasis and intestinal helminth were 66.1% and 33.9% were negative. Among them, 71.4% were wearing shoes while 28.6% were not wearing shoes. In this study, 64.4% wash their hands before eating while 35.7% do not wash their hands before eating. The association between demographic characteristics and results (positive and negative) in this study was found, occupation with the chi-squared value of 37.428a and p-value of .000 and Division with the chi-squared value of 51.743a and p-value of .000 were significant to the prevalence of Amoeba species and intestinal helminth at Nkombo health center. While ages with the chi-squared value of 1.765a and p-value of .795 and sex with the chi-squared value of .023a and p-value of 1.000 were not significant.

For the relationship between risk factors associated with Amoeba species and intestinal helminth and result positive and negative. on these parasites were, wearing shoes with chi-squared values of 22.966a and p-value of .000, using human fees as fertilizer with a chi-squared value of 11.031a and p-value of .000, washing hands before eating with the chi-squared value of 27.276a and p-value of .000, wash hands after toilette with the chi-squared value of 49.096a and p-value of .000. And water treatment with the chi-squared value of 29.263a and p-value of .000 all these risk factors were significant to the prevalence of Amoeba species and intestinal helminth at Nkombo health center. While period with a chi-squared value of .048a and p-value of .866 was not significant.

4.7 SUMMARY OF FINDINGS

Among 168 children that were enrolled in this study, 21.4% had 1 year old, 29.8% had 2 years, 15.5% had 3 years old, 18.5% had 4 years old and 14.0% had 5 years old. 46.4% of them were male while 53.6% were female. Among them 23.2% belong to the 1st division, 56% belong to the 2nd division, 20.2% belong to the 3rd division and 0.6% belong to the 4th division. 48.8% of their parent were Famer, 17.9% of their parents were self-employed and 33.3% of their parents were government employers.

In this study the prevalence of Amoeba species and Intestinal Helminth at Nkombo Health Center were: *Entamoeba histolytic* 17.3%, E,coli 2.4%, *Ascaris lumbricoides* 25.0%, *Trichuris trichiura*10.1%, *Ankylostoma duodenal* 6.0%, *Schistosoma mansoni 3*.0% and *Strongyloiedes stecolaris* 2.4%.

At Nkombo health center In general, I found children with positive for Amoebiasis and intestinal helminths were 66.1% and 33.9% were negative. Among them, 71.4% were wearing shoes while 28.6% were not wearing shoes. In this, study 64.4% wash their hands before eating while 35.7%. In this study, 35.7% were the first time affected by these parasites while 64.3% were not the first time. Among these children, 57.1%, drank untreated water while 42.9% drank treated water. Of this, children 50% wash their hands after toilette and 50% do not wash their hands after toilette.

CHAPTER FIVE: CONCLUSION AND RECOMMENDATION

5.0 INTRODUCTION

This chapter deals with the conclusion of the study objectives on the prevalence and risk factors associated with Amoeba species and Intestinal Helminth among children under 5 years old at Nkombo Health Center, in western Rwanda.

5.1 CONCLUSION

Mass drug administration can be a successful approach to the control of STH worms and Amoebiasis. this program in association with other preventive programs like education programs will bring a sustainable answer for the eradication of soil-transmitted helminths; still, the overall prevalence was: Entamoeba Histolytic 17.3%, E,coli 2.4%, Ascaris Lumbricoides 25.0%, Trichuris trichiura10.1%, Ankylostoma Duodenal 6.0%, Schistosoma Masoni3.0% and Strongiloyieds 2.4%. Interventions aiming at the eradication of Amoeba Species and Intestinal Helminth need to focus on educating the population, and addressing occupation- and socioeconomic issues, which are the predictors of hygiene best practices. Wearing shoes, Using human feces as fertilizer, Washing hands before eating, washing hand after toilet, and drinking water treated was the factor which is significant to the prevalence of these parasites. Control programs should focus on the environmental and hygiene factors to reduce the cost of carrying out regular treatment.

5.2 RECOMMENDATIONS

Amoeba Species and Intestinal Helminth are serious intestinal parasites that affect children under-five years old. It is the reason why we recommend:

5.2.1 To Nkombo health center

The health staff of Nkombo health center should increase the education to the entire population about the cause and prevention of Amoeba Species and Intestinal Helminth mainly the parent that has children under 5 years old. I recommend the Kato-Katz technic to be used for the diagnosis of soil-transmitted helminths.

Integrating methods of controlling Amoeba Species and Intestinal Helminth, which include health education to ensure health practices and to reduce risk factors for transmission of Amoeba Species and Intestinal Helminth.

5.2.2 To the Government of Rwanda and Local authorities

To command Schools at Nkombo Island to build sufficient toilets at their schools and provide hygiene-related materials at schools for the prevention of Amoeba Species and Intestinal Helminthes.

The factors that do put these children at risk, need to be further assessed and explored and more data is needed to draw a reasonable conclusion.

Further studies for assessing the effectiveness of Amoeba Species and Intestinal Helminth intervention with chemotherapy are needed using the larger sample size and in different areas of the country to conclude nationally.

The local authority will make more effort in case of decentralized water to the population for better hygiene practices. Proper awareness creations aiming to change the knowledge, attitude, and practices of the community should be strengthened in the study area.

5.3 SUGGESTIONS FOR FURTHER STUDY

- Further research should compare the findings and compare similarities between Amoeba Species and Intestinal Helminthes.
- Other research areas include evaluation of immunization program .
- Further researchers can evaluate the knowledge related to Amoeba Species and Intestinal Helminthes in the ages of 30-40 years old.

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APPENDICES

APPENDIX 1: QUESTIONNAIRE

IDENTIFICATION INFORMATION

Questionnaire on the evaluation of the prevalence of amoeba species and intestinal helminth among children under 5 years old attendings Nkombo health centers, in western Rwanda.

PART ONE: BACKGROUND INFORMATION.

1. Identification number(nimero yahawe)……

2. Age of participant(imyaka y'amavuko)….....

3. Gender of participant (igitsina) M ……F……

4. Socio-economic activities(Akazi kababyeyi):

a. Civil servant
b. Farmer
c. Self employer

5. Ubudehe Categories(icyiciro cy'ubudehe)

a. Category A
b. Category B
c. Category C
d. Category D
e. Category E

PART TWO: FACTORS OF AMOEBA SPECIES AND INTESTINAL HELMITH INFECTION.

6. Drinking unboiled water at home(Munywa amazi atetse)?:

a. Yes
b. No

7. Washing hand before meals(Mukaraba intoki mbere yokurya)?:

a. Yes

b. No

9. Washing hand after toilet(Mukaraba intoki muvuye mubwiherero?:

a. Yes
b. No

10. Using human or animal faces as fertilizer(Mukoresha ifumbire ivuye mu misarani y'abantu n'inyamanswa?:

a. No
b. Yes

Thank you for your participation

APPENDIX 2: PARASITES RESULT FORM

Date of examination……..
Parasitological findings of stool examination
Stool wet mount examination

Table 11: stool analysis form result

Id	Age	Sex	Histolytica	E.coli	Ascaris	Trichuris Trichiura	ankylostoma	schistosoma masoni	negative

APPENDIX 3: STUDENT PROJECT 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 **Mr NDAHIRO Eric** to conduct project work at **NKOMBO 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 amoeba species and intestinal helmith among children under 5years old attendings nkombo health center ."** 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

KIBOGORA POLYTECHNIC
HEAD OF DEPARTMENT
BIOMEDICAL LABORATORY
SCIENCE